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Effect of System Quality, Information Quality, and Perceived Usefulness on User Satisfaction of Webstudent Applications to Improve Service Quality for Budi Luhur University Students

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Abstract—Universitas Budi Luhur (UBL) is one of the private universities that prioritize the application of IT in the learning process. One application developed by UBL is the Webstudent application. The web-based application presents information and academic services for students. Based on interviews with UBLs Webstudent application users, there are still some complaints and inconveniences to application users. Most complaints are related to access to servers that are often interrupted when the number of application users increases. Also, the information displayed on Webstudent is not up-to-date. Therefore, in this study, an analysis of the relationship between application user satisfaction and several factors, namely system quality, information quality, and perceived usefulness, was analysed. This research uses the success model of the DeLone-McLean information systems combined with the Seddons success model. Data were collected by distributing questionnaires to active students in 2018/2019 odd semester at UBL. Based on the test results, it can be concluded that user satisfaction is influenced by system quality, information quality, and perceived usefulness simultaneously and significantly at 71.4%. Meanwhile, service quality is influenced by user satisfaction at 70.01%. The results of this study can be used as a basis for developing and improving services in the Webstudent application.

Keywords: *academic services, system quality, information quality, perceived usefulness, user satisfaction*

I. INTRODUCTION

The development of information technology is felt to be snowballing. Inter-community communication, which was initially done face-to-face immediately turned into indirect with the help of technology. Communication can occur despite different places, through the internet network. The internet is interconnection between computer networks, but in general, the internet must be seen as a source information power. Internet content is information, can be imagined as a database or multimedia library that is very large and complete. Even the Internet is seen as a world in another form (virtual) because almost all aspects of life in the real world exist on the internet such as business, entertainment, sports, and politics [1]. The

internet world is increasingly developing because humans are always looking for breakthroughs. The use of the internet in developing countries is seen as a technology that can improve the quality of education.

Universitas Budi Luhur (UBL) is one of the private universities that prioritize the application of IT in the learning process. One application developed by UBL is the Webstudent application. The webstudent application is a web-based application that presents the latest information and academic services for all students. Some of the services provided for students are the selection of courses, information on class schedules, exam timetable information, information on grades, Community Service Program, and thesis registration.

The Webstudent application has helped students get a variety of academic services. However, based on interviews with several students, the quality of services provided by Webstudent still needs to be improved. Information presented is sometimes not up-to-date. The quality of the information itself can affect user satisfaction of an application [2]. Also, in terms of availability, the webstudent is still often down and inaccessible. It happens when the high traffic usage of the internet network.

Therefore, in this study, the analysis was conducted to see the relationship between system quality, information quality, and perceived usefulness to student satisfaction with the Webstudent application services. This study involved respondents who came from active undergraduate level students in the odd semester of the 2018/2019 academic year at UBL. We developed and distributed questionnaires that contained several indicators based on DeLone-McLean's information system success model [3], which were combined with Seddon's information system success model [4]. The results of the questionnaire were tested for validity and normality and analysed using path analysis methods [5]. This research is expected to help UBLs in improving the quality of Webstudent applications that can also increase the level of student satisfaction with the UBL.

II. LITERATURE REVIEW AND HYPOTHESIS

Information systems are systems that can be defined by collecting, processing, storing, analysing, disseminating information for specific purposes [6]. Like other systems, an information system consists of inputs (data, instructions) and output (reports, calculations). The information system is a system within an organization that brings together the daily transaction processing needs that support the organization's operational functions that are managerial with the strategy activities of an organization to be able to provide certain external parties with the necessary reports [7]. Raymond McLeod considered that information systems are systems that can gather information from all sources and use various media to display information [8]. From some of the theories above, we can conclude that the information system is a system that provides information for management in making decisions and also for running company operations, where the system is a combination of people, information technology and systematic procedures.

For organizations that prioritize the application of information and communication technology, system quality is essential. The quality of the system will have an indirect impact on satisfaction with the users of the system. To measure system quality, various indicators are needed. According to the DeLone-McLean model, system quality indicators consist of ease of use, response time, reliability, flexibility, and security [3].

At present, many studies aim to determine the relationship between system quality and information quality towards user satisfaction in various organizations. The study by Pawirosumarto sought to find a relationship between system quality, information quality, and service quality to the satisfaction of using the e-learning system at Mercubuana University [9]. The study concluded that the better the perception of system quality and information quality will further increase the use of e-learning systems. E-learning learning is a method of learning that is not limited to place, space, and time. Another study at PT. Kereta Api Indonesia DAOP 9 Jember also obtained a similar conclusion [10]. The study concluded that the user satisfaction of the train ticketing system was influenced by system quality, information quality, and service quality.

In addition to system quality, information and services, perceived usefulness indicators can also affect user satisfaction. In the study by Tulodo & Solichin, the indicator of perceived usefulness was one of the factors that influenced user satisfaction with CARE's application to an insurance company in Jakarta [2]. Perceived usefulness is defined as the degree to which a person believes that using a particular system can improve performance [11]. Perceived usefulness variables can be measured whether information systems can increase productivity, facilitate work, be effective, useful, speed up work, and develop job performance [12].

User satisfaction with an information system is how users perceive information systems in real terms, but not on technical quality systems. The higher user satisfaction in information systems along with the quality of the information system itself. [13]. Besides user satisfaction, system quality is also

determined by the ease of use [14]. It shows that individuals will prefer to interact with technology if they think technology does not require too much cognitive effort. The implementation of this ease of use will be seen that someone will work more efficiently by using information technology compared to those who do not use it.

Meanwhile, service quality is the overall style and characteristics of a service that supports the ability to satisfy customers both directly and indirectly. Service quality is a measure of how well the level of service provided is by user expectations [15]. Delivery of service quality means consistently adjusting user expectations. Service quality is a measure of how services are distributed according to customer expectations. Submission of service quality means aligning customer expectations into something consistent.

Based on previous research related to the variables of system quality (X1), information quality (X2), perceived usefulness (X3), user satisfaction (Y), and service quality (Z), we proposed a hypothesis model (See Fig. 1) and constructed four hypotheses.



Fig. 1. Hypothesis model.

- H1: System quality has a significant effect on user satisfaction.
- H2: Information quality has a significant effect on user satisfaction.
- H3: Perceived Usefulness has a significant effect on user satisfaction.
- H4: User satisfaction has a significant effect on service quality.

III. METHODOLOGY

Research methods or scientific methods are procedures or steps in obtaining scientific or scientific knowledge. While research techniques are a way to carry out research methods. This study is quantitative research using a survey approach that is research that takes samples from a population. This research also uses a questionnaire as a primary data collection instrument. This research was conducted at the UBL, which has five faculties with a universal population of active students in the odd semester 2018/2019. The population is the overall research subject. If someone wants to examine all the elements in the research area, then the research is population research or population studies or census studies [16]. The population in this study is seen from the number of active students in 2018/2019 odd semester as many as 6,559. The data obtained from the IT departments of the UBL.

For that samples taken from the population must be genuinely representative [5]. This sample is through the convenience sampling method that takes from five faculties, with a total of 6,559 students. In this study, the number of samples obtained by the Slovin Formula [17]. The Slovin formula was chosen because, in sampling, the number of samples can be determined based on a simple formula and does not require a reference table. Also, the large number of population and limitations of the research underlie the need for proportional sampling.

$$n = \frac{N}{1 + Ne^2} \tag{1}$$

The Slovin formula showed at formula (1) with the n is the number of samples, N is the number of populations and e is the error tolerance. In this study, we use the sampling error tolerance 5%, so with the number of populations 6,559, we obtained 380 number of samples. Table 1 shows the number of sampling obtained from each faculty.

TABLE I. NUMBER OF RESPONDENTS

Faculty	Num of Active Students	%	Num of Sample
FTI	2.198	34%	127
FEB	1.526	23%	89
FISIP	599	9%	35
FT	298	5%	17
FIKOM	1.938	30%	112
TOTAL	6.559	100%	380,00

Variables are concepts that have variations in values, namely the existence of dependent and independent variables. Dependent variables are variables that are influenced or caused by the existence of independent variables, while the independent variables are variables that affect the dependent variable.

The variables in this study consisted of:

- Variable X (Independent Variables): System Quality (X1), Information Quality (X2), Perceived Usefulness (X3).
- Variable Y (Intervening Variable): User Satisfaction,
- Variable Z (Dependent Variable): Service Quality.

IV. RESULTS AND DISCUSSION

A. Path Analysis

Before conducting path analysis, we construct a path diagram model of the causal relationship between System Quality (X1), Information Quality (X2), Perceived Usefulness (X3), User Satisfaction (Y) and Service Quality (Z).

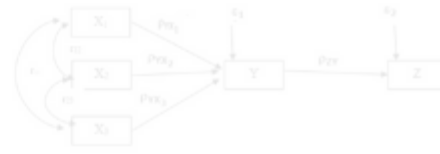


Fig. 2. Path analysis model.

Fig. 2 show the path analysis model. To conduct the path analysis, the relationship structure on Fig. 2 will be divided into two models, namely Sub-structure 1 and Sub-structure 2 (See Fig. 3). Sub-structure 1 connects the System Quality variable (X1), Information Quality (X2), Perceived Usefulness (X3) to User Satisfaction (Y). Sub-structure 2 connects the variable user satisfaction (Y) to service quality (Z). We have tested the relationships between variables on sub-structure 1 and sub-structure 2, both individually and simultaneously.

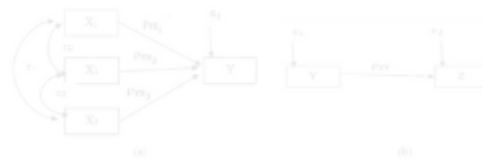


Fig. 3. Dividing model into two sub-structure, (a) sub-structure 1, and (b) sub-structure 2.

B. Testing the Relations of the Variables on Sub-Structure 1

Based on the model on sub-structure 1, we test the effect of independent variables X1, X2, and X3 on the dependent variable Y. First of all, we tested it simultaneously. Based on the results of data analysis with the ANOVA method (See Table 2), the Quality System variable (X1), Information Quality (X2), and Perceived Usefulness (X3) contribute simultaneously and significantly to the User Satisfaction variable (Y). The amount of the influence of variables X1, X2, and X3 on Y can be known through the following Model Summary (See Table 3).

TABLE II. ANOVA OF SUB-STRUCTURE 1

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	1382.283	3	460.761	313.482	.000
Residual	552.651	376	1.470		
Total	1934.934	379			

TABLE III. MODEL SUMMARY OF SUB-STRUCTURE 1

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.845	.714	.712	1.21236

It is known that the R-Square value is 0.714 or equal to 71.4%. So, variables X1, X2, and X3 affect the Y variable by 71.4%, and other variables outside of this study influence the

remaining 28.6%. Meanwhile, the value of the path coefficient for other variables outside the study is equal to 0.714. Based on the value of Sig. at Table 2, can be conclude that the variables X1 (system quality), X2 (information quality), and X3 (perceived usefulness) are contribute simultaneously and significantly to variable Y (user satisfaction).

In addition to testing the influence of independent variables (X1, X2, and X3) simultaneously on the dependent variable Y, we also test the effect of independent variables individually. Table 4 presents the results of the coefficient analysis of the model. To find out the effect of the independent variables partially on the independent variables, to find out the effect of partially independent variables on independent variables, it can be seen from the value of Sig. (See Table 4) for each variable.

TABLE IV. RESULTS OF THE COEFFICIENT ANALYSIS ON THE MODEL

Model	Unstandardized Coefficients			Standardized Coefficients	t	Sig.
	(Constant)	B	Std. Error	Beta		
1	.655	.369			1.773	.077
	X1	.052	.030	.079	1.747	.081
	X2	.114	.030	.189	3.866	.000
	X3	.400	.029	.628	13.621	.000

First of all, based on the significance value (the Sig. Column in Table 4), for the independent variable X1 (system quality) has a Sig. value 0.077, which is greater than 0.05 (alpha value of 5% that used in this study). Thus, variable X1 (system quality) does not contribute significantly to the Y variable (user satisfaction). Next, for the independent variable X2 (information quality) has a Sig. value 0.000 which is lower than 0.05 (alpha value). Thus, we can conclude that variable X2 (information quality) has contributed significantly to variable Y (user satisfaction). Finally, we also conclude that the perceived usefulness variable (X3) has significantly affected user satisfaction (Y) because it has the Sig. value 0.000, which is lower than alpha value.

Furthermore, summarizing the path coefficient values in the first sub-structure can be seen in Table 5. Based on the results of the first sub-structure analysis, it can be interpreted that user satisfaction (Y) is influenced by system quality (X1), information quality (X2) and perceived usefulness (X3) simultaneously and significantly at 71.4%. Another variable outside of this study influence the remaining 28.6%. Thus, the better the quality of the system, the quality of the information, and the perceived usefulness, the better the satisfaction of the users. The coefficient value of each path at the first sub-structure can be shown in Fig 4.

TABLE V. THE SUMMARY OF THE RESULTS OF TESTING ON THE SUB-STRUCTURE 1 PATH

The Influence between variables	Path coefficients (Beta)	Sig.	Testing Results	R Coefficient	Another variable
X1 to Y	0,079	0,081	Not significant	0.714	0.535
X2 to Y	0,189	0,000	significant		
X3 to Y	0,628	0,000	significant		



Fig. 4. The path coefficients (R) of the sub-structure 1.

C. Testing the Relations of the Variables on Sub-Structure 2

Based on the model on sub-structure 2 (See Fig. 3), we have tested the relationship between variable Y (user satisfaction) and variable Z (service quality). First of all, we tested it simultaneously. Based on the results of data analysis with the ANOVA method (See Table 6), the User Satisfaction variable (Y) contribute simultaneously and significantly to the Service Quality variable (Z). The amount of the influence of variable Y on Z can be known through the following Model Summary (See Table 7).

TABLE VI. THE ANOVA OF SUB-STRUCTURE 2

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3507.357	1	3507.357	885.321	.000
	Residual	1497.514	378	3.962		
	Total	5004.871	379			

TABLE VII. MODEL SUMMARY OF SUB-STRUCTURE 1

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.837	.701	.700	1.99040

From Table 7, it is known that the R-Square value is 0.701 or equal to 70.1%. So, variable Y affects the Z variable by 70.1%, and other variables outside of this study influence the remaining 29.9%. Meanwhile, the value of the path coefficient for other variables outside the study is equal to 0.714. Based on the value of Sig. at Table 7, it can be conclude that the variables Y (user satisfaction) is contribute significantly to variable Z (service quality).

On sub-structure 2, it is not necessary to test the relationship between variables individually because it only consists of one independent variable. The effect of variable Y on Z is known that is equal to 70.1%. It is also reinforced by the significance value (column Sig. In Table 6) of 0.000 or less than the alpha value (0.05). So, we can conclude that the variable user satisfaction has a strong influence on the variable quality of service. The R-value of each path at the second sub-structure can be shown in Fig 5.



Fig. 5. The path coefficient (R) of the sub-structure 2.

D. Overall Path Analysis

Finally, the overall effect of the causality of system quality variables (X1) and information quality (X2) and perceived usefulness (X3) on user satisfaction (Y) and their impact on service quality (Z) can be described in the structure model as seen at Fig. 6.



Fig. 6. Overall path analysis result.

Based on all path coefficients of the causal relationships that exist, it can be seen the direct causal influence, and the indirect causal influence of each variable studied. Based on Fig. 6, it can be concluded that the results of path analysis are as follows:

- User satisfaction (Y) is influenced by the quality of the system (X1), information quality (X2) and perceived usefulness (X3) simultaneously and significantly at 71.4% and other variables outside of this study influence the remaining 28.6%. However, individually, the quality variable of the system does not have a significant effect on user satisfaction, whereas the quality of information variables and perceived usefulness individually significantly influence user satisfaction.
- Based on the Sub-structure 2 analysis, it can be concluded that the Service quality (Z) is influenced by user satisfaction (Y) simultaneously and significantly at 70.01% and other variables outside of this study influence the remaining 29.9%.
- Direct and indirect causal influences can be described as follows:
 - a) The direct effect of the X1 variable on Y is 0.079
 - b) The direct effect of X2 variable on Y is 0.189
 - c) The direct effect of the X3 variable on Y is 0.628
 - d) The direct effect of variable Y on Z is 0.714
 - e) The indirect effect of X2 on Z is 0.1578
 - f) ϵ_1 of 0.535 shows the coefficient of influence of other variables outside this study can affect the Y variable.
 - g) ϵ_2 of 0.547 shows the coefficient of influence of other variables outside this research can affect variable Z.

V. CONCLUSION

This study aims to analyse the effect of system quality (X1), information quality (X2), perceived usefulness (X3), user satisfaction (Y), and service quality (Z). The independent variables used are Quality System, Service Quality, Perceived Usefulness. Next, the intervening variable is user satisfaction, and the dependent variable is service quality. The method used in this study is path analysis.

Based on the research that has been done, it can be concluded some of the results below:

- System Quality does not have a significant effect on the level of satisfaction of Webstudent users because the significance obtained is 0.081. So it can be said that there is still a system error that is still not able to respond when accessed by students quickly so that students do not feel satisfied as a whole using the system.
- Information Quality has a significant influence on the level of satisfaction of Webstudent users because the significance obtained is 0,000. So it can be said that the information produced by the system is easily understood and understood by students, so students feel essential and obligatory to access the Web Student.
- Perceived Usefulness has a significant influence on the level of satisfaction of Webstudent users because the significance obtained is 0,000. So, it can be said that Perceived Usefulness is very beneficial for students because it is instrumental in increasing student productivity in accessing it so that users feel satisfied.
- User Satisfaction has a significant influence on the level of mastery of Webstudent users because the significance obtained is 0,000. So it can be said that the level of user satisfaction makes students feel satisfied so that the quality of service provides direct evidence that is easily understood by students.

Based on the results of research that has been done, it can be seen that if an institution wants to increase user satisfaction, it is also necessary to improve system quality, information quality, and perceived usefulness. All three proved to have a significant effect simultaneously on user satisfaction. User satisfaction also has a positive influence on service quality, which means that more users are satisfied with an information system, so the quality of service also has good value.

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