

DeLone and McLean Model Testing upon The Information System Implementation of New Student Enrolment at Junior High school Level in Pekalongan City

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Abstract— The information technology based Information System in education has been used in responding the change and as a tool in maintaining efficiency and effectiveness, especially for the online system of new student admission (*PPDB*). The Pekalongan City Education, since 2014, has developed an online junior high school New Student Admission application. This system was built to handle the process of admitting new students, from registration, selection to announcement of selection result. Even though it has been implemented for 6 years, the measurement of the success of implementing *PPDB* online has not been carried out. The purpose of researching is to determine the success of implementing the *PPDB* online information system for junior high school level. The modified DeLone and McLean model was used to measure the success of online *PPDB*. Research respondents were all admin and operators of the online *PPDB* system as many as 92 respondents. The data analysis method for processing variables used linear regression statistical analysis. The test results show that system quality, information quality, service quality, and user satisfaction have a significant and significant effect on net benefits, so that users benefit from the online *PPDB* information system.

Keywords—DeLone and McLean Model, Information System.

1. Introduction

One area that has had the impact of using information technology based information system is education. The information system that supported by information technology has given a positive impact in many sectors, one of it is education. Information system in the field of education is used as a tool to improve management efficiency, and provide benefits that are develop into an effective information system. The information system that is built effectively means that the information system is successful.

The Pekalongan City Education Office, since 2014, has developed an online junior high school level New Student Admissions (*PPDB*) application. This system was built to handle the process of admitting new students, from registration, selection, to the announcement of the selection results. This system was developed to serve the admission process for new junior high school students, as well as a means of delivering information carried out online. The development of an online student admission information system, aims to improve the quality of education services, create a new student admission system that makes it easy for users, with the availability of an accurate school database. This system is used as a means of delivering information to support school performance, as well as providing information services to users. Even though it has been implemented for 6 years, the measurement of the success of online *PPDB* implementation has not been carried out.

DeLone and McLean in 1992 created a model to measure the success of information system. Many researchers have conducted empirical testing of DeLone and McLean's models. The variables used to measure the success of the information system are system quality, information quality,

use, user satisfaction, individual impact and organizational impact [1]. Modification of DeLone and McLean's other researchers have tested the DeLone and McLean's model has been done, which includes variables of service quality, individual impact, and organizational impact are converted into net benefit variables [2].

The results of empirical testing of DeLone and McLean's models show the inconsistency between one another. Several studies have shown that system quality and information quality are significant independent variables on user satisfaction. Other studies have shown that system quality and information quality are independent variables that are not significant to user satisfaction. The inconsistency of the results of testing the DeLone and McLean models carried out by the researchers in several fields of research opens up opportunities for research to be carried out on the different research object.

The aim of the research was to determine the success of implementing the *PPDB* online information system for junior high school, which was developed by the by Pekalongan City Education Office. The method used to determine the successful implementation of the online *PPDB* information system developed by the Education Office in this research adopts a modified DeLone and McLean model, which consist of 6 variables that influence the successful implementation of the system, they are system quality variable, information quality, service quality, use, user satisfaction, and net benefits [5]. Research to measure the success of information system with DeLone and McLean model refers to research conducted by several previous researcher, including [3], [4], [5], [6], [7], [8], [9], and [10].

2. Method

2.1. Information System Success Model of DeLone and McLean Model

DeLone and McLean’s model is one of the frameworks used to evaluate the successful implementation of information systems. The variables use in the modified DeLone and McLean models is system quality, information quality, service quality, use, user satisfaction, and net benefits. In the DeLone and McLean model research, it is stated that the variables of information quality, system quality, and service quality have a positive effect on use and user satisfaction, then the variables of use and user satisfaction have a positive effect on net benefits [2]. DeLone and McLean information system success model can be seen in the following Figure :

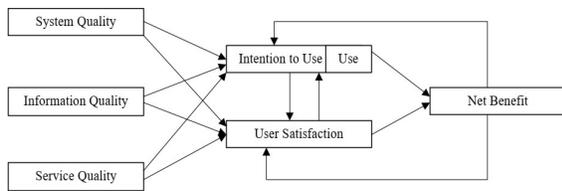


Figure 1 : Update DeLone and McLean Models [5]

This model can be used because it has advantages compared to the previous model, with the addition of quality service, and eliminating individual impact and organizational impact to net benefit. Net benefit advantages show the benefit provided by the system to user needs. Update DeLone and McLean model is carried out to adjust the model with development of technology. This methods has many researchers used the method in measuring the success of the system, that this model is used as the preliminary base hypothesis to be the reference in composing the questionnaire for measuring the success implementation of online PPDB.

2.2. Hypothesis

By DeLone and McLean model the preliminary hypothesis are yielded as the following:

- H₁ : system quality, information quality, and service quality will contribute and give significant impact to the use
- H₂ : system quality, information quality, and service quality will contribute and give significant impact to the user satisfaction.

After the system quality, information quality, and service quality are yielded, hence continued with the hypothesis in determining the relation among the use, user satisfaction, and net benefit.

- H₃ : the use, the user satisfaction will contribute and give significant impact to the net benefit.

- H₄ : system quality, information quality, service quality, and user satisfaction to the net benefit.

- H₅ : user satisfaction is an intervening variable between system quality, information quality, and service quality to the net benefit.

2.3. Research Sample

All school operators, verification operators, school administrator, and administrator of the Pekalongan City Education Office were the research samples, which determined by random sampling of 92 people.

2.4. Operational Variable Definition

The variable used is a variable suit to the hypothesis suggested that refer to DeLone and McLean model variable, they are variable:

- a. System Quality
System quality describe how the performance of information system in maintaining the information process. Indicator showed by the system flexibility, system availability, speed response, system reliability, easy to use, response consistency, easy to learn, and integrated completeness.
- b. Information Quality
Information quality showed all shapes or the report resulted by information system. The indicator showing the information qualities are completeness, accuracy, reliability, up to date, flexibility, and relevancy.
- c. Service Quality
Service quality is a comparison between customer expectation and perception from the real service experienced. The indicator used in rating the service qualities are quality assurance given by the system, system care for user input, and system accuracy in giving the response of usage.
- d. Use
Use is the usage of the system itself. Indicators in rating the use are use frequency and the aim of use.
- e. User satisfaction
This variable is indicated by an indicator of user satisfaction assessment, including satisfaction with the information generated by the system, and overall satisfaction with all system.
- f. Net benefit
Net benefit is a net result and benefit experienced by user after implementing the information system. The indicator in rating net benefit using 5 out of 6 items adapted from net benefit perception ratio, they are speed in finishing the task, work performance, effectiveness, work easiness, and security in work.

2.5. Validity and Reliability Instruments

Validity and reliability is a measurement to support the research conclusion in giving the description that is close to the real condition and the research is completely reliable. The validity of each indicator in questionnaire, showed when

product moment correlation coefficient is $> 0,3$ [11]. Reliability is used to determine how far the measurement tool is reliable. The reliability testing criteria is when Cronbach's Alpha > 0.6 [8].

2.6. Analysis Method

The analysis method used in this research is multiple regression analysis with intervening variable. The linier regression test is used in examining the relation among a dependent variable th one or other independent variables.

3. Result and discussion

3.1. Respondent Demographics

The questionnaire is sent by e-mail to 92 respondents, with the complete profil of the respondents participating as the object of the research may be seen in table 1 and table 2 as the following :

Tabel 1. Profile Based On Education

Education	Amount	Prosentase
High School	13	14
Diploma 3	20	22
Undergraduate	58	63
Graduate	1	1
Total	92	100

Tabel 2. Profile Based On Position

Position	Amount	Prosentase
SD Admission Operator	48	52
MI Admission Operator	1	1
SMP Admission Operator	14	15
MTS Admission Operator	1	1
Verification Operator	15	16
Administrator	3	3
School Administrator	10	11
Total	92	100

3.2. Validity Test

The validity test upon the questions showed by product moment correlation coefficient rate > 0.3 . the validity test upon independent and dependet variable may be seen in table 3 as the following :

Tabel 3. Validity Test Rekapitulation

System Quality	Correlation Coefficient Score
X1.1. System Flexibility	0,695
X1.2. System Availability	0,678
X1.3. Speed of Response	0,689
X1.4. System Reliability	0,706
X1.5. The Easyness of Use	0,743
X1.6. Response Consistency	0,761
X1.7. Easy to Learn	0,790
X1.8. Integrated Completeness	0,741

Information Quality	Correlation Coefficient Score
X2.1. Completeness	0,828
X2.2. Accuracy	0,842
X2.3. Reliability	0,820
X2.4. Up to date	0,721
X2.5. Flexibility	0,783
Service Quality	Correlation Coefficient Score
X3.1. Assurance	0,758
X3.2. Emphaty	0,844
X3.3. Response Quality	0,821
X3.4. Accuracy	0,783
Use	Correlation Coefficient Score
Y1.1. Use Frequency	0,949
Y1.2. Thea Aim of Use	0,941
User Satisfaction	Correlation Coefficient Score
Y1.1. Information Satisfaction Rating	0,939
Y1.2. System Satisfaction Rating	0,948
Net Benefit	Correlation Coefficient Score
Y1.1. Speed in finishing the work	0,778
Y1.2. Work Performance	0,885
Y1.3. Effectiveness	0,885
Y1.4. Ease of Work	0,831
Y1.5. Use of Work	0,784

Based on the validity test result, all question used in measuring the user satisfaction resulted the Pearson Correlation Score > 0.3 , it means all questions used are valid.

3.3. Reliability Test

Reliability Test showed by Cronbach's Alpha score > 0.6 . the reliability test for independent and dependent variable may be seen in table 4 as follows :

Tabel 4. Reliability Test Rekapitulation

Variable	Cronbach's Alpha
System Quality	0,891
Information Quality	0,867
Service Quality	0,808
Use	0,875
User Satisfaction	0,875
Net Benefit	0,880

From all variable reliability test result (system quality variable, information variable,service quality, use, user satisfaction, and net benefit the Cronbach's Alpha score is > 0.6 , it means the tool used in measuring the system quality, information quality, service quality, use, user satisfaction and net benefit is reliable.

3.4. Hypothesis Test Resultt

After completing the validity and reliability test, the next stage is to do the regression analysis to test the hypothesis. The analysis used is multiple regression analysis with intervening variable and the result of the hypothesis as follows :

3.4.1. Hypothesis Test 1

Hypothesis Test 1 (H₁) stated if system quality, information quality, and service quality will influence significantly to the use. The result of H₁ testing may be seen in table 5 and 6 as follows :

Tabel 5. Summary Model

Model	R	R Square	Adjust R Square	Std. Error of the Estimate
1	.555 ^a	.309	.285	.846

a. Predictors : (Constant), System Quality, Information Quality, Service Quality

Based on the analysis test result from table 5 above, the R correlation coefficient score is 0.555, it means the relation among X₁ variable (system quality), X₂ (information quality), and X₃ (Service Quality) with Y variable (use) is strong enough. Whereas R square score is 0.309 it means 30.9% of Y variabel (use) influenced by variable X₁ (system quality), variable X₂ (information quality), and variable X₃ (service quality). Whilst the rest 69.1% of variable Y (use) influenced by other variables out of the research.

Tabel 6. Anova

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	28.129	3	9.376	13.090	.000 ^b
Residual	63.034	88	.716		
Total	91.163	91			

a. Dependent Variable : Use
b. Predictors : (Constant), System Quality, Information Quality, Service Quality

The score of F test result is 13.090 with sig 0.000 < 0.05, it means the score is significant (H₀ rejected) since less than 0.05, there is a simultaneous influence among Y variable (use) with X₁ variabel (system quality), X₂ (information quality), X₃ (service quality). Based on F test showed that H₁ is accepted, it means the system quality, information quality and service quality has significant influence to the use.

3.4.2. Hypothesis Test 2

The Hypothesis Test 2 (H₂) stated if the system quality, information quality, and service quality will give a significant influence to user satisfaction. The result of H₂ test may be seen in table 7, 8, and 9 as follows :

Tabel 7 Summary Model

Model	R	R Square	Adjust R Square	Std. Error of the Estimate
1	.557 ^a	.311	.287	.864

a. Predictors : (Constant), System Quality, Information Quality, Service Quality

Based on the analysis result of table 7 above, the R correlation coefficient is 0.557, it means the relation among X₁ variable (system quality), X₂ (information quality), and X₃ (Service Quality) with Y variable (user satisfaction) is

strong enough. Whereas the R Square score is 0.311, it means 31.1% of Y variable influenced by X₁ variable (system quality), X₂ variable (information quality), and X₃ variable (service quality). Whilst the rest of 68.9% Y (variable user satisfaction influenced by other variables out of the research.

Tabel 8. Anova

Model	Sum of Square	df	Mean Square	F	Sig.
1 Regression	29.616	3	9.872	13.225	.000 ^b
Residual	65.688	88	.746		
Total	95.304	91			

a. Dependent Variable : User Satisfaction
b. Predictors : (Constant), Service Quality, System Quality, Information Quality

The amount of F test is 13.225 with sig 0.000 < 0.05, it means the score is significant (H₀ rejected) for less than 0.05, there is a simultaneous influence among Y variable (user satisfaction) with X₁ variable X₁ (system quality), X₂ (information quality), X₃ (service quality). Based on F test showed H₂ accepted, it proven that the system quality, information quality, and service quality has significant influence to user satisfaction.

Tabel 9. Coefficient

Model	Unstandardized Coefficients		Standardized Beta	t	Sig.
	B	Std. Error			
1 (Contant)	2.737	.911		3.004	.003
System Quality	.142	.046	.524	3.045	.003
Inf. Quality	.083	.075	.214	1.120	.266
Service Quality	-.117	.096	-.203	-1.217	.277

a. Dependent Variable : User Satisfaction

The t test of X₁ (system quality) yielded the sig score 0.03 < 0.05, it means partially the X₁ variable (system quality) stated significant and influence the Y variable (user satisfaction), whereas X₂ t test (information quality) resulted sig score 0.266 > 0.05, it means partially the X₂ variable (information quality) stated not significant and has no influence to Y variable (user satisfaction), and X₃ t test (service quality) has sig score 0.277 > 0.05, it means X₃ variable (service quality) partially stated not significant and has no influence to Y variable (user satisfaction)

3.4.3. Hypothesis Test 3

The hypothesis Test 3 (H₃) stated if the use, user satisfaction will have significant influence to the net benefit. The result of H₃ test may be seen in table 10 and 11 as follows :

Tabel 10. Summary Model

Model	R	R Square	Adjust R Square	Std. Error of the Estimate
1	.808 ^a	.653	.645	1.289

a. Predictors : (Constant), User Satisfaction, Use

Based on the analysis test result of table 10 above, the R correlation coefficient is 0.808, it means the X₁ variable relation (use), X₂ (user satisfaction), with Y variable (net benefit) is definitely strong. Whereas the R square score is 0.653 it means 65.3% of Y variable (net benefit) influence by X₁ variable, X₂ variable (user satisfaction). Whilst the rest 34.7% of Y variable (net benefit) influenced by other variables out of the research.

Tabel 11. Anova

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	278.064	2	139.032	83.724	.000 ^b
Residual	147.794	89	1.661		
Total	425.859	91			

- a. Dependent Variable : Net Benefit
- b. Predictors : (Constant), Use, User Satisfaction

The scor of F test result is 83.724 with the sig 0.000 < 0.05, it means the score stated significant (H₀ rejected) for less than 0.05, simultaneously there is an influence among Y variable (net benefit) with X₁ variable (use), X₂ (user satisfaction). Based on F test showed that H₃ is accepted, it proven that use and user satisfaction, has significant influence to net benefit.

3.4.4. Hypothesis Test 4

Hypothesis Test 4 (H₄) stated if system quality, information quality, service quality, and user satisfaction will have significant influence to the net benefit. The result of H₄ tes may be seen in table 12 and 13 as follows :

Tabel 12. Summary Model

Model	R	R Square	Adjust R Square	Std. Error of the Estimate
1	.734 ^a	.539	.518	1.502

- a. Predictors : (Constant), User Satisfaction, System Quality, Information Quality, Service Quality

Based on the analysis result of table 12 above, the R correlation coefficient score is 0.734, it means the realtion of X₁ variable (system quality), X₂ (information quality), X₃ (service quality), and X₄ (user satisfaction) with Y variable (net benefit) is strong. Whereas the R square score is 0.539, it means 53.9% of Y variable (net benefit) influenced by X₁ variable (system quality), X₂ (information quality), X₃ (service quality), and X₄ (user satisfaction). Whilst the rest 46.1% of Y variable (net benefit) influenced by other variables out of the research.

Tabel 13. Anova

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	229.614	4	57.404	25.448	.000 ^b
Residual	196.245	87	2.256		
Total	425.859	91			

- c. Dependent Variable : Net Benefit, System Quality

- d. Predictors : (Constant), System Quality, Information Quality, Service Quality, User Satisfaction

The F test score is 25.448 with the sig 0.000 < 0.05, it means the score is significant (H₀ rejected) for less than 0.05, there is simultaneous influence among Y variabel Y (net benefit) with X₁ variabel (system quality), X₂ (information quality), X₃ (service quality), and X₄ (user satisfaction). Based on F test showed H₄ is accepted, means proven that thenet benefit has significant influence to system quality, information quality, service quality and user satisfaction.

3.4.5. Hypothesis Test 5

Hypothesis Test 5 (H₅) stated if user satisfaction is an intervening variable of system quality, information quality, and service quality with net benefit. The H₅ test result may be seen in table 14 as follows :

Tabel 14. Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Contant)	4.605	1.663		2.768	.007
System Quality	.101	.085	.176	1.184	.240
Inf. Quality	.049	.130	.059	.374	.709
Service Quality	.217	.169	.178	1.283	.203
User Satisfaction	.970	.185	.185	5.232	.000

- a. Dependent Variable : Net Benefit

To prove that user satisfaction is an intervening variable of system quality, information quality, and service quality with net benefit done by examining the multiplication of indirect beta that must be > than the direct beta, and the result as the following :

1. The indirect relation of beta multiplication of system quality with net benefit = 0.524 * 0.459 = 0.241. The direct relation of beta multiplication of system quality with net benefit = 0.176. Since 0.241 > 0.176, thus the user satisfaction variable is an intervening variable between system quality and net benefit.
2. The indirect relation of beta multipliclotion of information quality with net benefit = 0.214 * 0.459 = 0.098. The direct relation of beta multipliclotion of information quality with net benefit = 0.059. Since 0.098 > 0.059, thus the user satisfaction is an intervening variable between information quality and net benefit.
3. The indirect relation of beta multipliclotion of service quality with net benefit = 0.203 * 0.459 = 0.093. The direct relation of beta multipliclotion of service quality with net benefit = 0.178. Since 0.093 < 0.178, thus the user satisfaction is not an intervening variable between service quality and net benefit.

From the beta multiplication of indirect and direct relation, it may be concluded that user satisfaction is an intervening variable of system quality, and information quality with net benefit, yet user satisfaction is a direct variable and not an intervening variable of service quality with net benefit.

4. Conclusion

The research background is various research that tested the success of the informations system using DeLone and McLean model, thus the 5 hypothesis is developed. After doing the 5 hypothesis testing, the test result stated that the information system success model of DeLone and McLean proven to be empirically significant in the success of online PPDB information system implementation for junior highschool level in Pekalongan city. The result of each hypothesis is as detailed :

1. System Quality, information quality, and service quality has significant influence to the use.
2. System quality, information quality, and service quality has significant influence to user satisfaction
3. Use, user satisfaction has significant influence to net benefit.
4. Net benefit has significant influence to system quality, information quality, service quality and user satisfaction.
5. From the beta multiplication result of indirect and direct relation, it may be comcluded that user satisfaction is an intervening variable of system quality and information quality with net benefit, yet user satisfaction as a direct variable is not an intervening variable on service quality with net benefit.

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