

Information System Analysis with Delone & Mclean Model Approach on Online Services of Perbanas Institute library

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Abstract

The purpose of this study was to determine the effect of system quality, information quality, service quality on satisfaction, and the effect of satisfaction on net benefits using the DeLone & McLean model. The population in this study were Perbanas Institute students who had used the Online Library Service. The sampling technique was selected using purposive sampling and a sample of 100 people. Data retrieval using primary data with a questionnaire tool and the method used is SEM (Structural Equation Modeling) with the help of the SmartPLS application. The results showed that system quality, information quality and service quality had a positive and significant effect on user satisfaction, then user satisfaction had a positive and significant effect on net benefits. In the intervening, relationship system quality, information quality and service quality have a positive and significant effect on net benefits through user satisfaction.

Keywords: *information quality; net benefits; service quality; system quality; user satisfaction*

INTRODUCTION

The development of information technology and telecommunications has shown very rapid progress. Adaptation of information technology in a service is something that must be done in order to improve the quality of a service or increase the satisfaction of its users. The Perbanas Institute Library is one of the college library in the DKI Jakarta area. The development of information technology and the Covid 19 Pandemic prompted the Perbanas Institute Library to seek internet-based remote services, and a service system was created called Layanan Online Perpustakaan. The library has a role as a unit that processes, develops, and maintains collection materials and provides information services relating to library materials to its users. Not only that, the library is also expected to increase the reading interest of the community around the library's environment. Therefore, it would be nice if the library services provided had good service quality in order to fulfill the expectations and the role of the library. Since the establishment of the Online Library Service in early January 2020, the number of users has been increasing, the number can be seen in the following graph:

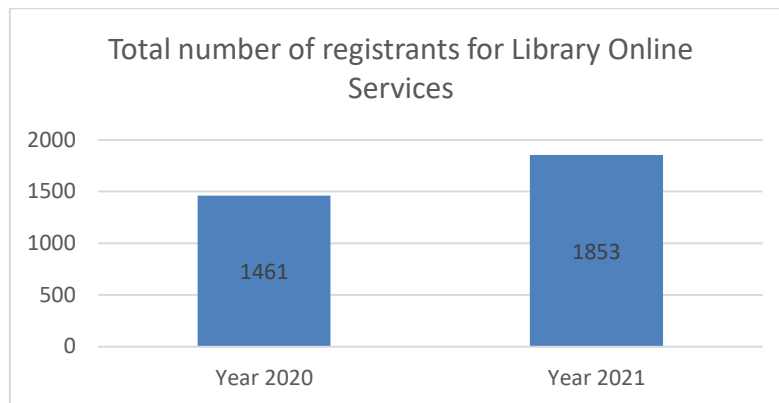


Figure 1. Users of Online Library Services

Figure 1 shows that the library's online service users have increased rapidly from the year it was launched in 2020, thus the Perbanas Institute Library must continue to improve its good service in order to meet satisfaction and provide good benefits to users. In simple terms, the more users, the greater the effort that must be made to maintain the quality of the services provided. Sutarno (2004) states that good service is a service that can provide a sense of satisfaction and pleasure to its users. Therefore we need a model to measure the success or success in an information system.

LITERATURE

The DeLone and McLean model is a model that shows a causal relationship between the effect of system quality, information quality and service quality on the intensity of use or use. System quality, information quality and service quality to satisfaction, and satisfaction to net benefits. Rahayu, et al. (2019) states that the DeLone and McLean information system success model is considered capable of explaining system evaluation from the user side, namely user satisfaction and net benefits, so the authors choose this research model.

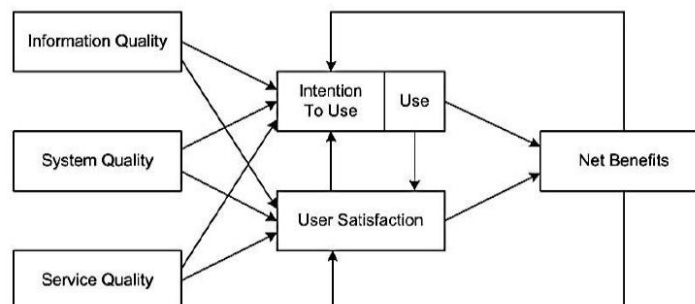


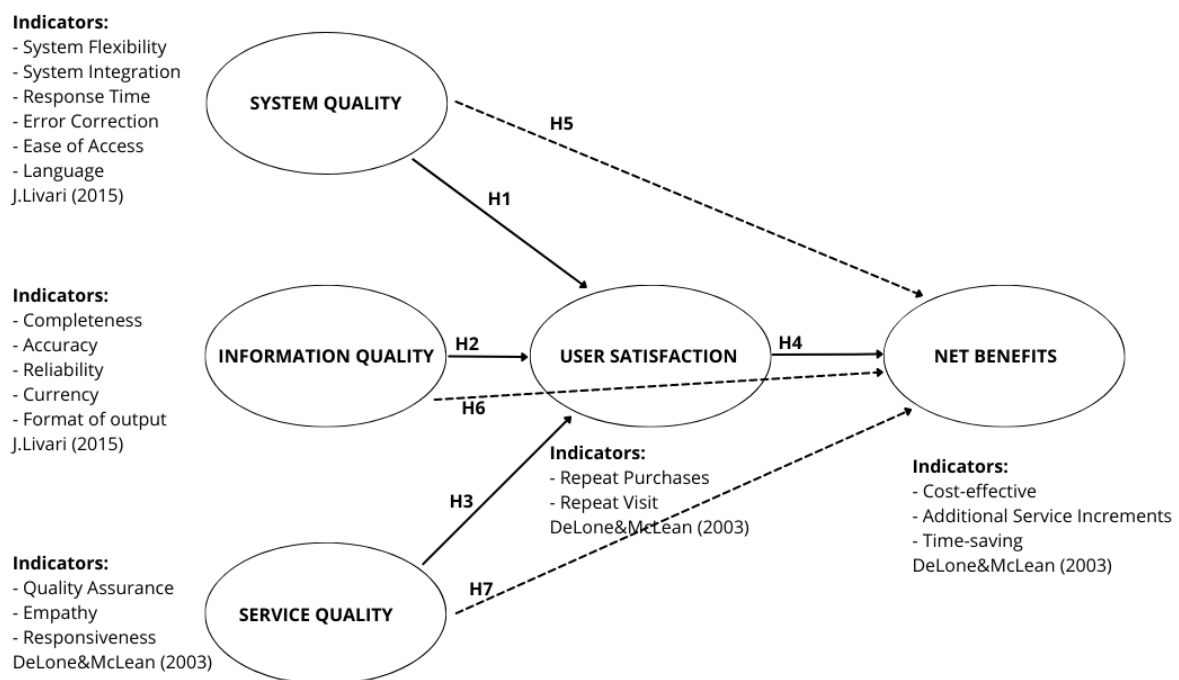
Figure 2. DeLone&McLean Models

Source : DeLone & McLean (2003)

The quality of the system is part of determining the success of the information system which will have an impact on user satisfaction. According to Jogiyanto (2007) in Rakhmadian et al (2017) the quality of the system is a technical quality of the information system itself. Thus the quality of the system is a combination of hardware and software in an information system. If the system used is very easy to understand and makes it easier for users, there will be a good perception of the user and will have an impact on perceived satisfaction. The indicator used by the author is to replicate the research of J. Iivari (2005) in Saputro, et al (2015) which consists of six measurement scales, namely system flexibility, system integration, response time, error correction, ease of access, and language. The quality of information can be seen from the output of the information such as the system information, such as information that is easy to understand, good accuracy, sufficient completeness, and accuracy. DeLone and McLean explain that the higher the quality of information produced by an information system, the more user satisfaction will increase. The information quality measurement indicator used is a reference from J.Iivari (2005) in Saputro, et al (2015) using five measurement scales, namely completeness, accuracy, reliability, currency, and format of output.

Service can be described as doing something for someone else. Tjiptono (2017) mentions that service implies everything that certain parties (individuals or groups) do to one another (individuals or groups) for example, such as customer service. There are three components that influence the satisfaction of service quality. The first guarantee is the quality assurance provided by the system, the second is the empathy system, is the system's concern for the user and the third is the responsiveness of the system, the quality of the response of the system to the actions taken by the user. Kotler & Keller (2018) define satisfaction in general as a person's feelings of pleasure or disappointment that arise as a result of comparing the performance results obtained against their/users' expectations. The indicators used to measure this satisfaction refer to the research of DeLone and McLean, namely repeat purchases and repeat visits.

Net benefit is a term to describe the expected results of the implementation of an information system. Net benefits relate to the extent to which information systems contribute to the success of individuals, groups, organizations, industries, or countries. The indicators are cost-effective, additional service increments, and time-saving (DeLone & McLean, 2003). Intensity-use/use was not included in this study because the information system under study is mandatory, considering that there are difficulties when this variable is used as a measure of the success of information systems implemented in a mandatory environment (DeLone & McLean, 2003) in Amriani & Iskandar (DeLone & McLean, 2003) in Amriani & Iskandar (2019). The use of information systems in previous studies conducted on mandatory information systems showed inconsistent results. When the use of a system is mandatory, the level of use/intensity of use of a system provides little information about the success of the system.



Research Hypothesis

- H1 : System Quality has a positive and significant effect on User Satisfaction.
- H2 : Information Quality has a positive and significant effect on User Satisfaction.
- H3 : Service Quality has a positive and significant effect on User Satisfaction.
- H4 : User Satisfaction has a positive and significant effect on Net Benefits.
- H5 : System Quality has a positive and significant effect on Net Benefits through User Satisfaction.
- H6 : Information Quality has a positive and significant effect on Net Benefits through User Satisfaction.
- H7 : Service Quality has a positive and significant effect on Net Benefits through User Satisfaction.

METHODS

This study uses a quantitative method, based on Sugiyono's (2018) explanation, a quantitative method based on the philosophy of positivism, which is used to examine certain populations or samples. The purpose of this research is the relationship between research variables, namely system quality, information quality and service quality variables on user satisfaction variables and user satisfaction variables on net benefits. The population of this research is the academic community of Perbanas Institute who have used the Online Library Service. In this study, the analysis tool used the Structural Equation Model (SEM), the sample used in this study used a minimum sample (Hair et al. 2010) as many as 100 respondents. Collecting data using a questionnaire using a Likert scale as a measuring tool. The Likert scale consists of numbers 1 (strongly disagree) to 5 (strongly agree) for all variables.

The analysis technique was carried out using Structural Equation Modeling (SEM) with the help of the SmartPLS program. This technique was chosen on the grounds that it does not require a lot of assumptions, the data does not have to have a multivariate normal distribution and the number of samples does not have to be large. The research PLS technique applies two components to the causal model, the measurement model and the structural model. The measurement model was conducted to assess the validity and discriminant validity, while the structural model described the hypothesized relationships.

RESULT

The results of data collection through questionnaires from 100 respondents were grouped into the characteristics of gender, age, type of user and user/non-user.

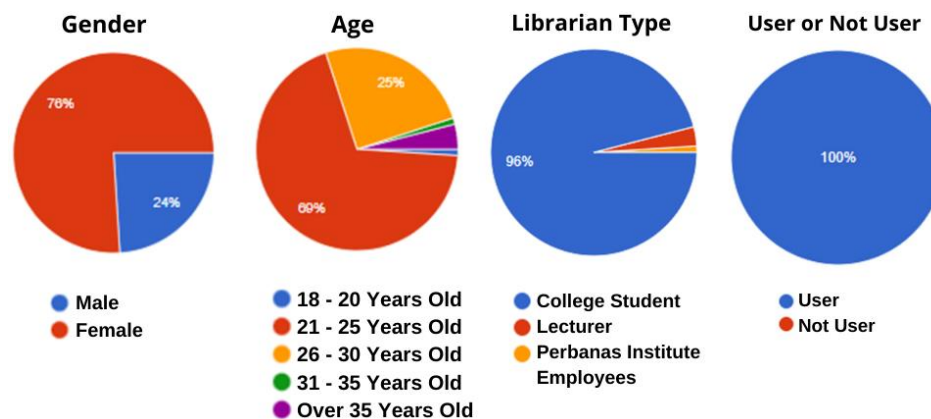


Figure 4. Characteristics of Respondents
Source: Data processed by researchers (2021)

Evaluation of Measurement Model)

Validitas Konvergen

Convergent validity is intended to determine the validity of each relationship between an indicator and the latent variable. The limit of Factor Loading is > 0.70 which is used in this study.

Table 1. Factor Loading

Variabel	Variable Indicator	Factor Loading Value
Information Quality (KI)	KI1	0,806
	KI2	0,840
	KI3	0,793
Service Quality (KL)	KL1	0,743
	KL2	0,823
	KL3	0,736
	KL4	0,802
	KL5	0,729
System Quality (KS)	KS1	0,837
	KS2	0,827
	KS4	0,844
	KS5	0,703
User Satisfaction (KP)	KP1	0,855
	KP2	0,893
	KP3	0,915
	KP4	0,865
	KP5	0,860
Net Benefits (MB)	MB1	0,780
	MB2	0,721
	MB3	0,841
	MB4	0,803
	MB5	0,741

Source: Data processed by researchers (2021)

Table 1 has eliminated the indicator variables that do not meet the criteria, namely KI4, KI5, KS3 and KS6. The next step is to see the score or value of the Average Variance Extracted (AVE). The recommended AVE value must be greater than 0.50 (Chin in Ghozali (2020) and its presentation in Table 2 below.

Table 2. Average Variance Extracted (AVE)

Variable	Average Variance Extracted (AVE)
User Satisfaction	0,771
Information Quality	0,661
Service Quality	0,589
System Quality	0,648
Net Benefits	0,606

Source: Data processed by researchers (2021)

Discriminant Validity

Table 3. Fornell-Larcker Criterion

Variable	User Satisfaction	Information Quality	Service Quality	System Quality	Net Benefits
User Satisfaction	0,878				
Information Quality	0,683	0,813			
Service Quality	0,729	0,603	0,768		
System Quality	0,777	0,645	0,695	0,805	
Net Benefits	0,732	0,616	0,636	0,620	0,778

Source: Data processed by researchers (2021)

Table 3 shows that each correlation between variables-with-the-variables-itself is greater than the correlations between these-variables-with-other variables. It can be seen that the correlation between user satisfaction and user satisfaction is 0.878, greater than the correlation between user satisfaction and

information quality is 0.683, as well as the correlation of the following variables, so that all variables can be said to have good discriminant validity.

Table 4. Cross Loadings

Variable Indicator	User Satisfaction	Information Quality	Service Quality	System Quality	Net Benefits
KI1	0,525	0,806	0,478	0,554	0,508
KI2	0,600	0,840	0,502	0,516	0,447
KI3	0,537	0,793	0,490	0,506	0,557
KL1	0,651	0,557	0,743	0,551	0,594
KL2	0,582	0,435	0,823	0,560	0,487
KL3	0,502	0,402	0,736	0,549	0,348
KL4	0,530	0,423	0,802	0,497	0,504
KL5	0,504	0,473	0,729	0,504	0,474
KP1	0,855	0,652	0,625	0,632	0,662
KP2	0,893	0,545	0,682	0,680	0,671
KP3	0,915	0,611	0,668	0,708	0,615
KP4	0,865	0,642	0,601	0,701	0,686
KP5	0,860	0,545	0,625	0,690	0,571
KS1	0,596	0,476	0,567	0,837	0,524
KS2	0,593	0,524	0,581	0,827	0,481
KS4	0,694	0,578	0,653	0,844	0,480
KS5	0,605	0,488	0,424	0,703	0,512
MB1	0,445	0,359	0,355	0,317	0,780
MB2	0,568	0,456	0,554	0,620	0,721
MB3	0,594	0,446	0,511	0,426	0,841
MB4	0,634	0,502	0,514	0,524	0,803
MB5	0,570	0,608	0,507	0,489	0,741

Source: Data processed by researchers (2021)

Table 4 cross loadings shows the correlation between the indicator variables and the variables themselves. The criteria for measuring cross loadings are that each indicator variable has a higher loading value for each measured latent variable compared to indicators for other latent variables. It can be seen that each indicator value of the cross loadings variable which is colored blue has a higher loading value than the indicator for other variables, so it can be said to have a good discriminant validity value (Indriani & Bangun, 2019).

Reliability Test

Table 5. Composite Reliability and Cronbach's Alpha

Variabel	Cronbach's Alpha	Composite Reliability
User Satisfaction	0,926	0,944
Information Quality	0,744	0,854
Service Quality	0,826	0,877
System Quality	0,817	0,880
Net Benefits	0,837	0,884

Source: Data processed by researchers (2021)

Table 5 shows the output results that all variables for Composite Reliability in this study have a value of > 0.7 and all variables for Cronbach's Alpha in this study have a value of > 0.6. It can be concluded that the results are valid and have high reliability.

Evaluation of the Structural Model (Inner Model)

R-Square (R²)

Table 6. R-Square (R²)

<i>Variabel Endogen</i>	<i>R Square</i>
User Satisfaction	0,702
Net Benefits	0,535

Source: Data processed by researchers (2021)

In Table 6, the acquisition of these values explains that the variables of system quality, information quality and service quality affect the user variable by 70.2%, and then the remaining 29.8% is influenced by other variables outside of this research variable. User satisfaction affects the net benefits by 53.5% which is included in the moderate category and then the remaining 46.5% is influenced by other variables outside of this research variable.

Path Coefficient Test

Table 7. Path Coefficient

Variable	User Satisfaction	Information Quality	Service Quality	System Quality	Net Benefits
User Satisfaction					0,732
Information Quality	0,233				
Service Quality	0,297				
System Quality	0,420				
Net Benefits					

Source: Data processed by researchers (2021)

Table 7 shows the path coefficient between exogenous variables and endogenous variables. Based on the table above, the exogenous variables of information quality, service quality and system quality on endogenous variables of user satisfaction show a positive path coefficient value, as well as the effect of user satisfaction on the net benefit variable. So that indicates a unidirectional effect, if the quality of information, service quality and system quality increases, the user satisfaction variable will also increase, and the same is true, if the satisfaction variable increases, the net benefit variable also increases, in the opposite direction as well.

Hypothesis testing (T-Test)

Hypothesis testing was carried out by looking at the significance value to determine the effect between variables through the bootstrapping procedure in SmartPLS. The bootstrap procedure uses the entire original sample to re-sampling, then analyzed by looking at the value of t-statistics on the bootstrap path coefficient. The T-statistics in the new path coefficient indicate the level of significance in hypothesis testing. The significant t-statistical assessment criteria can be seen if the t-statistic > 1.96 at a significance level of p-value 0.05 (Hair et al, 2014).

Table 8. Path Coefficient (Bootstrapping)

Variable	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Information Quality -> User Satisfaction	0,233	0,232	0,068	3,408	0,001
Service Quality -> User Satisfaction	0,297	0,305	0,095	3,133	0,002

System Quality -> User Satisfaction	0,420	0,415	0,091	4,633	0,000
User Satisfaction -> Net Benefits	0,732	0,742	0,045	16,310	0,000

Source: Data processed by researchers (2021)

H1: System Quality has a positive and significant effect on User Satisfaction.

From Table 8 above, it can be concluded that H1 is accepted. In line with research conducted by Amriani & Iskandar (2019), Hidayatullah, et al (2020) and Rakhmadian, et al (2017). System quality is the technical quality in an information system which is a combination of software and hardware in the information system. If the output obtained can make it easier for users and cause good perceptions for users, it will have an impact on perceived satisfaction. In the Online Library Service, the quality of the system can be seen from the service itself, the web system and the mechanisms it has. The system quality indicators used in this study after the loading factor test were system flexibility, system integration, error correction, access convenience, and language. Acceptance of this hypothesis indicates that respondents are satisfied with the indicators given in the form of questions answered by the respondents themselves. It can also be concluded that the quality of the existing system in the Online Library Service has all the characteristics of the indicator variables studied.

H2: Information Quality has a positive and significant effect on User Satisfaction.

From Table 8 above, it is concluded that the effect of the information quality variable on user satisfaction is positive and significant, which means that H2 is accepted. In line with the research of Hidayatullah, et al (2020) and Rahayu, et al (2018), the quality of information is the output of the information system used. If the quality of information according to user perceptions meets good criteria, users will tend to feel satisfied with the system. In the Library Online Service, the quality of information can be seen from the results received by the user after using the Library Online Service. The indicators of the quality of information used in this study after the loading factor test were completeness, accuracy and reliability. The acceptance of this hypothesis indicates that the respondent is satisfied with the indicators given in the form of questions answered by the respondents themselves. It can also be concluded that the quality of the existing system in the Library Online Service has all the characteristics of the indicator variables studied.

The completeness indicator in the Library Online Services interprets the complete information in the output or results that users receive after using the Library Online Services. The accuracy indicators in the Library Online Services interpret the information received by the user is very precise and helpful. In the Online Service Library, the results obtained are always appropriate, especially if the user is wrong in inputting or submitting the service they need. The officer always provides information on what the user should do next if they use the online library service incorrectly. The reliability indicators in the Library Online Services interpret the validity of the data provided in the output or results after using the Library Online Services.

H3: Service Quality has a positive and significant effect on User Satisfaction.

From Table 8 it can be concluded that the effect of the service quality variable on user satisfaction is positive and significant, which means that H3 is accepted. The results of this hypothesis are in line with the research of Hidayatullah, et al (2020), Rakhmadian, et al (2017) and Rahayu, et al (2018). Service is an activity, benefit or satisfaction provided to service users that is intangible but can be directly felt by the benefits or uses of the service/service and is not durable so that users have to come back to feel the service/service.

Service quality can be interpreted as a measure of how well the level of service provided is able to meet customer expectations. The service quality indicators used in this study after the loading factor test are assurance, empathy (system empathy) and system responsiveness. The acceptance of this hypothesis indicates that the respondent is satisfied with the indicators given in the form of questions answered by the respondents themselves. It can also be concluded that the quality of the existing system in the Library Online Service has all the characteristics of the indicator variables studied. The guarantee indicator is the guarantee of quality and security provided by the system, in the Library Online Service this guarantee can be in the form of output results that are in accordance with what they need and expect and also the security of the data they have. The empathy indicator in Library Online Services interprets concern for users of these services. Providing information and instructions in each service menu is included in the care of librarian to users. The indicators of responsibility in Library Online Services interpret the quality of a good response made by librarian, can be in responding to questions, processing services and also responding to suggestions.

H4: User Satisfaction has a positive and significant effect on Net Benefits.

From table 8 above, it is concluded that the effect of the user satisfaction variable on net benefits is positive and significant, which means that H4 is accepted. The results of this hypothesis are in line with the research of Hidayatullah, et al (2020), Amriani & Iskandar, et al (2019) and Rahayu, et al (2018). Satisfaction is a feeling of pleasure and joy felt by someone after buying or using a product, either goods or services from the company. In the Online Library Service, satisfaction is determined by the user who is the user of the service. The image and success of the library in carrying out its functions is determined by the performance of library services to its users.

The indicators used to measure this satisfaction are reuse (repeat purchases) and return visits (repeat visit). The acceptance of this hypothesis indicates that the respondent is satisfied with the indicators given in the form of questions answered by the respondents themselves. It can also be concluded that user satisfaction in the Online Library Service has all the characteristics of the indicator variables studied. The two indicators in Library Online Services can be seen if users often use Library Online Services if they need it and the increase in services on the extended loan service menu indicates that they are satisfied with using Library Online Services. If users have received or felt the indicators characterized by the quality of information, system quality and service quality as previously mentioned, then users who visit the Online Library Service return and use it again if they need it, it indicates that they are satisfied.

Intervening Effect Test

To test the hypothesis H5, H5 and H7, the Intervening Effect Test was conducted. This intervening effect can be seen in the Specific Indirect Effects menu on the Bootstrapped SmartPLS.

Table 9. Specific Indirect Effects

Variable	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Information Quality -> User Satisfaction -> Net Benefits	0,171	0,172	0,051	3,319	0,001
Service Quality -> User Satisfaction -> Net Benefits	0,217	0,225	0,068	3,211	0,001
System Quality -> User Satisfaction -> Net Benefits	0,308	0,309	0,077	4,012	0,000

Source: Data processed by researchers (2021)

H5: System Quality has a positive and significant effect on the Net Benefits intended by the User.

From the data in table 9 above, it shows that user satisfaction is an intervening between the relationship between system quality variables and net benefits, which means H5 is accepted. And also shows that the net benefits of system quality obtained by users are influenced by user satisfaction itself. The quality of the system is a combination of software and hardware from the Library Online Service, so that although the Library Online Service has a good system quality, if the user does not feel satisfied with the information system, the net benefits felt by the user will not be obtained.

H6: Information Quality has a positive and significant effect on Net Benefits through User Satisfaction.

From the data table 9 shows that user satisfaction is the intervening between the relationship between the information quality variables and the net benefits above, which means H6 is accepted. And also shows that the net benefit of the quality of information obtained by users is influenced by user satisfaction itself. Information is an output obtained by users, if they are satisfied with the information obtained then it has an impact on the good net benefits they receive. So that even though the Online Library Service has provided complete information, if the user does not feel satisfied with the information system, the net benefits felt by the user will not be obtained.

H7: Service Quality has a positive and significant effect on Net Benefits through User Satisfaction.

From the data in table 9 above, it shows that user satisfaction is an intervening between the relationship between service quality variables and net benefits, which means H7 is accepted. And also shows that the net benefit of service quality obtained by users is influenced by user satisfaction itself. Service quality can be interpreted as a measure of how well the level of service provided is able to match customer expectations. If they are satisfied with the services provided then this has an impact on the good net benefits they receive. So even though the Online Library Service has provided the best service, if the user does not feel satisfied with the information system, the net benefits felt by the user will not be obtained.

CONCLUSION

There is a positive and significant influence between system quality, information quality and service quality on user satisfaction. Then there is also a positive influence between user satisfaction and net benefits. In the intervening relationship, system quality, information quality and service quality have a positive and significant effect on net benefits through user satisfaction. This means that the higher the quality of the system, the quality of information and the quality of service, the better the user satisfaction will be. For this reason, the library must continue to strive to fulfill aspects and indicators related to system quality, information quality and service quality, so that users can feel the ease and benefits of using the provided information system.

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