# The Effect of System Quality, Information Quality and Service Quality on User Satisfaction of E-Learning System

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**Abstract.** The study aims at analyzing and explain the influence of system quality, information quality, service quality to user satisfaction e-learning system in the Master of Accounting. Total population of this study were 451 students with a total sample of 82. The sampling technique using proportional random sampling. The analytical method used GSCA (Generalized Structured Component Analysis). The results showed that the system quality, information quality, and service quality significantly influence user satisfaction e-learning system. The better the perception of the quality system, the quality of information, and the quality of service it will further increase user satisfaction.

**Keywords:** Quality Systems, Quality of Information, Quality of Service and User Satisfaction

**Abstrak.** Penelitian bertujuan untuk mengetahui dan menganalisis pengaruh kualitas sistem, kualitas informasi, kualitas layanan terhadap kepuasan pengguna sistem *e- learning* di Program Studi Magister Akuntansi. Jumlah populasi penelitian sebanyak 451 mahasiswa dengan jumlah sampel sebanyak 82. Teknik pengambilan sampel menggunakan *proportional random sampling*. Metode analisis yang digunakan GSCA (*Generalized Structured Component Analysis*). Hasil penelitian menunjukkan bahwa kualitas sistem, kualitas informasi, dan kualitas layanan berpengaruh signifikan terhadap kepuasan pengguna sistem *e-learning*. Semakin baik persepsi terhadap kualitas sistem, kualitas informasi, dan kualitas layanan maka akan semakin meningkatkan kepuasan pengguna.

**Kata Kunci:** Kualitas Sistem, Kualitas Informasi, Kualitas Layanan, dan Kepuasan Pengguna

## INTRODUCTION

The development and the use of technology in Indonesia shows an increasing trend, one of the means of using technology in Indonesia is the internet. As per the data from emarketer.com, Indonesia is currently ranked sixth in the number of internet users, as seen below:

**Table 1.** Users and Predictions of Internet Users in Indonesia Top Countries, Ranked by Internet Users, 2013-2018 in Millions

| No | Country | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|
| 1 | China* | 620.7 | 643.6 | 669.8 | 700.1 | 736.2 | 777.0 |
| 2 | US** | 246.0 | 252.9 | 259.3 | 264.9 | 269.7 | 274.1 |
| 3 | India | 167.2 | 215.6 | 252.3 | 283.8 | 313.8 | 346.3 |
| 4 | Brazil | 99.2 | 107.7 | 113.7 | 119.8 | 123.3 | 125.9 |
| 5 | Japan | 100.0 | 102.1 | 103.6 | 104.5 | 105.0 | 105.4 |
| 6 | Indonesia | 72.8 | 83.7 | 93.4 | 102.8 | 112.6 | 123.0 |
| 7 | Russia | 77.5 | 82.9 | 87.3 | 91.4 | 94.3 | 96.6 |
| 8 | Germany | 59.5 | 61.6 | 62.2 | 62.5 | 62.7 | 62.7 |
| 9 | Mexico | 53.1 | 59.4 | 65.1 | 70.7 | 75.7 | 80.4 |
| 10 | Nigeria | 51.8 | 57.7 | 63.2 | 69.1 | 76.2 | 84.3 |
| 11 | UK** | 48.4 | 50.1 | 51.3 | 52.4 | 53.4 | 54.3 |
| 12 | France | 48.8 | 49.7 | 50.5 | 51.2 | 51.9 | 52.5 |

| No | Country | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|----|---------|------|------|------|------|------|------|
| 13 | Phillippines | 42.3 | 48.0 | 53.7 | 59.1 | 64.5 | 69.3 |
| 14 | Turkey | 36.6 | 41.0 | 44.7 | 47.7 | 50.7 | 53.5 |
| 15 | Vietnam | 36.6 | 40.5 | 44.4 | 48.2 | 52.1 | 55.8 |
| 16 | South Korea | 40.1 | 40.4 | 40.6 | 40.7 | 40.9 | 41.0 |
| 17 | Egypt | 34.1 | 36.0 | 38.3 | 40.9 | 43.9 | 47.4 |
| 18 | Italy | 34.5 | 35.8 | 36.2 | 37.2 | 37.5 | 37.7 |
| 19 | Spain | 30.5 | 31.6 | 32.3 | 33.0 | 33.5 | 33.9 |
| 20 | Canada | 27.7 | 28.3 | 28.8 | 29.4 | 29.9 | 30.4 |
| 21 | Argentina | 25.0 | 27.1 | 29.0 | 29.8 | 30.5 | 31.1 |
| 22 | Colombia | 24.2 | 26.5 | 28.6 | 29.4 | 30.5 | 31.3 |
| 23 | Thailand | 22.7 | 24.3 | 26.0 | 27.6 | 29.1 | 30.6 |
| 24 | Poland | 22.6 | 22.9 | 23.3 | 23.7 | 24.0 | 24.3 |
| 25 | South Africa | 20.1 | 22.7 | 25.0 | 27.2 | 29.2 | 30.9 |

Note: Individuals of any age who use the internet from any location via any device at least once per month; * Excludes Hongkong, **Forecast from Aug 2014; ***Includescountries not listed Source: eMarketer, Nov 2014

Table 1 shows that the usage of internet technology in Indonesia in 2016 was 102.8 million users. It is estimated that in the next 2 years (in 2018) internet users in Indonesia will reach 123 million people or more than half of Indonesia's population. When compared to the data of internet users in the world in 2016, Indonesia's position is in sixth place under China, US, Japan, India, Brazil, and Japan.

The phenomenon seen from the development and usage of Science and Technology as described above greatly influences the tendency of change in the field of education. This is indicated by: (1) learning resources are very easy to find, (2) the use and utilization of ICT such as media and multimedia as well as e-learning, mobile learning, web-learning and others in learning activities, and (3) learning models in the form of individual or blended learning system.

The e-Learning system provides a new hope as an alternative solution to most problems in Indonesian education sector, with functions that could be adapted to specific needs, either as a supplement (addition), complement (complementary), or substitution (substitute) for the current and ongoing learning activities in the classroom (Wildavsky, 2001; Lewis, 2002). The use of the e-learning system is expected to be able to assist students in improving their learning both inside and outside of the classroom. Individuals and groups will take advantage of the e-learning system if such system could provide benefits for them.

A research was conducted by Hsu et al., (2011) on users of e-learning systems using the Moodle platform by comparing learning with conventional methods and e-learning system methods, as well as to determine the gap between high-achieving students and low-achieving students. The results showed that there is a negative relationship between the efficiency of the e-learning system and the accessibility to computers, while there is a positive relationship between the frequency of taking the e-learning system and the students' test scores.

The success model of information systems has been developed by many researchers (Bailey and Person 1983, DeLone and McLean 1992, Seddon 1997, Rai et al., 2002). Of the several success models of information system, the DeLone and McLean (1992) model received higher attention from the subsequent researchers (Mc Gill et al., 2003). Livari (2005) also empirically tested the DeLone and McLean (D and M) model, the results proved that the

success of information systems is influenced by the quality of information systems and the quality of information generated from the system, and the quality of services.

This study focuses on individual perceptions, which is the individual perceptions related to system quality, information quality, service quality, usage, and user satisfaction with regards to the use of e-learning systems. Individual readiness for technology refers to a person's tendency to accept and use technology to accomplish goals in everyday life and at work (Parasuraman, 2000).

**System Quality.**

System quality is a measurement of the information system process that focuses on the results of the interaction between the user and the system. System quality has several attributes, such as: equipment availability, equipment reliability, ease of use, and response time. These attributes are the determining factors on why an information system is used or why it is not used.

Nielsen (2000) argues that there are several principles of *usability*, namely: online environment, navigation, response time, credibility, and content. From various literatures, there are four dimensions of system quality, namely: navigation, ease of use, response time, and security. McKinney et al., (2002) suggested that there are three dimensions of system quality, which are: access, usability, and navigation.

System quality can be measured by looking at its functional part, which is usability. Usability is part of the principle of interaction between human and computers that provides a collection of important instructions about learning design. Nielsen (2000) argues that usability consists of four basic principles in online activities, namely: navigation, timeliness, credibility, and content. Palmer (2002) argues that the important elements in the use of the website are consistency, ease of use, clarity of interaction, ease of reading, information arrangement, speed, and layout/website design. Such elements could improve the level of use of e-learning system and thus motivate more students to use it.

**Information Quality.** Information quality is related to system use, user satisfaction, and net benefits (DeLone and McLean 1992, 2003). Information quality has several attributes, such as: information obtained from a system, accuracy of information, relevance of information, timeliness, and completeness of information. Information quality is often a key dimension regarding the end-user satisfaction instrument (Ives et al., 1983; Baroudi and Orlikowski, 1988; Doll et al., 1994). As a result, information quality is often not distinguished as a unique construct but is measured as a component of user satisfaction. Therefore, the measurement of this dimension is a problem for any research on the success of information system. DeLone and McLean (1992) and the model by Seddon (1997) show that system quality and information quality have a significant positive effect on the user satisfaction of information system. Information quality referred to in this study is the user's perception of the quality of information generated by the internet that is used by students to obtain any needed information.

Some of the characteristics used to assess information quality include: accuracy, timeliness, relevance, informativeness, and competitiveness (Weber, 1999). Information quality refers to the level of relevance (relevant), timeliness (timely), and safety which are presented with a good information design in a website (Liu and Arnett, 2000). The best quality of information can be delivered by the internet provided that it can be obtained easily (not difficult to find), organized (in order), and available in large quantities (Istianingsih and Wijanto, 2008).

Information quality could also be seen from the potential to produce unlimited information both within the organization and outside the organization (Barnes and Vidgen, 2003). According to Li et al., (2002), good quality information is information that is accurate, clear, detailed, relevant, easy to obtain, timely, up to date and appropriate to the user needs. Liu and Arnett (2000) stated that the best quality information will improve the usage of users' perception and improve the use of information systems. Lin and Lu (2000) also add that acceptance or rejection of a system by the users is caused by the quality provided by the system itself.

Zeithaml et al., (1990) formulated a model that emphasizes the important clauses that service providers need to comply with in order to improve service quality. Devaraj et al., (2002) view SERQUAL as consisting of four dimensions, namely: empathy, reliability, responsiveness, and assurance. The other dimensions are price, time, ease of use, and usefullness.

Service quality, as proposed by (Parasuraman, 1988), is based on a comparison between what should be offered and what is provided. Companies that have a high level of service quality in particular develop two information systems that are very important to improve service capabilities. The first is an information system that collects service performance information for management purposes and employee motivation. Second, information systems that distribute information that is valued useful by customers.

According to DeLone and McLean (2003) service quality is more important than other practices because the users of the current system mostly consist of customers, as opposed to employees or internal users of the organization. Therefore, poor support on services could lead to lost customers and even lost sales.

**User Satisfaction.**

Satisfaction is a consideration of a product or service that provides a pleasant level of fulfillment of user desires at the lower or upper level (Oliver, 1997). This definition places emphasis on consumers rather than customers because even if customers pay for products or services, they are not likely to directly use said products or services. Satisfaction towards a product or service requires the experience of using a product/service for each individual.

User satisfaction has a very central role in the development of information systems. The results of the research presented by McKeen et al., (1994); Doll and Deng (2001); Guimaraes et al., (2003); Suryaningrum (2003) found that user understanding is an effective variable and is able to determine user satisfaction, system success and system quality.

The use of the three variable terms (user satisfaction, system success, and system quality) is often mixed up and could get confusing. Often, user satisfaction is considered the same as system quality, or otherwise user satisfaction is used to measure system quality. Guimaraes et al., (2003) stated that the use of user satisfaction to measure system quality will actually lead to a subjective assessment of the notion of system quality. User satisfaction is more concerned with the user's view of the information system, but not on the technical quality aspect of the system concerned. In other words, user satisfaction measures the perception of what is provided by the information system rather than providing information about the functional capabilities of the information system in question.

The Success Dimension of user satisfaction is the level of user satisfaction when using the information system. This is considered to be one of the most important steps of the success
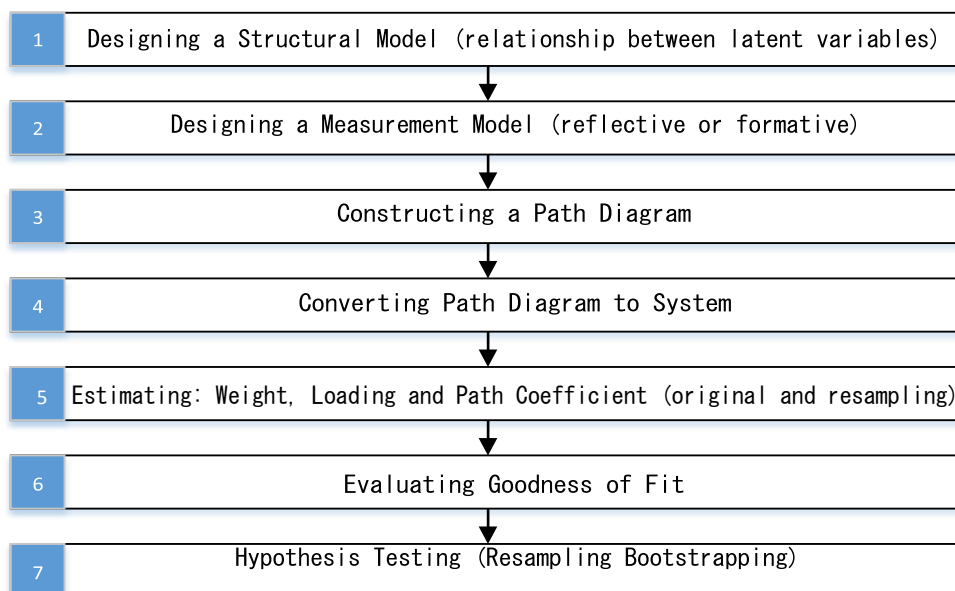
information system. Information system user satisfaction can be assessed using the following criteria: adequacy, effectiveness, efficiency, overall satisfaction (Seddon and Kiew, 1994); enjoyment, information satisfaction, and system satisfaction (Gable et al., 2008).

**METHOD**

The research object in this study is the students who use the e-learning system in Master of Management Study Program, Postgraduate Program, Mercu Buana University and the Unit of Analysis of the students of Master of Management program. The population referred to in this study are the students of Master of Management Program who are the users of the 2013 e-learning system with a total of 451 students. In this study, the sampling technique used the Slovin formula, with a total sample of 82 students.

**Technical Analysis.** The data analysis carried out in this study is in accordance with the research flow chart; the initial activity carried out after finding the research problem was literature study and followed by the preparation of a questionnaire. After perfecting the questionnaire by testing its validity and reliability, primary data collection was carried out by conducting a field survey. The survey data obtained were then analyzed using GSCA (Generalized Structured Component Analysis).

Inferential statistical analysis was carried out using the Generalized Structured Component Analysis (GSCA) approach, which is a new approach to the structural equation model – maximum likelihood (SEM-ML) (Hwang and Takane, 2002, 2007). GSCA is a powerful soft modeling (Ghozali, 2007) because it is not based on many assumptions, i.e. the data does not have to have a certain distribution (distribution free), the sample does not have to be large, and the same model can be used for indicators with nominal, ordinal, interval to ratio scales. The steps of the GSCA analysis are as follows:



| | |
|---|---|
| 1 | Designing a Structural Model (relationship between latent variables) |
| 2 | Designing a Measurement Model (reflective or formative) |
| 3 | Constructing a Path Diagram |
| 4 | Converting Path Diagram to System |
| 5 | Estimating: Weight, Loading and Path Coefficient (original and resampling) |
| 6 | Evaluating Goodness of Fit |
| 7 | Hypothesis Testing (Resampling Bootstrapping) |

**Figure 1.** The steps of GSCA Analysis

**RESULTS AND DISCUSSION**

**Linearity Test.** Before conducting a test analysis of exogenous variables n endogenous variables using Generalized Structured Component Analysis (GSCA), it is necessary to first conduct a linearity test. The linearity test aims to determine whether two variables have a significant linear relationship or not. This test is usually used as a prerequisite in correlation analysis or linear regression. The test was done on SPSS using the *Test for Linearity* with a significance level of 0.05. Two variables are said to have a linear relationship if the significance (Linearity) is less than 0.05. The linearity test is intended to determine the significance level of deviations from the linearity of the relationship. If the deviation found is not significant, then the relationship between exogenous variables and endogenous variables could be concluded to be linear. If the relationship is linear, then the test can be followed up.

This linearity relationship also shows a unidirectional relationship. The assumption of linearity using the Curve Fit method is that the relationship between variables is declared linear if it meets one of the following two possibilities: (1) significant linear model (sig linear model < 0.05), (2) non-significant linear model and all possible non-significant models (sig linear model > 0.05, and sig model other than linear > 0.05). The model specifications used as the basis for testing are: linear, quadratic, cubic, inverse, logarithmic, power, compound, growth, and exponential models. The results of the linearity test of the relationship between variables are presented in full in Table 2.

**Table 2. Linearity Test Results**

| Relationship between variables | | Test Result | Linearity |
|---|---|---|---|
| System Quality (X1) | User Satisfaction (Y) | 0.000 | Linear |
| Information Quality (X2) | User Satisfaction (Y) | 0.000 | Linear |
| Service Quality (X3) | User Satisfaction (Y) | 0.000 | Linear |

*Source: Processed Data, 2016*

The results of the linearity test in Table 2 show that all relationships between variables are linear and significant with a level of <0.05, thus it can be said that the linearity assumption is fulfilled.

**GSCA analysis**

The results of the model test based on Goodness of Fit (GFI) are as follows:

**Table 3.** *Measurement* Model

| Model Fit | |
|---|---|
| FIT | 0.529 |
| AFIT | 0.522 |
| NPAR | 69 |

*Source: Ghozali, 2008*

**FIT = 0.529**

FIT shows the total variance of all variables that can be explained by a particular model. A good FIT value ranges from 0 to 1, where a greater FIT value would mean that the variance of the data can be explained in the model (Ghozali, 2008). From Table 3 above, it can be seen that the model formed can explain all the existing variables of 0.529. The diversity that can be explained by the model is 52.9%, thus the model can be said to be quite good.

## AFIT = 0.522

AFIT (Adjusted Fit) is similar to adjusted R square analysis. AFIT can be used for model comparison. The model with the largest AFIT value can be selected among the better models. As seen from Table 3, the value of AFIT is 0.522, which means that the diversity that can be explained by the model is 52.2%.

**Hypothesis test.** Based on the empirical data proposed in this study, it is possible to test the proposed hypothesis. Table 4 shows a hypothesis test by looking at the estimate value and SE (Standard Error), where if the value is less than 0.05 then the relationship between variables is significant.

**Table 4.** Recapitulation of Hypothesis Test Results

| Hypothesis | Relationship between Variables | Estimate | SE | CR | P-Value | Significancy |
|---|---|---|---|---|---|---|
| H1 | system quality > user | 0.168 | 0.044 | 3.81* | 0.000 | Significant |
| H2 | information quality > | 0.135 | 0.038 | 3.52* | 0.001 | Significant |
| H3 | service quality > | 0.148 | 0.036 | 4.11* | 0.000 | Significant |

*CR* = *significant at .05 level*
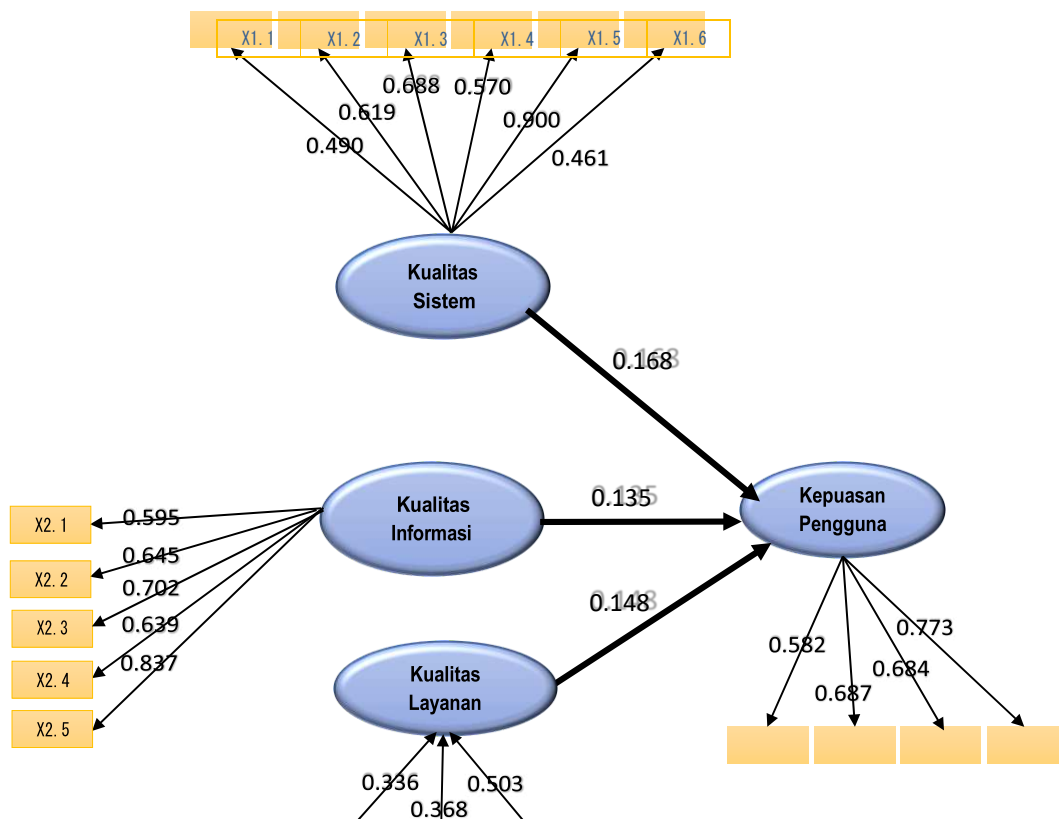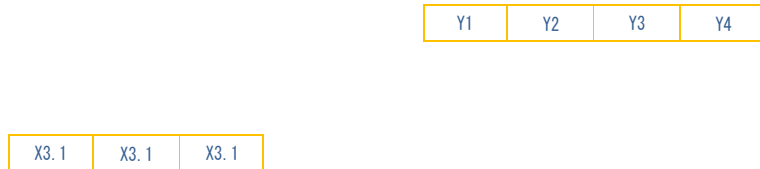
**Figure 2.** Results of the Research Hypothesis Model

The interpretation of Table 4 (Figure 2) can be explained as follows: (1) The result for the coefficient of the effect of system quality on user satisfaction is 0.168, with a standard error of 0.044, with a critical ratio value and a p-value of 3.81 and 0 respectively. Since the p-value (0) < 0.05, it can be concluded that the influence of system quality on user satisfaction is significant. This means that the higher the quality of the system, the higher the user satisfaction. (2) The result for the coefficient of the effect of information quality on user satisfaction is 0.135, with a standard error of 0.038, with critical ratio values and p-values of 3.52 and 0.001 respectively. Since the p-value (0.001) <0.05, it can be concluded that the effect of information quality on user satisfaction is significant. This means that the higher the quality of information, the higher the user satisfaction. (3) The result for the coefficient of the effect of service quality on user satisfaction is 0.148, with a standard error of 0.036, with a critical ratio value and a p-value of 4.11 and 0 respectively. Since the p-value (0) < 0.05, it can be concluded that the effect of service quality on user satisfaction is significant. This means that the higher the service quality, the higher the user satisfaction.

**Discussion**

**The effect of System Quality (X1) on User Satisfaction (Y).** The hypothesis test for the relationship between system quality and user satisfaction is completely presented in Table 4, and graphically presented as follows:
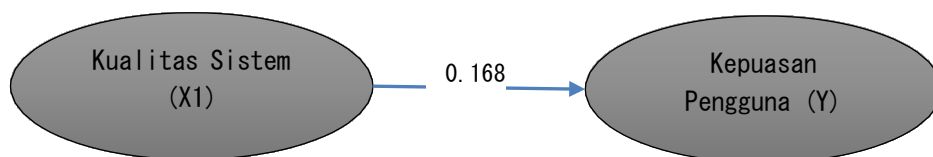


GSCA analysis produces an estimate value of 0.168 and a critical ratio value of 3.81* which means that system quality has a significant effect on user satisfaction. Considering that the estimate value is positive, this means that there is a unidirectional relationship between the quality of the system and user satisfaction, i.e. the higher the quality of the e-learning system provided by the postgraduate program, the higher the level of satisfaction of the users of the e-learning system in the postgraduate program.

The quality of the information system is a characteristic of the inherent information about the system itself, as a *perceived ease of use*, which is the level of how much computer

technology is felt to be relatively easy to understand and use. This shows that if users of information systems feel that using the system is easy, they do not require much energy and time to use it, so they will be happier to work and feel satisfied.

The higher the quality of the information system used, it is predicted that it will affect the higher level of satisfaction of its end users. The findings of this study confirm and expand the Theory of Reasoned Action (TRA), or the theory of joint action developed by Ajzen and Fishbein (1980), which states that a person will utilize an information system on the grounds that the system will produce benefits for him/herself. This TRA describes the stages of human behavior. In the early stages, behavior is assumed to be determined by intentions. At the next stage, intentions can be explained in the form of attitudes toward the behavior, and subjective norms can be explained in the form of beliefs about the consequences of doing behavior against the normative expectations of relevant people. When someone receives a system with a good system quality, then in the person's mind he will feel happy and satisfied with the information system.

The findings of this study also confirm and expand the theory by DeLone and McLean (1992) that good system quality and information quality, represented by the usefulness of the system output obtained, can affect the level of usage of the system concerned (*intended use*) and user satisfaction. The success of information system is influenced by perceived information quality and perceived system quality, which are significant predictors of user satisfaction. User satisfaction is a significant predictor of intended use and perceived individual impact.

The findings of this study also confirm and expand the opinion of Guimaraes et al., (1992) and Yoon, et al., (1995) which argues that the measure of user satisfaction on a computer system is reflected by the quality of the system owned. User satisfaction towards an information system is how the user perceives the real information system, not on the technical quality of the system (Guimaraes et al., 2003). In research literature as well as in practice, user satisfaction is often used as an alternate measurement for the effectiveness of information system (Melone, 1990).

The findings of this study also confirm and expand the opinion of Seddon and Kiew (1995) and affirm that user satisfaction can be influenced by system quality. It also confirms the research of Livari (2005) by showing the results that system quality has an effect on user satisfaction. The results of this study are also in accordance with research conducted by Subramanian (2005). However, research by Zulaikha and Radityo (2007) shows different results, which is that system quality has no significant effect on user satisfaction. The results of this study also support the results of research by Istiningsih and Utami (2009), providing empirical evidence that the quality of information systems has a positive and significant effect on user satisfaction.

The results of this study indicate that the users of the e-learning system will feel satisfied if the e-learning system provided by the university has a good system quality. This means that users will be satisfied if the e-learning system comes with easy-to-understand guidelines, presents material according to learning needs, supports the learning process, is easy to operate, makes communication between teachers and students more intensive, and has easy access to e-learning system features. Conversely, when the e-learning system provided by the university has poor system quality, it would result in a lower level of user satisfaction.

**The Effect of Information Quality (X2) on User Satisfaction (Y).** The hypothesis test for the relationship between information quality and user satisfaction is completely presented in Table 4, and graphically presented as follows:
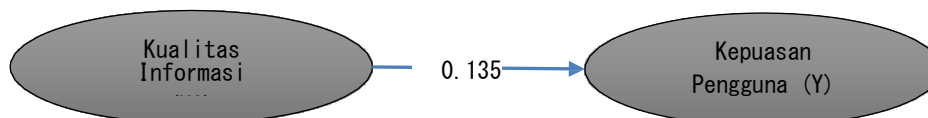


GSCA analysis produces an estimate value of 0.135 and a critical ratio value of 3.52* which means that information quality has a significant effect on user satisfaction. Considering that the estimate value is positive, this means that there is a unidirectional relationship between the information quality and user satisfaction, i.e. the higher the quality of information provided by the e-learning system, the higher the level of user satisfaction with the e-learning system will be.

Information quality refers to the quality of output in the form of information generated by the information system used. Users of information systems certainly hope that by using the system they will get the information they need. The characteristics of the information produced by a certain information system may differ between one another. An information system that is able to produce timely, accurate, appropriate, and relevant information and fulfills other criterias and measures of information quality will be influencial to the user satisfaction.

The findings of this study also confirm and expand the Theory of Planned Behavior (TPB) which is the development of TRA. Ajzen (1975) developed a construct that did not yet exist in TRA. This construct is called perceived behavioral control. It is used to control the limitations and the lack of resources used to perform the behavior. The limitations of a person in providing or inputting information will be supported by the quality of the information obtained, so that users become satisfied.

The findings of this study also confirm and expand the opinion of Guimaraes, et al., (1992) and Guimaraes and O'Neal (1995) which affirms that user satisfaction on a computer system is reflected by the quality of information held. User satisfaction on an information system refers to how the user perceives the real information system, and not the technical quality of the system (Guimaraes, Staples, and McKeen, 2003). This result also supports the research of Istiningsih and Utami (2009), which provides empirical evidence that information quality has a positive and significant effect on user satisfaction. A higher quality of information produced by an information system is predicted to improve the end-user satisfaction of the information system.

The findings of this study also confirm and extend the results of research conducted by DeLone and McLean (1992), Rai et al., (2002), McGill et al., (2003), Almutairi and Subramanian (2005), and Livari (2005) who show that the quality of information systems has a positive effect on user satisfaction. If users of information systems believe that the quality of the system and the quality of information generated from the system used is good, they will feel satisfied in using the system.

The findings of this study also confirm and expand the theory of McKiney et al., (2002), that user satisfaction on web usage is affected by the information quality and system quality. The success of a system can be measured by user satisfaction in using the system, both in terms

of the quality of the system and the information produced. System quality has three dimensions, namely: access, usability, and navigation. Information quality is influential because information is very important so it needs to have the dimensions of understandability, reliability, and usefulness.

The findings of this study also confirm and extend the research of Kim et al., (2009) and Palmer (2002) that were specifically conducted to look at the aspects of information quality on Websites, such as their content and layout. The results of the study have found a significant relationship between construction and user satisfaction. Meanwhile, the research does not support the research conducted by Marmer (2005), which does not find a significant relationship between measurement of information quality and user satisfaction of two organisations' information systems.

The findings of this study also confirm and extend the research of Saba (2012) who conducted a study to examine the relationship between e-learning systems, self-efficacy, and student learning outcomes at Wawasan Open University (WOU) Malaysia. The research focuses on the effects of e-learning system management on user satisfaction and the relationship between user satisfaction and e-learning outcomes. User satisfaction is an important predictor of e-learning outcomes. On the other hand, system quality, information quality, and independent learning behavior have a significant direct impact on the satisfaction felt by students.

The results of the study indicate that the users of the e-learning system will feel satisfied when the information provided by the university is of high quality and is useful for its users. A user will be satisfied using the e-learning system if the e-learning system provides clarity about the lecture material, the e-learning system provides details about the lecture material, the e-learning system provides timeliness in presenting information, and the e-learning system provides accurate assessments. Conversely, when the quality of the information provided gets worse/lower, the satisfaction of e-learning system users in universities will also decline.

**The Effect of Service Quality (X3) on User Satisfaction (Y).** The hypothesis test for the relationship between service quality and user satisfaction is completely presented in Table 4, and graphically presented as follows:
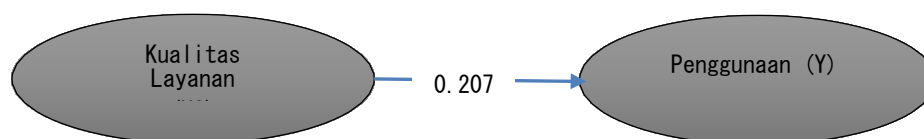


GSCA analysis produces an estimate value of 0.207 and a critical ratio value of 6.17* which means that service quality has a significant effect on usage. Considering that the value of the estimate is positive, this means that there is a unidirectional relationship between service quality and usage, i.e. the higher the quality of services provided by the e-learning system, the higher the level of usage of the e-learning system.

The findings of this study confirm and extend the research conducted by Wang (2007) which examines the success of e-commerce in Taiwan, and Wang and Liao (2007) which examines the success of e-government in Taiwan. Both studies show a significant positive relationship between service quality and system usage. The positive relationship between the two studies can occur because the research was conducted on the system environment as a support for the services provided.

The findings of this study confirm and expand the theory of Parasuraman et al. (1985) which states that service quality is a comparison between the service quality perceived by users and the quality that should be provided by the information department. He stated that the quality of service depends on the difference between the expected service and the perceived service. If service expectations are higher than perceived, it can be said that the service is unsatisfactory. If the expectation is lower than perceived, it can be said that the service quality is at a satisfactory level.

The findings of this study also confirm and extend the research conducted by: Kositanurit et al., (2006), Halawi et al., (2007), and Petter et al., (2008). Petter et al., (2008) conducted a meta-analysis using the DeLone and Mclean (2003) model to determine whether the model has been validated by previous studies. The results of the research by Petter et al., are: there is a strong relationship between the variables: user satisfaction and intention to use, net benefits and intention to use, system quality and user satisfaction, user satisfaction and net benefits, information quality and user satisfaction, information quality and intention to use, as well as system quality and intention to use; and there is a moderate relationship between information quality and use, use and individual impact, and system quality and use.

The results of this study indicate that users will use the e-learning system provided in the presence of the following conditions: the download process of lecture materials takes place quickly, the assessment of online learning outcomes is equivalent to conventional lectures, and the management unit is easy to contact when users encounter problems in accessing the e-learning system. On the other hand, the lower the service quality, the lower the level of use.


**CONCLUSION**

This study aims to investigate the effect of system quality, information quality, and service quality on user satisfaction of a website-based e-learning system in the Master of Accounting Study Program. The conclusions that can be drawn are as follows: The better the perceived quality of the system, the higher the user satisfaction of the e-learning system will be. This finding confirms previous studies which state that system quality has a significant effect on user satisfaction. This finding confirms one of the theories from Guiemares et al., (1992) which states that the measure of user satisfaction on a computer system is reflected by the quality of the system owned. The better the perceived quality of the information, the higher the user satisfaction of the e-learning system will be.

This finding confirms previous studies which state that the information quality has a significant effect on user satisfaction. This finding confirms one of the theories from Ives et al., (1983) which states that information quality is a key dimension regarding the instrument of end-user satisfaction.

The better the usage of an e-learning system, the higher the user satisfaction of the e-learning system will be. This finding confirms previous studies which state that usage has a significant effect on user satisfaction. Although there is a significant relationship, the average respondent's answers to the four indicators still tend to not be as good, hence, efforts are still needed to increase usage, especially in terms of: regularly using the e-learning system in lectures (daily use), using the e-learning system for the clear guidelines (navigation patterns), increasing the frequency of visits to the e-learning system (number of site visits), and taking quizzes with the e-learning system (number of transactions).

As suggestions for the Master of Management Postgraduate Program that acts as the organizer of the e-learning system, further improvement shall be carry out in terms of the

quality of information, system, and services. With the increase in system quality, information quality, and service quality, it is expected that it will have an impact on user satisfaction.

As suggestions for further research, since this study only involves a single student perspective, future research is recommended to use the perspective of the organization/institution (e-learning system management unit) and the lecturers who teach the courses.

## REFERENCES

Almutairi, H. & Subramanian, Girish, H., 2005, An Empirical of the DeLOne and McLean Model in the Kuwaiti Private Sector, The Journal of Computer Information System, Spring, 45,3,pg.113

Ajzen, I., & Fishbein, M., 1980, Understanding Attitudes and Predicting Social Behavior, 83-111, Prentice-Hall, Englewood Scliffs, New York.

Bailey, J.E. and Pearson, S.W. (1983). Development of a Tool for Measuring and Analyzing Computer User Satisfaction*, Management Science* (29:5), May 1983, 530-545.

Barnes, S.J. and Vidgen, R.T. (2003). Measuring Web Site Quality Improvements: A Case Study of The Forum On Strategic Management Knowledge Exchange. *Industrial Management And Data Systems*, 297-309.

Baroudi JJ and Orlikowski WJ. (1988). A Short-Form Measure of User Information Satisfaction: A Psychometric Evaluation and Notes On Use. Journal Of Management Information Systems 4(4), 44–59.

Davis, Fred D., (1989), "*Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology*‖, MIS Quarterly, September, 319- 340 Davis, Fred D., Bagozzi, Richard P., dan Warshaw, Paul R., (1989), ―*User Acceptance Of Computer Technology: A Comparison Two Theoretical Models*‖ Management Science, August, 982-1003

DeLone, W.H., and McLean E.R, (1992). ―*Information System Success: The Quest forthe Dependent Variable*‖. Information System Research, March, 60-95.

--------------. (2003). "The Delone and Mclean Model of Information Systems Success: A Ten-Year Update*,*‖ *Journal of Management Information Systems*, vol. 19,no. 4, 9–30.

Devaraj S, Fan M, and Kohli R (2002). Antecedents of B2C Channel Satisfaction and Preference: Validating E-Commerce Metrics. Information Systems Research 13(3), 316–333.

Doll, William dan Xiadong Deng. (2001). "The Collaborative Use Of Information Technology: End User Participation and System Success". *Information Resources Management Journals*. ABI/INFORM Global.

Doll, W.J., and Torkzadeh, G. (1991). "*Issues and Opinions—The Measurement of End-User Computing Satisfaction*: Theoretical and Methodological Issues," MIS Quarterly, 15, 1991, 5-10.

Doll W.J., Xia W., and Torkzadeh G. (1994). *A Confirmatory Factor Analysis of The End-User Computing Satisfaction Instrument*. MIS Quarterly 18(4), 453–461.

Engelbrecht, E. (2003). *A Look at E-Learning Models: Investigating Their Value for Developing an E-Learning Strategy*. University of Pretoria Bureau for Learning Development, Unisa Progressio.

Gable, G., Sedera, D., & Chan, T. (2008). Re-conceptualizing Information System Success: The IS-Impact Measurement Model. *Journal of the Association for Information Systems*, 9(7), 377-408.

Ghozali Imam, (2007). Model Persamaan Struktural : Konsep dan Aplikasi dengan Program Amos Ver 5.0, Badan Penerbit Universitas Diponegoro. ISBN 979.704.233.2

Guimaraes, T., and Igbaria, M. (1997). "*Client/Server System Success: Exploring the Human Side*", *Decision Sciences* (28), 851-876.

Guimaraes, T., M. Igbaria, and M. Lu. (1992). ―*The determinants of DSS success: An integrated model‖*. Decision Sciences 23, no. 2: 409-430.

Guimaraes, T., D. S. Staples, dan J. D. McKeen, (2003). ―*Empirically Testing Some Main User*-Related *Factor for Systems Development Quality‖*. QualityManagement Journal 10, No. 4: 39- 54.

Guimaraes; Armstrong; O'Neal. 2006. Empirically Testing Some Important Factors for Expert Systems Quality. The Quality Management Journal; 2006; 13, 3; ABI/INFORM Global pg. 7.

Halawi La, Mccarthy R, dan Aronson J.E. (2007), "An empirical investigation of knowledge-management systems success", The Journal of Computer Information Systems, Vol. 48, No. 2, hal. 121–135.

Ho, W. (2004). *Use of Information Technology and Music Learning in the Search for Quality Education. British Journal of Educational Technology, Vol 35* No. 1, 57-67.

Holsapple, C., and Lee-Post A., (2006). *Defining, Assessing, and Promoting E- Learning Success: An Information Systems Perspective Decision Sciences,Journal of Innovative Education, Volume 4 Number 1, Printed in the U.S.A.*

Hsu D., Karampatziakis N., Langford J., and Smola A,. (2011). *Parallel online learning*. In Scaling Up Machine Learning.

Hwang, H., & Takane, Y. (2002). Structural Equation Modeling By Extended Redundancy Analysis. In S. Nishisato, Y. Baba, H. Bozdogan, and K. Kanefuji(Eds.), *Measurement and Multivariate* Analysis (pp. 115–124). Tokyo: Springer Verlag

Hwang, H., DeSarbo, S.W., & Takane, Y. (2007). Fuzzy Clusterwise Generalized Structured Component Analysis. *Psychometrika, 72, 181–198.*

Igbaria, M., and Tan, M. 1997. "*The Consequences of Information Technology Acceptance on Subsequent Individual Performance*," *Information & management* (32:3), pp 113121.

Igbaria, M., Livari,.J., & Maragahh, H.(1995). *Why do individuals use computer technology? A Finnish case study*. *Information & Management*, 29, 227-23

Istianingsih & Utami (2009) Pengaruh Kepuasan Pengguna Sistem Informasi Terhadap Kinerja Individu pada Pengguna Sistem Informasi Akuntansi di Indonesia, SNA XII, Palembang

Istianingsih dan Setyo Hari Wijanto. 2008. Pengaruh Kualitas Sistem informasi, Kualitas Informasi, dan Percived Usefulness Terhadap Kepuasan Pengguna Software Akuntansi. Simposium Nasional Akuntansi IX, Pontianak.

Ives B, Olson M and Baroudi JJ (1983). *The Measurement of User Information Satisfaction*. Communications of the ACM 26(10), 785–793.

Jenkins, M. dan Hanson, J., (2003) *"e-Learning Series: A guide for Senior Managers‖, Learning and Teaching Support Network (LTSN) Generic Centre*, United Kingdom, August 2003.

Kamali, S.B Kan, M. Bashir, A.B. Khan. (2009). *Motivation and Its Impact on Job Performance, European Journal of Work and Organizational Psychology*: Vol. 17 (2).

Khan, B. H. (2005). *E-Learning QUICK Checklist*. Hershey, PA: Information Science Publishing.

Kelley, H. (2001) *"Attributional Analysis of Computer Self-efficacy,"* PhD Dissertation, The University of Western Ontario

Kheterpal, S., (2005). Quality Measures in Design & Development of e-LearningContent (Sumb

er:

http://elearn.cdac.in/eSikshak/eleltechIndia05/PDF/26Quality%20Measures%20in%20Design%20&%20Development%20of%20eLearning%20Co

Kim, J., B. Jin and JL. Swinney. 2009. The role of etail quality, e-satisfaction, and etrust in online loyalty development process. Journal of Retailing and Consumer Services. 16. 239- 247.

Kim, JH., M. Kim and J. Kandampully. 2009. Buying environment characteristics in the context of e-service. European Journal of Marketing. 43 (9/10). 1188- 1204.

Kositanurit, B., Ngwenyama, O., dan Osei B.K. (2006). An exploration of factors that impact individual performance in an ERP environment: An analysis using multiple analytical techniques. European Journal of Information Systems, Vol. 15, no. (6),pp. 556–568.

Lee, H. (2006). *Promoting the knowledge-based economy through e-Learning*. In Kim, J.(Ed.) *New paradigms of human resources development.* Seoul: Korea Research Institute for Vocational Education and Training (KRIVET).

Lee Y., Strong D., Kahn B., Wang R. Y., (2002). *AIMQ: A Methodology for Information Quality Assessment, Information and Management*, Vol. 40, No. 2, 133-146.

Lee-Post, A. (2009). *e-Learning Success Model: an Information Systems Perspective*. Electronic Journal of e-Learning, 7(1), 61-70.

Lending, D. & Dillon, T. (2007). *The Effects of Confidentiality on Nursing Self- Efficacy with Information Systems*. *International Journal of Healthcare Information Systems and Informatics*, 2 (3), 49-64.

Lewis, D.E., (2002). *More Companies Seeing Benefits of E-Learning*. A Departure From Training by The Book. The Boston Globe, Globe Staff. (Sumber: http://bostonworks.boston.com/globe/articles/052602/elearn.html)

Li, Y., K. Tan and M. Xie,. (2002). "Measuring Web-based Service Quality", Total

Quality Management, Vol. 13, No. 5:685-700.

Lin, H.-F. (2007). Measuring online learning systems success: Applying the updated DeLone and McLean model. CyberPsychology and Behavior, Vol 10 (6), 817- 820.

Liu C and Arnett KP (2000). *Exploring The Factors Associated With Web Site Success In The Context Of Electronic Commerce*. Information and Management 38(1), 23–33.

Livari, Juhani, (2005). *"An Empirical Test of the DeLone and McLean Model of Information System Success‖*, Database for Advances in Information Systems, Spring,, 36,2.pg.8.

Marmer, E., Langmann, B., 2005. Impact of ship emissions on the Mediterranean summertime pollution and climate: a regional model study. Atmospheric Environment 39, 4659e4669.

Melone N.P. 1990,"A Theoretical Assessment of The User Satisfaction Construct in Information System Research", Management Science. January.

McGill, Tanya, Hobbs, Valerie, dan Klobas, Jane, (2003). "*User-Developed Applications and Information Systems Success: a Test of DeLone and McLean's Model‖,* Information resource Management Journal; Jan-Mar; 16.1. 24.

McKeen JD, Guimaraes T and Wetherbe JC (1994). *The Relationship Between User Participation And User Satisfaction: An Investigation Of Four Contingency Factors.* MIS Quarterly 18(4), 427–451.

McKeen J. D., Guimaraes, T., dan D. S. Staples. (2003). *Empirically Testing Some Main User-Related Factor for Systems Development Quality, Quality* Management Journal, 10(4): 39- 54.

McKiney, V., Yoon, K., and Zahedi, Fatemeh, (2002). "*The Measurement of Web- Customer Satisfaction: An Expectation and Disconfirmation Approach‖,* Information System Research, 13,3.

Nielsen J. (2000). *Designing Web Usability*. Indiana USA: New Riders.

Oliver LW (1987). *Research integration for psychologists: an overview of approaches. Journal of Applied Social Psychology* 17(10), 860–874.

Palmer, J. W. (2002). *Web Site Usability, Design, and Performance Metrics. Information Systems Research*, 13(2), 151-167.

Parasuraman, A., (2000). Technology Readiness Index (TRI): *A Multiple Item Scale to Measure Readiness to Embrace New Technologies, Journal of Service Research.*

Petter, S., DeLone W., dan McLean E. (2008). Measuring Information Systems Success: Models, Dimensions, Measures, And Interrelationships. European Journal of Information Systems, 17, 236–263.

Planning and Action Research. Human Relations, 1(2), 143153.

Pitt, L., Watson, R., dan Kavan, B. (1998). *Measuring Information Systems Service Quality: Lessons from Two Longitudinal Case Studies*. MIS Quarterly, 22(1), 61-79.

Rai, A., Lang, S.S. and Welker, R.B., (2002). "Assessing the Validity of IS Success Models: An Empirical Test and Theoretical Analysis", Information System Research, Vol.13, No.1. 29-34.

Saba, T. 2012. Implications of E-learning systems and self-efficiency on students outcomes: a model approach. Human-centric Computing and Information Sciences Journal.

Seddon, P.B., and Yip, S-K. (1992). "*An Empirical Evaluation of User Information Satisfaction (UIS) Measures for Use with General Ledger Accounting Software*", *Journal of Information Systems* Spring, 75-92.

Seddon.P.B. (1997). "*A Respecification and Extension of The DeLone and McLean's Model* of IS Success", Information System Research.8.September. 240-250.

Seddon, P. B., and Kiew, M.Y. (1996). "*A Partial Test and Development of DeLone and MacLean's Model of IS Success.*" Australian Journal of Information Systems 4(1).

Solimun. (2012). *Investigation the Instrument Validity: Concistensy between Criterion Validity and Unidimensional Validity. 2nd Basic Science International Conference 2012.* February 24 –25th Aria Hotel Malang Indonesia.

Subramanian, Girish. H. (2005). "*An Empirical Application of the DeLone and McLean Model in The Kuwaiti Private Sector.*" Journal of Computer Information Systems.

Suryaningrum, D. H., (2003). The Relationship Between User Participation and System Success: Study of Three contigency Factors on BUMN in Indonesia. Simposium Nasional Akuntansi. Surabaya 2003.

Umar, H., (1999). "Metode Penelitian Untuk Skripsi dan Tesis Bisnis", Penerbit PT

Raja Grafindo Persada, Cetakan II, Jakarta.

Venkatesh, V. (2000). *Determinants Of Perceived Ease Of Use: Integrating Control, Intrinsic Motivation, And Emotion Into The Technology Acceptance Model. Information System Research*, 11 (4), 342-365.

Venkatesh, V., dan Davis, F. D. (1996). *A Model Of The Antecedents Of Perceived Ease Of Use: Development and Test. Decision Sciences*, 27(3), 451

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D.    (2003). *User Acceptance of Information Technology: Toward a Unified View. MIS Quarterly*, vol. 27, no. 3, 425-478.

Wang Y. (2007). "*Assessing e-commerce Systems Success: A Respecification and Validation of the DeLone and McLean model of IS success,*" Blackwell Publishing Ltd, Information Systems Journal*, 1-29

Wang, Yi-Shun dan  Liao, Yi-Wen (2007). "*Assessing e-Government systems success: A validation of the DeLone and McLean Model of Information Systems Success,*" Government Information Quarterly*, 1-17

Wang, R., dan Strong, D., (1996). *Beyond Accuracy: What Data Quality Means to Data Consumers, Journal of Management Information Systems*, 4, pp.5-34.

Webber, Ron, (1999). Information System Control and Audit, First Edition, Upper Saddle River, New Jersey: Prentice Hall Inc.

Wildavsky, Ben. (2001). "Want More From High School?" Special Report: E-Learning 10/15/01, Sumber: http://www.usnews/edu/elearning/articles).

Watson, R., Pitt, L., dan Kavan, B. (1998). *Measuring Information Systems Service Quality: Lessons from Two Longitudinal Case Studies*. MIS Quarterly, 22(1), 61-79.

Yoon, Y., T. Guimaraes, and Q. O"Neal. 1995. Exploring the factors associated with

expert systems success. MIS Quarterly 19, no. 1: 83-106

Zeithaml, V., Berry, L. dan Parasuraman, A., (1996). "*The behavioral consequences of service quality*", *Journal of Marketing*, Vol. 60, April, 31-46.

Zeithaml, V.A., Parasuraman, A. and Berry, L.L. (1990). *Delivering quality service; Balancing customer perceptions and expectations* , The Free Press, New York, NY.

Zikmund, William. G. (2003). *Exploring Marketing Research 8th Edition*. USA, Ohio: South Western, A Division of Thomson Learning.

Zmud, W. (1984). *Design alternatives for organizing information systems activities. MIS Quarterly*, 8(2), 79-93.

Zulaikha dan Radityo, Dody. 2008. "Kesuksesan Pengembangan Sistem Informasi: Sebuah Kajian Empirik dengan DeLone and MacLean Model" Jurnal MAKSI Vol 8 No.2: hal 199-212