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Effects of Quality Factor and Satisfaction on the Acceptance of Online Learning (Adoption Learning Technology)

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Abstract— In recent years, fundamental changes have occurred in the approach to education caused by advances in information and communication technology. Adoption of online learning technology is gaining increasing global attention for a number of reasons. This study aims to explore the complex dynamics between the quality attributes of online learning (System Quality and Service Quality), user Satisfaction (Satisfaction), and Continuance Intention to use (CI) and also pay attention to the factors of Effort Expectancy (EE), Performance Expectancy (PE), Social Influence (SI), Facilitating Condition (FC) and Self Efficacy (SE). The research methodology used in this study began with conducting a literature study on the correlation of the relationship between quality factors and user satisfaction in e-learning in acceptance of technology in e-learning, then a survey was carried out on e-learning users, especially students, then the data was processed statistically using PLS to find a correlation between quality factors and satisfaction in using e-learning. In this study conducted on 318 respondents. The results obtained in this study are that there is a correlation between $SQ \rightarrow Sat$, $SrQ \rightarrow Sat$, $SQ \rightarrow EE$, $EE \rightarrow PE$, $Sat \rightarrow CI$, $PE \rightarrow CI$, $FC \rightarrow EE$, $SE \rightarrow EE$, $FC \rightarrow PE$, $SI \rightarrow PE$ according to the hypothesis that was compiled based on a study of the literature.

Keywords—quality factor, satisfaction, e-learning, continuance intension, adoption.

I. INTRODUCTION

In recent years, the field of education has undergone a significant transformation due to rapid technological advances. The introduction of online learning systems is one of the most obvious trends. A number of variables, such as improvements in digital infrastructure, increased internet connectivity, and the demand for flexible learning options, particularly in light of global events that disrupt traditional learning contexts, have hastened this transformation.

In the constantly evolving educational environment, it is critical to consider how quality criteria and user satisfaction affect the acceptance of online learning technologies. Understanding the factors that affect how students, teachers, and other stakeholders respond to this technology is crucial as more and more educational institutions, from schools to universities, incorporate online learning into their curricula.

For educators, educational institutions, and policymakers, it is crucial to comprehend how quality parameters, user happiness, and online learning acceptance are related.

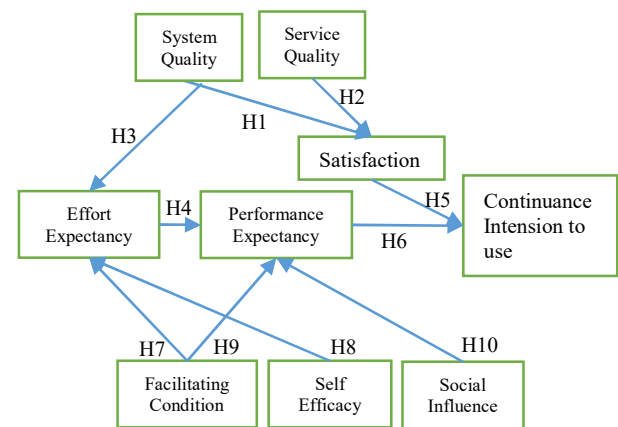


Fig. 1. Model This Research

The development and implementation of efficient techniques to improve the educational experience can be greatly aided by identifying the major elements that either encourage or discourage the adoption of online learning technology. Understanding the findings of this study can also aid in the development of online learning environments that are more appealing, effective, and sensitive to the requirements and preferences of a wide range of users.

The development and enhancement of the usage of online learning technologies in educational settings can benefit greatly from empirical research that aims to quantify the impact of quality and satisfaction aspects on adoption. For instance, quality and satisfaction variables have been demonstrated to have a substantial impact on the acceptability of online learning technology in a study conducted by Raza et al. [1]. This result is in line with the findings of research by Al-Fraihat et al. [2], which demonstrated a favorable relationship between the success of online learning systems and evaluations of quality and satisfaction.

Therefore, this study aims to explore the complex dynamics between the quality attributes of online learning (System and Service Quality), user satisfaction (Satisfaction), and overall acceptance of this technology (CI) and also pay attention to the factors of convenience (EE), usability (PE), surrounding support (SI), available facilities (FC) and also independence (SE). By uncovering these relationships, this

research aims to provide valuable insights that will inform educational practice, enrich technological advances in the online learning space, and ultimately contribute to the ongoing evolution of modern education.

II. PROPOSED MODEL AND HYPOTHESES

A. Proposed Model

The model to be developed in this investigation is illustrated in Figure 1. This model is constructed upon a hypothesis derived from prior research concerning the acceptance of technology, as presented in international journals or conferences.

Variables used in this study are Information System Quality (SQ), Service Quality (SrQ), Satisfaction (Sat), Performance Expectancy (PE), Effort Expectancy (EE), Facilitating Condition (FC), Self Efficacy (SE), Social Influence (SI), and Continuance Intention to Use (CI).

B. Hypotheses

The hypotheses are formulated by drawing from literature reviews that have been conducted, encompassing studies conducted by various researchers.

B.1 The Effect of System Quality and Effort Expectancy on Satisfaction (H1 and H2)

Research by Saxena et al. [3] and Tanuharjo et al[4] established a strong relationship between the quality of e-learning and the level of student satisfaction in online learning amid the COVID-19 pandemic in India and Indonesia. Strengthened by Suzianti's research[5], that information system variables correlate with satisfaction variables. Based on the studies above, formulate hypothesis 1, namely:

H1: System Quality has positive effect on Satisfaction

In [6] research analyzed the relationship between service quality in the context of e-learning and student satisfaction. Data was collected through a survey of students using e-learning platforms in learning. The results of the analysis show that service quality has a positive and significant influence on student satisfaction. That is, students tend to be more satisfied with their e-learning experience if they perceive the service quality of the platform to be high. This study provides further understanding of how service quality in e-learning can contribute to student satisfaction levels. Other studies also discuss the relationship between service quality and satisfaction [7,8,9]. Based on these studies, a third hypothesis was developed:

H2: Service Quality has positive effect on Satisfaction

B.2 The Effect of System Quality on Effort Expectancy (H3)

Research in [10] provides a perspective on how system quality and business expectations can affect the success and use of systems in a technology context. Even if not in the context of e-learning, these elements can be applied in understanding the user experience on e-learning platforms. Likewise, research [11,12] also discusses the relationship between System Quality variables and Effort Expectancy, based on these studies a third hypothesis is made, namely:

H3: System Quality has positive effect on Effort Expectancy

B.3 The Effect of Effort Expectancy on Performance Expectancy (H4)

In this reference [13], research extends the Technology Acceptance Model (TAM) by considering the relationship between effort expectancy and performance expectancy in the context of technology acceptance. This study involved four longitudinal field studies that collected data from various users in various technological contexts, including e-learning. The results show that effort expectancy and performance expectancy have a significant relationship in influencing technology acceptance and use. This research provides further insight into how perceptions of effort required and performance expectations are interrelated in shaping user acceptance of technology, including in the context of e-learning. Studies [13,14] also discuss the relationship between Effort Expectancy and Performance Expectancy, based on these studies a fourth hypothesis is made:

H4: Effort Expectancy has positive effect on Performance Expectancy

B.4 The Effect of Satisfaction and Performance Expectancy on Continuance Intention to Use (H5 and H6)

A structural equation model is used in this study in [15] to examine the link between user satisfaction with the e-learning system and their intent to keep using it. A survey of students utilizing e-learning platforms in a classroom setting was used to gather data. The analysis's findings demonstrate a significant positive relationship between user satisfaction with the e-learning system and the intention to keep using it. This indicates that students who are happy with their e-learning experience are more likely to want to use the system in the future. This study provides further understanding of how perceived satisfaction can influence an individual's intention to continue participating in e-learning. The following studies [16, 17] also discuss the relationship between satisfaction and CI. Derived from these investigations, the fifth hypothesis is formulated:

H5: Satisfaction has positive effect on Continuance Intention to Use

In research [18] looks at the relationship between performance expectancy and continuance intention to use in the context of using e-learning platforms. Data is collected through a survey of students who use e-learning platforms in their learning. The results of the analysis show that performance expectancy has a positive influence on continuance intention to use. In other words, students who have high expectations for the performance of e-learning platforms tend to have a stronger intention to continue using the platform. In addition, continuance intention to use also functions as a mediator between performance expectancy and sustainable use. That is, part of the positive influence of performance expectancy on continued use is explained by continuance intention to use. The implication is that positive expectations for the performance of e-learning platforms can affect the intention to continue using the platform, which in turn can affect the level of continued use. Other studies have also discussed the correlation between PE and CI [19,20], with these literatures a sixth hypothesis was made:

H6: Performance Expectancy has positive effect on Continuance Intention to Use

B.5 The Effect of Facilitating Condition and Self Efficacy on Effort Expectancy (H7 and H8)

Garcia's research [21] aims to explore how facilitating conditions affect effort expectancy in e-learning learning

environments. Data was collected through a survey of students involved in distance learning programs. The results of the analysis show that the existence of facilitating conditions, such as the availability of easily accessible learning resources, good technological support, and positive interactions with instructors and fellow students, have a positive impact on effort expectancy. Students who feel they have favorable conditions and adequate resources to study online tend to have lower expectations regarding the level of effort required. The implication is that providing a facilitating environment in e-learning can reduce the perception that great effort is required, which in turn can encourage active participation and better adoption of distance learning platforms. Other studies that discuss the correlation between FC and EE [22,23], based on these studies, the seventh hypothesis is formulated:

H7: Facilitating Condition has positive effect on Effort Expectancy

This research in [24] aims to understand how self-efficacy affects effort expectancy and behavioral intentions in an e-learning environment. This research collects data through a survey of university students who use e-learning platforms for learning. The results of the analysis show that students who have a higher level of self-efficacy tend to have a more positive effort expectancy. In other words, students who are confident in their ability to tackle e-learning tasks tend to have more positive expectations of the effort required to achieve good results. In addition, self-efficacy also positively influences behavioral intentions to actively participate in e-learning. The implication is that developing self-efficacy through support and positive feedback can increase effort expectations and intentions to engage more actively in online learning. Drawing on these stud, result in the development of the eighth hypothesis:

H8: Self Efficacy has positive effect on Effort Expectancy

B.6 The Effect of Facilitating Condition and Social Influence on Performance Expectancy (H9 and H10)

This research [25] focuses on the role of facilitating conditions in increasing performance expectancy in the context of online professional development. This research involved collecting data through surveys and interviews with participants taking professional development courses in the form of e-learning. The results of the analysis show that the existence of facilitating conditions, such as adequate technological support, easy access to learning materials, and support from instructors, has a positive impact on participant performance expectancy. Participants who feel they have adequate conditions to learn and thrive in an e-learning environment tend to have higher expectations of achieving good results. The implication is that the provision of facilitating conditions in e-learning platforms can increase participants' performance expectations and promote more effective adoption of e-learning technologies. based on these studies, the ninth hypothesis is formulated:

H9: Facilitating Condition has positive effect on Performance Expectancy

This study in [26] analyzes how social influence that comes from interactions between students in e-learning can affect their performance expectancy or expectations of their performance. Using the theoretical framework of the

Technology Acceptance Model (TAM), this research collects data through an online survey of students taking online courses at a university. Data analysis shows that social influence in the form of interaction with fellow students, either through discussion forums or collaboration in projects, has a significant influence on performance expectancy. Students tend to have higher expectations of their performance in online learning if they feel involved in positive social interactions with their classmates. The implication is that developing good social interactions within e-learning platforms can help increase performance expectations and ultimately lead to better adoption of e-learning technologies. based on these studies, culminate in the creation of the tenth conjecture:

H10: Social Influence has positive effect on Performance Expectancy

II. RESEARCH METHODOLOGY

The approach used in this study is to create a model derived from relevant academic journals. After the model is created, the next step includes determining the variables and indicators in the model. The subjects of this research are students. After compiling the index (list of questions) is complete, the next stage is giving a survey to students at Soegijapranata Catholic University.

In addition, after obtaining student data, the next stage includes examining the collected statistical data. The statistical analysis was conducted utilizing PLS-SEM, with the intention of evaluating both validity and reliability, and ascertaining the acceptance or rejection of the formulated hypotheses.

IV. RESULT AND DISCUSSION

A. Measurement Model Test

A.1. Validity test

When the framework depicted in Figure 1 is executed using PLS, the outcomes of the outer loading can be observed in the following Table 1:

TABLE I. THE VALUE OF THE LOADING FACTOR

	CI	EE	PE	SE	SI	FC	SQ	Sat	SrQ
CI1	0.84								
CI2	0.87								
CI3	0.81								
EE1		0.91							
EE2		0.91							
EE3		0.90							
PE1			0.79						
PE2			0.87						
PE3			0.76						
SE1				0.85					
SE2				0.84					
SE3				0.83					
SI1					0.80				
SI2					0.86				
SI3					0.84				

FC1						0.83			
FC3						0.87			
SQ1							0.90		
SQ2							0.84		
Sat1								0.83	
Sat2								0.89	
Sat3								0.90	
SrQ1									0.84
SrQ2									0.86
SrQ3									0.75

The data presented in Table 1 reveals that the outer loading values for each indicator exceed the minimum threshold of 0.7 set for this assessment.

A.2. Reability Test

Reliability pertains to the constancy or steadiness of an indicator. The quantification of reliability involves composite reliability and Cronbach's alpha values. The ensuing Table 5 will showcase the values of composite reliability and Cronbach's alpha for each construct.

TABLE II. CRONBACH'S ALPHA AND COMPOSITE RELIABILITY

	Cronbach's Alpha	Composite Reliability
CI	0.797	0.881
EE	0.892	0.933
PE	0.742	0.853
SE	0.805	0.885
SI	0.792	0.878
FC	0.741	0.847
SQ	0.795	0.867
Sat	0.852	0.910
SrQ	0.755	0.860

As indicated in Table 5, it becomes apparent that all constructs possess a composite reliability value surpassing 0.7.

B. Structural Model Test

Following the completion of the measurement model and its successful validation, the subsequent phase involves examining the structural model. This involves evaluating the inherent connections between the observed variables and their underlying constructs. The tests for the structural model encompass the analysis of path coefficients and determination coefficients.

B.1. Test path coefficients

The criterion for ascertaining the acceptance or rejection of a hypothesis relies on path coefficients. The outcomes of this assessment are presented in Table 7.

TABLE III. PATH COEFFICIENTS

	CI	EE	PE	SE	SI	FC	SQ	Sat	SrQ
CI									
EE			0.35						

PE	0.23								
SE		0.35							
SI			0.07						
FC		0.22	0.51						
SQ		0.41						0.26	
Sat	0.53								
SrQ								0.46	

There exists only one path coefficient with a value lower than 0.1, specifically SI → PE.

B.2. Coefficient of Determination

The objective behind testing the coefficient of determination, or R², is to assess the accuracy of the predictions made by the model in this study. This value indicates the extent to which the independent variable's capability elucidates the variance of the latent variable. The interpretation of the coefficient of determination yields three levels: small, medium, or large effect size. Table 8 displays the coefficient of determination values for the three factors utilized in the research model.

TABLE IV. COEFFICIENT OF DETERMINATION

	R Square	R Square Adjusted
CI	0.516	0.510
EE	0.586	0.578
PE	0.671	0.665
Sat	0.455	0.448

Any determination value exceeding 0.26 or 26% signifies a substantial effect size, indicating a strong relationship.

C. Hypothesis Test

Hypothesis testing was executed through a two-tailed assessment, involving the comparison of p-values against a significance level of 5%. If the p-values are under 5%, the hypothesis is accepted; whereas, if the p-values exceed 5%, the hypothesis is rejected.

TABLE V. HYPOTHESIS TEST

	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values	Information Hipotesis
EE -> PE	0.066	5.349	0.000	Accepted
PE -> CI	0.098	2.412	0.016	Accepted
SE -> EE	0.069	5.099	0.000	Accepted
SI -> PE	0.053	1.846	0.065	Rejected
FC -> EE	0.068	3.275	0.001	Accepted
FC -> PE	0.066	7.787	0.000	Accepted
SQ -> EE	0.086	4.790	0.000	Accepted
SQ -> Sat	0.094	2.826	0.005	Accepted
Sat -> CI	0.097	5.465	0.000	Accepted
SrQ -> Sat	0.084	5.473	0.000	Accepted

D. Discussion

Based on the hypothesis test table, the correlation between variables can be explained as follows:

Effect of Effort Expectancy on Performance Expectancy

The influence of Effort Expectancy on Performance Expectancy in the context of e-learning can provide insight into how users perceive how much effort is required to interact with the system and the extent to which they believe that this interaction will result in effective performance.

The influence of Effort Expectancy on Performance Expectancy in this research has a positive influence. Since users believe that the e-learning system will help them achieve good performance, this may influence their perception of the effort required. Users may be inclined to believe that the effort they invest in interacting with the system will yield positive results. In this case, the higher the performance expectation, the lower the user's perceived effort expectation.

Effect of Performance Expectancy on Continuance Intention to use

The influence of Performance Expectancy on Continued Intention to use in the context of e-learning reflects how users' expectations about how effective the e-learning system is in helping them achieve their learning goals can influence their intention to continue using the platform in the future.

The effect of Performance Expectancy on Continuance Intention to use in this study has a positive effect, because users have positive expectations about how well the e-learning system will help them achieve their learning goals, they tend to have a higher intention to continue using the platform. Positive expectations regarding performance can motivate users to continue using the system to achieve the desired results.

Effect of Self Efficacy on Effort Expectancy

The Influence of self-efficacy on effort expectancy in the context of e-learning illustrates how users' beliefs about their ability to successfully interact with the system can influence their expectations of how much effort is required to use the system.

The effect of self-efficacy on effort expectancy in this study has a positive effect, because users have high self-confidence regarding their ability to use technology or interact with e-learning systems, they may tend to have lower expectations of effort required. High self-confidence can motivate users to better overcome technical obstacles and challenges.

Effect of Social Influence on Performance Expectancy

The effect of social influence on performance expectancy in the context of e-learning reflects how the views or influences of others on the use of the e-learning system can influence user expectations of the extent to which the system will provide effective results.

The effect of social influence on performance expectancy in this study has an effect that approaches a positive threshold value because social influence may not have a direct impact on performance expectations. Users may have certain expectations regarding performance regardless of the views of others.

Effect of Facilitating Condition on Effort Expectancy

The effect of facilitating conditions on effort expectancy in the context of e-learning illustrates how users' perceptions of their readiness to face technical or organizational challenges in interacting with e-learning systems can influence their expectations of how much effort is expended required for system use.

Users who believe they have good facilitating conditions, such as readily available technical support and adequate technical skills, tend to have lower expectations of the effort required to use the system, which is a positive effect of facilitating conditions on effort expectancy in this study. They might believe that the effort needed will be reduced given adequate assistance and conditions.

Effect of Facilitating Condition on Performance Expectancy

The relationship between enabling conditions and performance expectancy in the context of e-learning demonstrates how users' perceptions of their capacity to deal with organizational or technological difficulties when dealing with e-learning systems can affect their expectations.

Users tend to have higher expectations of performance from systems when they perceive themselves to have good facilitating conditions, such as readily available technical support and adequate technical abilities. This study found that users' perceptions of their facilitating conditions have a positive influence on their performance expectancy. This impression may be brought on by the conviction that they are equipped with the resources and assistance needed to work with the system effectively.

Effect of System Quality on Effort Expectancy

An example of how system quality affects users' perceptions of how easy or difficult is to utilize a system is the influence of system quality on effort expectancy in the context of e-learning. The user's estimation of the amount of effort necessary to utilize or interact with the e-learning system is referred to as effort expectation.

Because of the high quality of the e-learning system, users may feel more sure that using it will be simple, which is a positive effect of system quality on effort expectancy in this study. A system's responsiveness, intuitiveness, and provision of features that aid users in navigation and interaction may contribute to this perception. In this situation, consumers can anticipate to exert less effort the greater the system quality.

Effect of System Quality on Effort Satisfaction

In the context of e-learning, the relationship between system quality and user satisfaction is very relevant. System quality refers to the extent to which the e-learning platform functions properly, while satisfaction measures the extent to which users are satisfied with their experience using the platform.

The influence of system quality and satisfaction in this study has a positive effect, because the quality of the e-learning system is improved, there is a possibility that the user experience will also improve. This can have a positive impact on user satisfaction. In this case, the better the quality of the system, the higher the level of user satisfaction.

Effect of Satisfaction on Continuance Intention to use

The influence of satisfaction on continuance intention to use in the context of e-learning illustrates how the level of user satisfaction with their current experience can influence their intention to continue using e-learning platforms in the future.

The effect of between satisfaction and continuance intention to use in this study has a positive effect, because users are satisfied with their experience when using the e-learning platform, they tend to be more inclined to have a higher intention to continue using the platform. Their satisfaction with previous experiences can provide positive expectations that continued use will continue to provide benefits and satisfaction.

Effect of Service Quality on Satisfaction

The influence of service quality on satisfaction in the context of e-learning is also very important to understand. Service quality refers to the extent to which the services provided by the e-learning platform meet user expectations and needs, while satisfaction measures the extent to which users are satisfied with their experience using the service.

The effect of service quality and satisfaction in this study has a positive effect, because the quality of e-learning services is improved, users are more likely to be satisfied with their experience. Good service quality, such as quick responses to user questions, good technical support, and platform ease of use, can positively influence user satisfaction.

V. CONCLUSION

In this study, the influence of quality factors, in this case, was system quality and service quality and satisfaction with online learning acceptance. The variables examined in this study include System Quality (SQ), Service Quality (SrQ), Satisfaction (Sat), Effort Expectancy (EE), Performance Expectancy (PE), Facilitating Conditions (FC), Self Efficacy (SE), Social Influence (SI), and Continuance Intention to use (CI). The results of this study show that the correlation between variables is as follows: $EE \rightarrow PE$, $PE \rightarrow CI$, $SE \rightarrow EE$, $FC \rightarrow EE$, $FC \rightarrow PE$, $SQ \rightarrow EE$, $SQ \rightarrow Sat$, $Sat \rightarrow CI$, $SrQ \rightarrow Sat$ is positively correlated, there is only one correlation, namely $SI \rightarrow PE$ which has a correlation above the positive threshold value.

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