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MEASUREMENT OF E-LEARNING SUCCESS WITH ADOPTING THE DELONE & MCLEAN MODEL (UNIVERSITY STUDY CASE IN SOUTH JAKARTA)

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ABSTRACT

Many universities nowadays have been trying to implement an integrated information system, such as automated scheduling and e-learning, to provide added value for students and efficiency in the business process. A university located in South Jakarta has implemented an integrated system with e-learning portals for lecturers and students, but the success of the information system implementation has never been measured. As we know, the investment of information systems implementation could cost a lot of resources, time, and cost, which makes the measurement of the success of information systems a very important thing to do. The aim of this research is to measure the success of the e-learning system that was implemented in the university using the updated DeLone and McLean IS Success model (2003), with the objective to understand whether implementing an e-learning model really helped produced organizational benefits in the university such as good corporate image, and also to understand whether or not the updated DeLone and McLean IS Success model could really be used to assess the success of implementing e-learning in the university.

Keywords: *D&M IS success model, e-learning, education, university*

1. INTRODUCTION

1.1 Research Background

The rapid development of Information Technology has brought us into the information age where the technology for information distribution are widely available, which led to many companies competing to adopt information technology to improve its business capabilities and to gain competitive advantage.

The same case happens in education businesses. Universities have been using many kinds of information system to improve their learning and administration processes. The governmental institution that manages the educational procedures in Indonesia, Dirjen Pendidikan Tinggi, also has included the use of information technology as one of the assessment parameters in the accreditation process.

As Fontainha and Gannon-Leary stated, information system such as information portals and e-learning could provide enhanced learning environment and other benefits for the university while improving the business process in universities by using information portals as a way of effective and efficient information distribution for stakeholders (lecturers and students) and also allow the students to get their learning material anytime and anywhere [18].

Given the investment of resources, time and cost in IT implementation is not small, it is important to measure the success of e-learning to make sure that

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the investment could certainly provide benefits which commensurate with the costs incurred.

To help assess the benefits of using information system in educational institutions, we chose a university in South Jakarta that has implemented an information system since 2009 where the success of the information system has not been measured yet as a research subject.

Currently the usage of information system in our subject university is limited to e-learning portals, where the lecturers and students could upload their learning materials, schedules, test results, and also discuss them in the forum-like portal.

This research was done in order to measure the success of the information system mentioned above, which includes an e-learning system that is integrated with information portal for the students and lecturers.

To measure the success of e-learning systems at the university, we will be using the updated DeLone and McLean (2003) models, since this model has been widely used and validated by many previous researchers (Chiao-Chen, 2013, Yung-Ming, 2012 and Ramayah & Chow LEE, 2012) [1]–[3].

1.2 Research Objective

The objectives of this research are as follows:

1. To measure the success rate of e-learning in a university in South Jakarta in terms of organizational benefits.
2. To assess the success model of DeLone and McLean's updated information system (2003) in e-learning.

1.3 Research Purpose

The purposes of this research are as follows:

1. This research could help enrich the study of measuring the success of information system in academic field.
2. For organizational management especially in information systems management, this research can provide inputs in e-learning investment decisions by measuring the net benefit obtained through the information system implementation.

2. LITERATURE REVIEW

2.1. DeLone and McLean IS Success Model

DeLone dan McLean (2003) proposed the first successful model of information system measurement in 1992. A measurement model called the DeLone and McLean Information System model proved to have many shortcomings, and was updated in 2003.

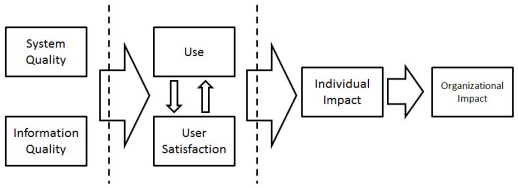

Figure 1: DeLone and McLean Information System Success Model (1992)

DeLone dan McLean modified some variables such as adding quality of service as an independent variable and combining the impact of the individual and the impact of the organization into one factor which was called the net benefit. The success model was also modified from a process model into a causal model.

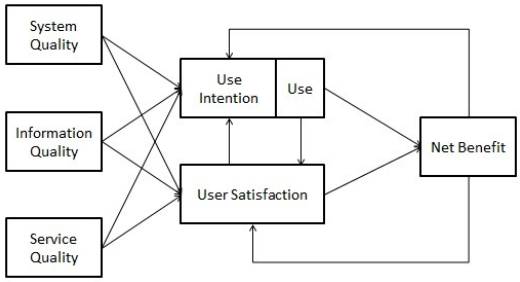

Figure 2: Updated DeLone and McLean Information System Success Model (2003)

After DeLone and McLean updated the success model of information systems in 2003, a lot of research has been done in order to validate the IS Success model.

2.2. E-Learning

E-learning is defined as the delivery of educational materials and methods online using information technology for the purposes of learning, teaching, training or acquiring knowledge when and wherever [4].

2.3. Factors In The Success Of Information Systems

In previous models, DeLone and McLean used system quality and information quality (see Figure 2) as independent variables that affect user use and satisfaction, which in turn will have both individual and organizational impacts.

The first DeLone and McLean model test was conducted by Seddon and Kiew in 1994, suggesting that system quality has a significant effect on user satisfaction and individual impact [5]. Information quality has a significant effect on user satisfaction

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and individual impact. While user satisfaction impacts significant impact on users.

Other studies that support the first DeLone and McLean model are as follows (as quoted by DeLone and McLean, 2003):

1. Goodhue & Thompson (1995) research on the appropriateness between technology and individual task and performance.
2. Taylor & Todd research (1995) about testing models of the use of information technology.
3. Jurison Research (1996) which is a longitudinal study of the advantages of information systems.
4. Etezadi-Amoli and Farhoomand (1996) studies on the structural model of user satisfaction and user performance.
5. Weill and Vitale (1999) studies that measure the health of a portfolio of information systems.

Igbaria and Tan (1997) study that examined the effect of information system acceptance on individual performance.

As for the updated model (DeLone and Mclean Information Success Model 2003), it has also been proven and supported by several researches, including research from (Tam & Oliveira, 2017) which examines the use of mobile banking from the customer side and (Mudzana & Maharaj, 2015) empirical investigation of business intelligence system in south africa.

The results of the research (Tam & Oliveira, 2017) show that the system quality positively affect the use of the system and user satisfaction. Information Quality has a positive effect on Use Intention and User Satisfaction. Service Quality negatively affects Use Intention but positively affects User Satisfaction. While Use Intention affects Net Benefits, and User Satisfaction positively affects the Net Benefits.

(Mudzana & Maharaj, 2015) conducted a study using the updated model (DeLone and McLean Information System Success Model 2003) found that the Information Quality significantly affected the Use Intention and User Satisfaction. While the Service Quality has a negative influence on User Satisfaction. And User Satisfaction has a positive effect on Net Benefits.

From all the studies listed above, it can be concluded that these studies confirm the measurement of the DeLone and McLean Information System success model.

For the purposes of this study, we will be using the the intention of use variable instead of the use variable, this is done because the use of e-learning is an obligation that must be done by students as research subjects.

These are the hypotheses based on the DeLone and McLean Information System Success Model and the studies listed above:

H1. System Quality (SQ) positively affects the intention to use e-learning (IU)

H2. System Quality (SQ) positively affects user satisfaction (US)

H3. Information Quality (IQ) positively affects the intention to use e-learning (IU)

H4. Information Quality (IQ) positively affects user satisfaction (US)

H5. Service Quality (SVQ) positively affects the intention to use e-learning (IU)

H6. Service Quality (SVQ) positively affects User Satisfaction (US)

H7. User Satisfaction (US) positively affects the intention to use e-learning (IU)

The success model of DeLone and McLean 2003 information system combines the variables individual impact and organizational impact into one dependent variable which is net benefit. This is because the term 'impact' has not been defined clearly as positive or negative, while ‘benefit’ is clearly defined as a positive impact [5].

According to DeLone and McLean, net benefit is the most important variable in measuring the success of an information system. Net benefit, should be determined by the context and purpose of the investment of information system [5]. In the adaptation of DeLone and McLean models in e-commerce, these benefits can be seen from stakeholders such as customers, suppliers, employees, organizations, markets, industries, economies, even communities. Indicators used to measure net benefits from e-commerce are cost savings, expanding markets, gradual increase of sales, reduced search costs and time savings.

As the objective of this study states, this paper will specifically examine the application of e-learning at a university in South Jakarta. The net benefits will be measured from the organizational side, which in this case is an educational institution. Therefore, the indicators used to measure the success of e-commerce used by DeLone and McLean above are not relevant in this study.

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Another study from Mahmood, Gemoets, Hall, López, & Mariadas uses customer perceptions to calculate the success of e-commerce businesses. Those kind of perceptions are measured through the corporate image, customer satisfaction, product/service innovation, and number of returning customers [6].

Tai and Ho's research also states that the influence of sharing organization information through information technology to the relationship with customers [7]. In this study, information systems are the tools that enable the sharing of information to customers, and the company's relationship with the customers are part of the corporate image [6], [8]. These studies supports the theory that the corporate image is also part of the net benefits for the measurement of e-learning success in the university. With all the theories stated above, the next hypothesis is proposed as follows.

H8. User Satisfaction (US) positively affects the Corporate Image (CI).

From the eight hypotheses stated above, the relationship between variables in this study can be described as follows:

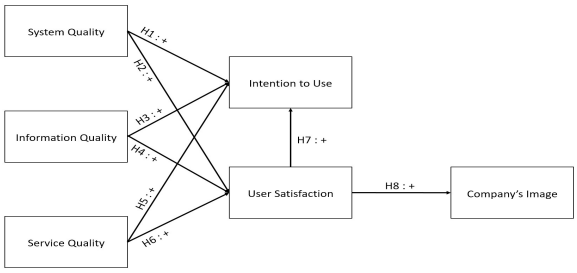

Figure 3: Operationalization of Research Variables

3. RESEARCH METHODS

3.1. Research Procedure

This research is a causal research that searches for factors causing free variables (SQ, IQ, and SVQ) affecting the independent variable (IU, and CI) through intervening variable (US) (Sekaran and Bougie, 2014).

The research strategy that was used is survey by using questionnaires to get the primary data of e-learning success measurement. The survey was conducted on XYZ University students as e-learning users.

From the definition of e-learning that we see in chapter 2.1.2, through observation at XYZ University, the existing e-learning systems uses a forum and discussion feature (where the PDF material from related courses could be uploaded). Which makes this research limited to the measurement of both e-learning features.

From time perspective, this study is a cross-sectional study that takes data only once from the respondents, collected over a period of time. The data obtained are primary data taken using questionnaires, which was distributed directly and online distribution.

The sampling technique that was used in this study is convenience sampling. In this case a sample of at least 200 students of the total population (all of XYZ University's active students) is collected. This sample is based on Loehlin (1998) suggesting that 100 samples be taken as a minimum, but it is recommended to get 200 samples for SEM for stable parameter estimation and strong significance test result [9].

3.2. Instrument Development

Since this study examines the DeLone & McLean information systems success model in a university, the measurement indicators of system quality, quality of information, service quality, and user satisfaction was done using the indicators stated in the journal article written by DeLone & McLean (2003) with the necessary adjustments to the subject (XYZ University) and the object (e-learning system that is the feature of the forum and discussion) of research.

Since DeLone and McLean have not proposed indicators for measuring Intention to Use variables in their success models (DeLone & McLean, 2003), therefore the indicator proposed in some research related to Intention to Use with the research object being e-Learning. Research conducted (Mohammadi, 2015) on the use of e-learning from the user's point of view using the TAM model and the Information System Success Model states some indicators related to Intention to Use, which are tend to use, the desired system are available, and the desire to continue using for the near future. The 'desire to continue using for the near future' indicator have also been studied by (Antonio, Ana Rosa del, & Aurora, 2013) on their research to prove that gender differences influence Intention to Use against blended learning systems [19]-[22].

As for corporate image indicator, the indicators used are taken from Mahmood, et al. (2008) and Minkiewicz, Evans, Bridson & Mavondo (2011) researches, which was also supported by Turkyilmaz, Oztekin, Zaim, & Demirel (2013) researches, which are: reliable, professional, relationship with customers, innovative, prestigious,

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competent, up-to-date, modern, and commitment [6], [8], [10].

The following is a list of indicators used in this study:

1. System Quality:
   - Availability
   - Reliability
   - Response time
   - Usability
2. Information Quality:
   - Completeness of information
   - Easy to understand
   - Personalization (suitable to the customer)
   - Relevance
   - Security
3. Service Quality:
   - Support
   - Empathy
   - Response time
4. Intention to Use:
   - The desire to use
   - the desire to continue to use
   - Increasing the usage
   - The thought that other people also need to use
5. User Satisfaction:
   - Satisfaction while using the discussion feature
   - Satisfaction while using the forum feature
6. Corporate Image:
   - Reliable
   - Professional
   - Customer relationship
   - Innovative
   - Prestigious
   - Competent
   - Modern
   - Commitment (committed to education)

All of the indicator stated above will be measured using the Likert Scale from the scale of 1 (strongly disagree) to 5 (strongly agree).

3.3. Data Analysis

To test the effects between each research variables, the writer used the Structural Equation Modeling by using a software called Lisrel.

4.3.1. Validity test

To test the validity, the writer uses the product-moment formula as follows:

$$r = \frac{n\,(\Sigma XY) - (\Sigma X)(\Sigma Y)}{\sqrt{[n(\Sigma X^2) - (\Sigma X)^2][n(\Sigma Y^2) - (\Sigma Y)^2]}}$$

Source: [11]

Information:
X =Value of the instrument item that will be used
N = The number of respondents/samples in the instrument test
Y = The value of all instrument in the variable
ri = Pearson correlation coefficient between instrument items that was used with the corresponding variable.

From result of calculation of Product Moment ri, a test for each question on the questionnaire was conducted by using r correlation table. To facilitate the calculation of this validity, the writer used a program called SPSS. Testing was done by comparing the result of r calculation with r value in the table. If r count for each question is positive and greater than r table, then the question is said to be valid.

4.3.2. Reliability test

To test the reliability, the writer used the alpha formula as follows:

$$r_{11} = \left(\frac{k}{k-1}\right)\left(\frac{\sum \sigma_b^{\,2}}{\sigma_t^{\,2}}\right)$$

Information:
r_{11} = Instrument reliability
k = Number of questions
$\sum \sigma_b^{\,2}$ =Number of variants of the questions
$\sigma_t^{\,2}$ = Total variants

Sekaran & Bougie (2014) states that Cronbach's alpha above 0.60 means the variable is reliable

4.3.3. Line diagram

The line diagram used in this study could be seen in Figure 4. This figure explains the influence between the six variables: the three exogenous latent variables (ξ_1, ξ_2,ξ_3) and three endogenous latent variables (η_1, η_2 dan η_3) as follows:
ξ_1= System Quality
ξ_2 = Information Quality
ξ_3 = Service Quality
η_1 = Intention to Use
η_2= User Satisfaction
η_3 = Corporate Image

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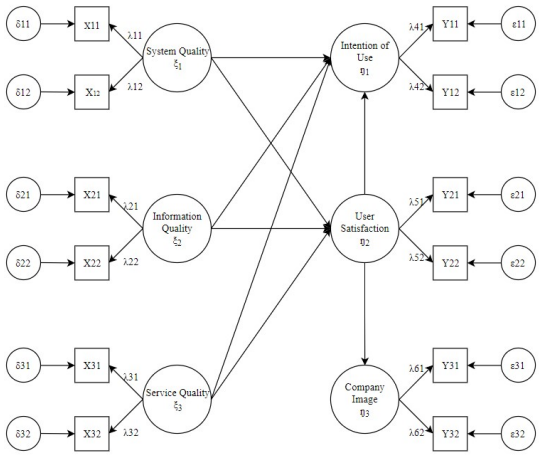

Figure 4: Line Diagram

The structural equation modeling used in this research is as follows:

1. $\eta_1 = \gamma_{11} . \xi_1 + \gamma_{21} . \xi_2 + \gamma_{31} . \xi_3 + \beta_{21} . \eta_2 + \zeta_1$
(Intention to Use = System Quality + Information Quality + Service Quality + User Satisfaction + Error between each variable)
2. $\eta_2 = \gamma_{12} . \xi_1 + \gamma_{22} . \xi_2 + \gamma_{32} . \xi_3 + \zeta_2$
(User Satisfaction = System Quality + Information Quality + Service Quality + Error between each variable)
3. $\eta_3 = \beta_{23} . \eta_2 + \zeta_3$
(Corporate Image = User Satisfaction + Error between each variable)

4.3.4. Model Identification

The model identification relates to the assertion of whether the proposed model can produce an estimate that is unique (singular) or not. The requirement in which a model is possible to produce a unique estimate is that the model should be just-identified or over identified. A model is said to be just-identified if the model has a free degree equal to zero, and is said to be over identified if its degrees are greater than zero.

4.3.5. Goodness of fit test

SEM model testing can be done through a two-stage approach, which is to test the measurement model and then simultaneously test the measurement and structural model.

In the SEM analysis method, estimation statistics are tested individually by using t test. Through a t-value line diagram (PATH) statistic output, Lisrel confirms the complete t test result with a test error level set at 0.05. If the test results are non significant, Lisrel will print the output with a red line diagram line. T test results are considered significant if the value of t is greater than the critical value of t table, which is 1.96 for two directions, dan 1.645 for the one direction.

For validity test in SEM, a variable is said to have good validity to the constructs or latent variables when:

1. The loading factors are greater than or equal to the critical values according to Rigdon and Ferguson [17].
2. The standardized loading factors are greater than or equal to 0.50 [12].

Reliability analysis of measurement model is done by calculating Construct Reliability (CR) and Variance Extracted (VE) values from standardized loading factors and error variance [17]. Reliability is declared good if Construct Reliability value ≥ 0.70 and all Variance Extracted value ≥ 0.50.

Besides individual test, SEM also tests the proposed model as a whole through Goodness of Fit testing. In SEM analysis, the suitability of the model is the covariance of the sample with the estimated population covariance matrix generated.

The Goodness of Fit Test is performed using some measure of conformity model (Goodness of Fit Test, GOF). Basically the size of GOF consists of three sizes, which are: absolute, comparative, and parsimony [12]. The following table shows the size of GOF according to Lisrel used in this study:

Table 1: Goodness of Fit Index

Gof Size	Description
Absolute Fit Indices	
Chi-Square (χ2) P-value	A measurement used in Maximum Likelihood to compare the observed variance and covariance matrix to the predicted variance and covariance matrix. The value $\chi 2 = 0$ and the P-value = 1 indicates a perfect-fit model.
Goodness of Fit Index (GFI)	A descriptive measurement that measures the relative amount of variance and covariance. GFI Usually ranges between 0 and 1, higher value indicates the better fit. Values > .90 usually indicates an acceptable fit.
Root Mean Square Error of Approximation	A measurement of approximate fit in the population. Values ≤ .05 can

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(RMSEA)	be considered as a good fit, values between .05 and .08 as an adequate fit, values between .08 and .10 as a mediocre fit, and values > .10 are not acceptable.
Incremental Fit Indices	
Adjusted GFI (AGFI)	A measurement model that adjusts the GFI's degree of freedom relative to the number of observed variables, which rewards less complex models with fewer parameters. AFGI ranges from 0 to 1, higher value indicates a better fit. Values > .85 indicates an acceptable fit.
Normed Fit Index (NFI)	A descriptive measurement model that compares the proportion in the improvement of the overall fit of the hypothesis model to the independence model. NFI ranges from 0 to 1, higher value indicates a better fit. Values above .90 indicates an acceptable fit.
Comparatif Fit Index (CFI)	A measurement model, similar to NFI, that avoids the underestimation of fit. CFI ranges from 0 to 1, higher value indicates a better fit. Values > .95 indicates an acceptable fit.
Parsimony Fit Indices	
Normed Chi-Square (NCS)	A parsimonious fit measurement which measures the chi-square fit index divided by degrees of freedom. Values of 2 or less indicates a good fit.
Akaike Information Criterion (AIC)	A descriptive measurement model that can be used to compare competing models that need not be nested. Values closer to the saturated AIC indicates a better fit.

Source: [13]

4.3.6. Hypothesis testing

Hypothesis testing, to know the significance of exogenous and endogenous variables in this study, is as follows:

Hypothesis 1:

H0: B1 = 0 (There is no significant and positive influence of system quality (SQ) on the intention to use e-learning (IU))
Ha: B1 > 0 (There is a significant and positive influence of the system quality (SQ) on the intentions of the use of e-learning (IU))

Hypothesis 2:
H0: B2 = 0 (There is no significant and positive influence between system quality (SQ) on user satisfaction (US))
Ha: B2 > 0 (There is a significant and positive influence between system quality (SQ) on user satisfaction (US))

Hypothesis 3:
H0: B3 = 0 (There is no significant and positive influence between the Information Quality (IQ) on the intentions of using e-learning (IU))
Ha: B3 > 0 (There is a significant and positive influence between the Information Quality (IQ) on the intentions of using e-learning (IU))

Hypothesis 4:
H0: B4 = 0 (There is no significant and positive influence between the Information Quality (IQ) on user satisfaction (US))
Ha: B4 > 0 (There is a significant and positive influence between the Information Quality (IQ) on user satisfaction (US))

Hypothesis 5:
H0: B5 = 0 (There is no significant and positive influence between service quality (SVQ) on the intentions of using e-learning (IU))
Ha: B5> 0 (There is a significant and positive influence between service quality (SVQ) on the intentions of using e-learning (IU))

Hypothesis 6:
H0: B6 = 0 (There is no significant and positive influence between service quality (SVQ) on the user satisfaction (US))
Ha: B6> 0 (There is a significant and positive influence between the service quality (SVQ) on the user satisfaction (US))

Hypothesis 7:
H0: B7 = 0 (There is no significant and positive influence between user satisfaction (US) on the intention to use e-learning (IU))
Ha: B7> 0 (There is a significant and positive influence between user satisfaction (US) on the intention to use e-learning (IU))

Hypothesis 8:
H0: B8 = 0 (There is no significant and positive influence between user satisfaction (US) on corporate image (CI))

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Ha: B8> 0 (There is a significant and positive influence between user satisfaction (US) on corporate image (CI))

4. THEORETICAL BACKGROUD

4.1. Respondents Overview

The distribution of questionnaires was done online through a questionnaire placed on Google Drive. The number of questionnaires filled is 123 questionnaires, distributed over 6 study program at the university.

4.2. Respondents Overview

Preliminary questionnaire testing was conducted on the first 71 respondents. The value of Product Moment Pearson r with 95% confidence level for N = 71 samples is 0.233. Therefore all indicators used in this study are valid.

Table 2: Validity Test of Research Indicators

Indicator	Corrected Item-Total Correlation
SQ1	0.593
SQ2	0.568
SQ3	0.600
SQ4	0.617
IQ1	0.506
IQ2	0.657
IQ3	0.653
IQ4	0.727
IQ5	0.497
SVQ1	0.688
SVQ2	0.763
SVQ3	0.764
IU1	0.707
IU2	0.709
IU3	0.589
IU4	0.579
US1	0.751
US2	0.755
CI1	0.745
CI2	0.717
CI3	0.569
CI4	0.785
CI5	0.696
CI6	0.795
CI7	0.666
CI8	0.706

Source: Primary Processed Data, 2017

While on the Reliability Test, Cronbach's Alpha of all latent variables is > 0.60, therefore all latent variables can be said to be reliable.

Table 4: Reliability Test Results of Latent Variable

Variables	Cronbach's Alpha
SQ	0.787
IQ	0.819
SVQ	0.861
IU	0.822
US	0.754
CI	0.911

Source: Primary Processed Data, 2017

4.3. Data Analysis

From the results of the questionnaire, the categorization of the score is based on the maximum score of each variable divided by five then averaged based on all indicators. Therefore the scores obtained for each variable can be seen in Table 3, where all the variables show good measurement results. This means technical success (System Quality), and semantic success (Information Quality) shows good value. In addition, this measurement also shows the success of the effectiveness (Intention of Use, User Satisfaction and corporate image) is good. In terms of net benefit which is the most important measurement, which in this study is using corporate image, also obtained a good score [5].

Table 3: Scores Obtained from each Variables

Variables	Score	Categories
System Quality	497	Very Good
Information Quality	485	Good
Service Quality	442	Good
Intention of Use	490	Good
User Satisfaction	469	Good
Corporate Image	477	Good

The data obtained are not normally distributed, where the P value for Skewness and Kurtosis = 0 then the estimation to be used is Robust ML (Maximum Likelihood).

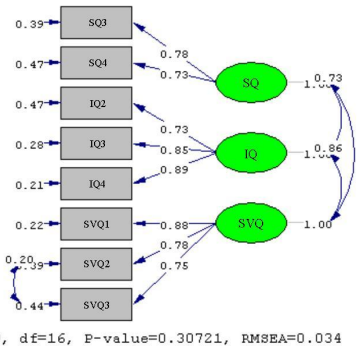

Figure 5: Standardized Loading Factor Exogenous Constructs

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4.3.1. *CFA exogenus construct*

Exogenous test results show that SQ1, SQ2, IQ1, IQ5 have Standardized Loading Factor smaller than 0.7 so it is removed from the system. The Standardized Loading Factor of exogenous constructs from this study can be seen in Figure 5. While from table 5 it can be seen that exogenous constructs already meet the good GOF.

Tabel 5: Goodness of Fit Exogenus Constructs

Goodness-of-fit Measurements	Cut-off Value	Test Result	Decision
Absolute Compatibility Measurement			
Chi-Square Satorra-Bentler	χ^2hit <χ^2table (df=16, p=0.05, χ^2 = 26.30)	18.29	Fit
P value	>0.05	0.31	Fit
RMSEA	≤ 0.08	0.034	Fit
GFI	≥ 0.90	0.96	Fit
Incremental Compatibility Measurement			
AGFI	≥ 0.90	0.91	Not Fit
NFI	≥ 0.90	0.98	Fit
CFI	≥ 0.90	1.00	Fit
Parsimonious Compatibility Measurement			
NCS	1.0 ≤ NCS ≤ 5.0 (NCS=chi-square /df)	1.14	Fit

Source: Primary Processed Data, 2017

4.3.2. *CFA endogenus constructs*

The endogenous test results show that observed variables IU3, IU4 and US1 have Standardized Loading Factor smaller than 0.7 so it is excluded from the model.

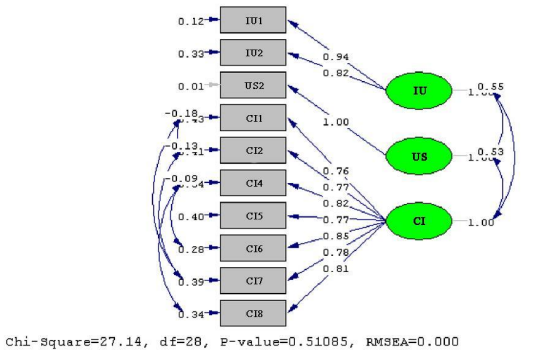

Figure 6: Standardized Loading Factor Endogenus Constructs

The Endogen construct test shows a very good fit of fit, in which all parameters measured meet the matching conditions, except NCS, so to represent the GOF the parsimonious compatibility measure is used by the AIC indicating that the model is fit. The list of goodness of fit is shown in table 6.

Table 6: Goodness of Fit Endogenus Constructs

Goodness-of-fit Measurements	Cut-off Value	Test Result	Decision
Absolute Compatibility Measurement			
Chi-Square Satorra-Bentler	χ^2hit <χ^2table (df=28, p=0.05, χ^2 = 41.34)	27.14	Fit
P Value	>0.05	0.51	Fit
RMSEA	≤ 0.08	0.00	Fit
GFI	≥ 0.90	0.95	Fit
Ukuran Kesesuaian Inkremental			
AGFI	≥ 0.90	0.91	Fit
NFI	≥ 0.90	0.98	Fit
CFI	≥ 0.90	1	Fit
Ukuran Kesesuaian Parsimonious			
NCS	1.0 ≤ NCS ≤ 5.0 (NCS=chi-square /df)	0.97	Not Fit
AIC	AIC smallest value and close to saturated AIC compared to independent	I=1572 M*=81 S=110	Fit

Source: Primary Processed Data, 2017

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4.3.3. *Reliability and validity test*

Reliability test results show all values of Construct Reliability ≥ 0.7 and all Variance Extracted values ≥ 0.5. It can be stated the reliability of the measurement model is good.

As for the validity test can be seen in table 8, where all of the loading factor value of t is greater than 1.65 and loading factor greater or equal to 0.7 (valid).

Table 7: Result of Reliability Test of Measurement Model

Variables	Standardized Loading	εj	CR (≥0.70)	VE (≥0.50)
SQ			**0.72**	**0.56**
SQ3	0.80	0.36		
SQ4	0.70	0.52		
IQ			**0.85**	**0.66**
IQ2	0.74	0.46		
IQ3	0.82	0.33		
IQ4	0.88	0.22		
SVQ			**0.84**	**0.63**
SVQ1	0.87	0.24		
SVQ2	0.78	0.39		
SVQ3	0.73	0.47		
IU			**0.88**	**0.78**
IU1	0.95	0.09		
IU2	0.81	0.35		
US			**0.99**	**0.99**
US2	1.00	0.01		
CI			**0.92**	**0.63**
CI1	0.75	0.44		
CI2	0.77	0.41		
CI4	0.82	0.33		
CI5	0.77	0.41		
CI6	0.85	0.28		
CI7	0.78	0.39		
CI8	0.82	0.33		

Source: Primary Processed Data, 2017

Table 8: Test Result Validity of Measurement Model

Variables	Loading Factor	t Value
System Quality		
SQ3	0.80	8.93
SQ4	0.70	7.49
Information Quality		
IQ2	0.74	9.14
IQ3	0.82	10.58
IQ4	0.88	12.54
Service Quality		
SVQ1	0.87	13.59
SVQ2	0.78	9.32
SVQ3	0.73	8.99
Intention of Use		
IU1	0.95	***
IU2	0.81	9.60
User Satisfaction		
US2	1.00	***
Corporate Image		
CI1	0.75	***
CI2	0.77	10.35
CI4	0.82	10.34
CI5	0.77	10.17
CI6	0.85	11.20
CI7	0.78	8.95
CI8	0.82	11.48

Source: Primary Processed Data, 2017

4.3.4. *Structural model analysis*

Based on this research, the path analysis of SEM Structural Model in this study are as in Figure 7. Goodness of fit tests performed indicate the result of a representative fit for each criterion, the use of 4-5 fit fit criteria is sufficient to assess the feasibility of a model, provided that each criterion of absolute, incremental and parsimony matches is represented [12].

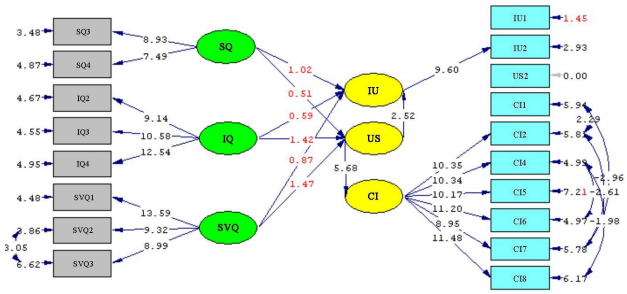

Figure 7: t Value Structural Mode

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Table 9: Goodness of Fit Structural Model

Goodness-of-fit Measurements	Cut-off Value	Test Result	Decision
Absolute Compatibility Measurement			
Chi-Square Satorra-Bentler	χ^2hit < χ^2table (df=119, p=0.05, χ^2 = 145.46)	159.52	Not Fit
P Value	>0.05	0.01	Not Fit
RMSEA	≤ 0.08	0.053	Fit
GFI	≥ 0.90	0.86	Not Fit
Incremental Compatibility Measurement			
AGFI	≥ 0.90	0.79	Not Fit
NFI	≥ 0.90	0.96	Fit
CFI	≥ 0.90	0.99	Fit
Parsimonious Compatibility Measurement			
NCS	1.0 ≤ NCS ≤ 5.0 (NCS=chi-square /df)	1.10	Fit

Source: Primary Processed Data, 2017

From the structural model analysis, the obtainable equation is :

1. Structural Equation
   - IU = 0.32*US + 0.15*SQ + 0.12*IQ + 0.24*SVQ, Errorvar.= 0.47 , R^2 = 0.53
   - US = 0.082*SQ + 0.27*IQ + 0.38*SVQ, Errorvar.= 0.52 , R^2 = 0.48
   - CI = 0.54*US, Errorvar.= 0.71 , R^2 = 0.29

2. Reduced Form Equation
   - IU = 0.17*SQ + 0.20*IQ + 0.36*SVQ, Errorvar.= 0.53, R^2 = 0.47
   - US = 0.082*SQ + 0.27*IQ + 0.38*SVQ, Errorvar.= 0.52, R^2 = 0.48

CI = 0.044*SQ + 0.15*IQ + 0.20*SVQ, Errorvar.= 0.86, R^2 = 0.14

4.4. Results of Analysis and Discussion

From the result of structural model analysis, the value of t is smaller than 1.65 in almost all path, except for US to IU and US to CI. So from 8 hypotheses, only H7 and H8 are accepted.

Tabel 10: Structural Model Significance Test

Hypothesis	Path	t Value	Conclusion
1	SQ→IU	1.02	Not Significant (H1 is rejected)
2	SQ→US	0.51	Not Significant (H2 is rejected)
3	IQ→IU	0.59	Not Significant (H3 is rejected)
4	IQ→US	1.42	Not Significant (H4 is rejected)
5	SVQ→IU	0.87	Not Significant (H5 is rejected)
6	SVQ→US	1.47	Not Significant (H6 is rejected)
7	US→IU	2.52	Significant (H7 accepted)
8	US→CI	5.68	Significant (H8 accepted)

Source: Primary Processed Data, 2017

Tabel 11: Direct-indirect effect

Impacting Variables	Impacted Variables	Direct Effect	Indirect Effect	Total Effect	Intervening Variables
Information Quality	Corporate Image		0.15	0.15	User Satisfaction
Service Quality	User Satisfaction	0.38		0.38	
Service Quality	Intention of Use	0.24	0.12	0.36	User Satisfaction
Service Quality	Corporate Image		0.20	0.20	User Satisfaction
User Satisfaction	Intention of Use	0.32		0.32	

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User Satisfaction	Corporate Image	0.54		0.54	
System Quality	User Satisfaction	0.08		0.08	
System Quality	Intention of Use	0.15	0.02	0.17	User Satisfaction
System Quality	Corporate Image		0.04	0.04	User Satisfaction
Information Quality	User Satisfaction	0.27		0.27	
Information Quality	Intention of Use	0.12	0.08	0.20	User Satisfaction

Source: Primary Processed Data, 2017

The table above shows that in this research there is no significant effect of system quality, information quality or service quality to user's intention and user satisfaction. While user satisfaction was found to have a significant and positive impact on the intentions of use and corporate image, which is 0.32 and 0.54.

Therefore the first hypothesis until the sixth hypothesis is rejected because it has a value t smaller than 1.645. This indicates that the success model of DeLone and McLean's information system can not be used to measure e-learning success in the university in South Jakarta. The logical explanation of the results of this study is that the use of e-learning at the university is an obligation and not an option. This is supported by Livari's (2005) study which found that information quality has no significant effect on system usage on a system whose use is mandatory [14].

Even in systems where usage is not a liability such as B2C e-commerce, it is also found that the quality of the system and the quality of information has no significant effect on user satisfaction [15].While the quality of service, according to Brown & Jayakody (2008) only affect user satisfaction, but not against usage intent.

Research from Eom (2012) on the effectiveness of LMS (Learning Management System) also shows that the quality of the system and the quality of information does not strongly affect the intention of use [16].

The contribution of system quality, information quality, service quality and user satisfaction to the intention of use of this model was found to be only 53%. While the contribution of system quality, information quality and service quality to user satisfaction is only 48%. This indicates that there are still other larger and significant factors affecting the two dependent variables. Similarly, the contribution of user satisfaction to the corporate image, which only amounted to 29%.

5. CONCLUSIONS AND SUGGESTIONS

Based on the results of research that has been done in the previous chapter, it can be concluded that:

1. The result of measuring the success of e-learning system at university in South Jakarta which is the subject of this research shows good score category, that is through user satisfaction variable and corporate image measurement. However, the success model of information systems from DeLone and McLean used in this study was not able to explain the cause of success, this could be seen from the variables of service quality, system quality and quality of information that has no significant effect on the intentions of use and user satisfaction.
2. The result of this research shows only two hypotheses are accepted, which are: User satisfaction has a significant positive effect on intentions of use, and User satisfaction has a significant positive impact on corporate image.
3. This research shows that educational institutions can improve their corporate image through the successful implementation of an e-learning system.
4. This research shows that the success model of information systems from DeLone and McLean cannot be used to find the cause of the success of e-learning systems at universities in South Jakarta, therefore more research can be done to get a better level of generalization.
5. Further research can be done to find the determinant variables of the success of information systems in order to create a success model of information systems, especially in a place where the use of information system is mandatory.

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