

Analyzing the Influence of Information System's Quality, User Satisfaction and Net Benefit of E-Learning Users

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ABSTRACT

e-learning is widely used by academic institutions to support their teaching and learning process, so does Information Systems Department, Institut Teknologi Sepuluh Nopember. Despite the fact that e-learning system offers a lot of convenience and advantages for its students and lecturers, many students also expressed their complaints. Since the very first time this system is being implemented, there is no evaluation whether the quality of the system influence the satisfaction of students as the users of the system. Moreover, there is not yet an evaluation whether the satisfaction of students influence the improvement of individual impact such as an improvement of individual productivity and an improvement on knowledge sharing. This study aims to analyze the influence of service quality, information quality and system quality to user satisfactions and analyze the influence of users' satisfaction to individual impacts. To conduct the study, this study adopts the information success model developed by DeLone and McLean Model. The data used for this study was 22 respondents while the tools used were SPSS and SEM GSCA. This study contributes to show factors that influence user satisfactions of students and also the net benefit in using the e-learning. Having known these factors, academic institution can use it as a base to improve the quality of their e-learning system.

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1. INTRODUCTION

The department of Information Systems, Institut Teknologi Sepuluh Nopember, has made use of Moodle e-learning system as a web-based learning tool that supports its teaching and learning process since 2008. Moodle is a Learning Management System (LMS) that aims to manage the interaction among students and lecturers in a web based application in term of learning activities such as uploading and downloading course materials, opening assignment submissions for students, conducting online quiz and other activities. This learning system focuses on students and is aimed to improve the independency of the students to learn.

Despite the fact that this system offers a lot of convenience and advantages for students and lecturers, many students also expressed their complaints in relation to the system such as the website is frequently down, inability to access some of the functionalities of the system and other problems. Considering that the success of a system is related to the satisfaction of its users, it is important to comprehend the satisfaction of students as the users of e-learning system. In addition to that, [1] states that user satisfaction has no meaning when it is not followed by an improvement of individual and organization performance or called net benefit. In other words, user satisfaction is ideally adhered to an impact for users as an individual in term of performance improvement. Therefore, it is also essential to understand the impact of e-learning system to the improvement of productivity and knowledge of students or called the individual impact.

However, since the very first time this system has been implemented in Information Systems department, no research has been conducted to analyze the quality of e-learning system to the improvement

of user satisfactions and the improvement of individual impact. Hence, this paper provides a study to analyze the influence of quality of e-learning system, user satisfaction and individual impact of e-learning users.

To do so, a model is required as a framework of thinking in conducting this research. In this study, we adopt a model developed by [2] called “The DeLone and McLean Model of Information Systems Success”. This model has been used by many scholars to measure the success of various information systems, as stated in [3] that there are more than 300 articles from various journals utilizing this model as a base to measure the success of a variety of information systems. However, while DeLone and McLean model depicts a relationship between information systems’ quality to net benefits through user satisfaction and intention to use, we simplify the model by excluding the intention to use referring to a previous research conducted by [4].

2. INFORMATION SYSTEM SUCCESS MODEL

Information system success model proposed by [3] was developed as the continuation of [2]. This model is constructed based on the causal relationship of the variables contained in this model. The measurement of each variable is not calculated independently but overall, meaning that one affects the other. The model is depicted in the figure below.

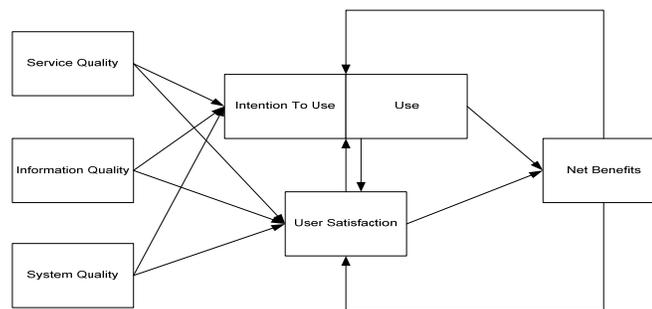


Figure 1. DeLone and McLean Success Model by [3]

According to the figure, it can be explained that the quality of service (Service Quality), the quality of system (System Quality) and the quality of information (Information Quality) are independent each other. However, these variables affect the other two variables: intention to use (Use) and user satisfaction (User Satisfaction). The amount of users to use a system (Use) may affect the value of user satisfaction (User Satisfaction) positively and negatively. Use (Use) and user satisfaction (User Satisfaction) affect individual impact (Individual Impact) which in turn affects the organizational impact (Organizational Impact).

3. THE METHODOLOGY

The method to conduct this study begins with the construction of conceptual framework, as depicted in the sub chapter 3.1. To follow, we detail the conceptual framework into a research design, as described in the sub chapter 3.2. We then implement the research design to our case study which is explained in the sub chapter 3.3.

3.1 Constructing Conceptual Framework

This research simplifies the model of DeLone and McLean (1992-2003) based on the object of research in the Department of Information Systems, ITS Surabaya.

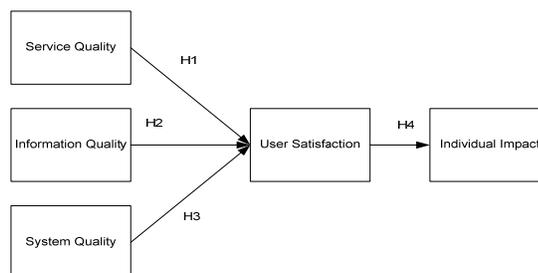


Figure 2. Conceptual Framework

In this research, three quality variables are used, i.e. service quality, information quality and system quality. The use of these three variables are taken directly based on variables contained in the D & M Success

Model 2003 [5]. However, we exclude two variables of the D & M Success model in our conceptual framework, those are: use variable and intention to use variable. The elimination of these variables is mainly related to the scope of our research which focuses on the influence of the three quality variables to the user satisfaction and the individual impact.

Based on the above conceptual framework, there are four hypotheses constructed in this research:

- H1: Service quality has an influence on the user satisfaction
- H2: Information quality has an influence on the user satisfaction
- H3: System quality has an influence on the user satisfaction
- H4: User satisfaction has an influence on the individual impact

3.2 Determining Indicator Variables

Referring to our conceptual model, we begin the construction of our research design by determining the measurement variables or the indicators of each variable.

Table 1. Variables and their indicators

Variables	Definition	Indicator Variables	References
Service quality	Service quality is a dynamic state associated with products, services, people, processes and environments that meet or exceed expectations.	<i>Tangibility, reliability, responsiveness, assurance, empathy</i>	[6]
Information quality	The output of an information system, concerning the value, benefits, relevance, and urgency of information produced (Pitt and Watson, 1997)	<i>Accuracy, timeliness, completeness, format</i>	[7]
System quality	the performance of system which refers to how well the capabilities of the hardware, software, policies and procedures of information systems can provide the information needed by users (DeLone and McLean, 1992)	<i>Ease of use, system flexibility, response time, security</i>	[8]
User satisfaction	the response and feedback that appear after the users using the information system	<i>Efficiency, effectiveness, satisfaction</i>	[9]
Individual impact	the effect of the application to the user behavior	<i>Improved individual productivity, improved knowledge sharing</i>	[10]

3.3 Constructing Research Design

We begin with determining formative and reflective measurement model. The formative measurement model for this study consists of service quality, information quality and system quality while the reflective measurement model consists of user satisfaction and individual impact. Combining the variables and their indicator, we construct a research design as seen in Figure 4. This research design explains variables (represented in a rounded rectangle) with their indicators (represented in rectangle) in which each indicator of each variable is composed of several questions (represented in small rounded rectangles with a number inside).

3.4 Defining the Case Study, Sampling, Data Collection and Analysis Tool

Our case study is e-learning system in the Department of Information Systems (IS Department), Institut Teknologi Sepuluh Nopember (<http://is.its.ac.id/apps/elearning/login/index.php>) and the object of study is the students of IS Department as the central user of this system. Several activities can be conducted by the users of this system such as assignment, forum, chat, blog, and quiz.

The population used in this research is bachelor students majoring in information systems. Sampling techniques used is simple random sampling. Using “Slovin” formula, the minimum number of samples required for this study is 88 respondents from 717 respondents. We also use homogeneous sampling, since we focus only to the bachelor students of IS department.

In term of data collection, we use questionnaire that represents questions for each indicator per variable in the conceptual framework. The questionnaire has to be completed by respondents as the input of data analysis. The output of this analysis is the influence of three quality variables to user satisfaction and individual benefit. The analysis itself is performed within two stages involving two tools: 1) descriptive

statistical analysis with SPSS 16.0 for validity, reliability and linearity tests and 2) inferential analysis using GSCA (Generalized Structured Component Analysis), part of Structural Equation Model (SEM-based).

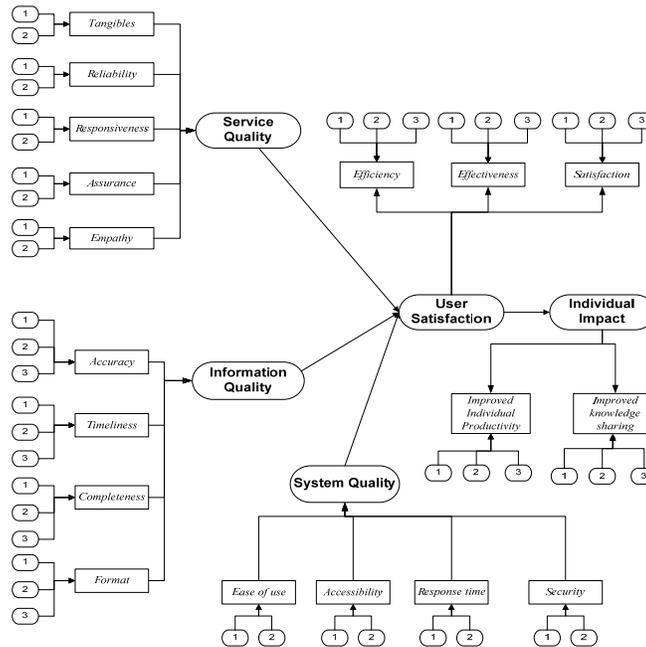


Figure 3. Research Design

4. RESULTS AND ANALYSIS

Within four weeks of collecting data, there were 225 respondents who filled in the online questionnaire. So, the number of sample used in this study is 225 respondents.

4.1 Reliability, Validity and Linearity Tests

In order to analyze the data and result, we require conducting reliability and validity tests. This study uses SPSS 17.0 to conduct the tests. Reliability test is aimed to check the consistency of our survey while validity test is used to ensure that our test or survey correctly measures what we aim to measure. For reliability test, we rely on Cronbach’s Alpha to measure how close the relation between items is. A sample is called reliable when the value of its Cronbach’s Alpha is larger than 0.6. As for the validity test, we calculate it based on the correlation between each variable and the total score of the variables, using Pearson Correlation. An item is valid when the value of the correlation contains **.

Table 2. The reliability and validity tests

Indicator	Label	Cronbach’s Alpha	Pearson Corr.	Indicator	Label	Cronbach’s Alpha	Pearson Corr.
Tangible	X1.1	0.862	0.866**	Ease of Use	X3.1	0.845	0.863**
Reliability	X1.2	0.894	0.853**	Accessibility	X3.2	0.962	0.818**
Responsiveness	X1.3	0.761	0.869**	Response Time	X3.3	0.845	0.863**
Assurance	X1.4	0.738	0.890**	Security	X3.4	0.733	0.872**
Empathy	X1.5	0.760	0.818**	Efficiency	Y1.1	0.823	0.830**
Accuracy	X2.1	0.760	0.727**	Effectiveness	Y1.2	0.773	0.853**
Timeliness	X2.2	0.887	0.749**	Satisfaction	Y1.3	0.717	0.875**
Completeness	X2.3	0.859	0.872**	Improved Individual Productivity	Z1.1	0.866	0.820**
Format	X2.4	0.802	0.872**	Improved Knowledge Sharing	Z1.2	0.892	0.576**

The above table was constructed based on the reliability and validity tests conducted in SPSS. According to the table, the values of Cronbach’s Alpha for all indicators are larger than 0.6 indicating that the data used in this study is reliable. As for the validity, all the indicators are marked with ** indicating that the data is also valid. Having this result, we conclude that our data in this study is reliable and valid to be analyzed further using GSCA tool.

4.2 Hypotheses Test

As mentioned earlier, this study was aimed to answer the three hypotheses. To do so, we run our data in GSCA considering the variables and indicators that have been explained in the research design. The path coefficients table below is an output obtained from GSCA, a base to answer the hypotheses.

Table 3. Path Coefficients

Path Coefficients			
	Estimate	SE	CR
Service Quality->User Satisfaction	0.159	0.067	2.36*
Information Quality->User Satisfaction	0.539	0.044	12.24*
System Quality->User Satisfaction	0.516	0.088	5.85*
User Satisfaction->Individual Impact	0.825	0.030	27.68*

CR* = significant at .05 level

According to the above table, all CR values are significant at 0.05 levels. This implies that all variables used in this study have a significant influence each other: service quality -> user satisfaction is significant with CR value is 2.36*, information quality -> user satisfaction is significant with CR value is 12.24*, system quality -> user satisfaction is significant with CR value is 5.85* and user satisfaction -> individual impact is significant with CR value is 27.68*. In addition to the significant levels, all variables in the path coefficients have positive influence to other related variables, as seen that all their estimate level is positive. Hence, the entire hypothesis is accepted as summed below.

Table 4. The hypothesis evidence

Hypothesis	Evidence
H1: Service quality has an influence on the user satisfaction	Accepted
H2: Information quality has an influence on the user satisfaction	Accepted
H3: System quality has an influence on the user satisfaction	Accepted
H4: User satisfaction has an influence on the individual impact	Accepted

Even though all hypotheses have been proven to be accepted, it is essential to comprehend the fitness of the model. This can be seen from the FIT, AFIT and NPAR values as follows.

Table 5. Model Fit

Model Fit	
FIT	0.573
AFIT	0.570
NPAR	27

Based on the output GSCA in the fitness of model, the identification goodness of FIT is 0.573. FIT shows the total variance of all the variables that can be explained by a particular model where the values range from 0 to 1. In this model, it means that the diversity variables consisting of service quality, information quality, system quality, satisfaction users and individual impact that can be explained by the model is 57.3 %. The remaining 42.7 % can be explained by other variables. Seen from the AFIT value, diversity variables consisting of service quality, information quality, system quality, satisfaction users and individual impact that can be explained by the model is 57 %. The remaining 43 % can be explained by other variables. The NPAR value of the model is 27, which shows the number of free parameters used in the calculation of GSCA tools, including weights, loadings, and path coefficients.

5. CONCLUSION

Service quality, information quality and system quality of e-learning used in the Department of Information Systems ITS positively influences on the satisfaction of students as users. In addition to that, the satisfaction of students in the use of the e-learning in the Department of Information Systems ITS also positively influences the impact to the individual student, i.e. the increase of the knowledge and productivity

of students on the courses. This study also proves that the simplification of DeLone and McLean model can be applied to the e-learning case.

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