How Technology Acceptance Model (TAM) Factors of Electronic Learning Influence Education Service Quality through Students' Satisfaction

Mar'atus Sholikah [1], Sutirman Sutirman [2]

[1]*Universitas Negeri Yogyakarta, Yogyakarta, Indonesia*
[2] *Faculty of Economics, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia*

Abstract **– The objectives of the study is figuring out of the results of adoption of electronic learning systems (BeSmart) using Technology Acceptance Model (TAM) factors and servqual models to measure the education services. The data was obtained using SEM with AMOS 2.4. From the findings of the study, note that EoU and U of electronic learning systems hava a positive and significant effect on ESQ through student satisfaction. These findings contribute to university management to understand that service quality needs to pay attention to Ease of Use, Usefulness, and student satisfaction. This research provides insights into the importance of improving the quality of service in education and students' satisfaction, especially in the provision of service in learning and teaching field. As such, the study has implications for teaching and learning practice in higher education institution, and suggests recommendations for further research.**

Keywords **– service quality, student satisfaction, convenience, usefulness**

1. Introduction

The development of technology and information greatly affect the quality of education. Therefore, educators are encouraged to utilize technology in their teaching as a tool to facilitate learning or as a means for formative assessment [1], [2]. Judging from the current educational trends, many universities in Indonesia use online learning systems such as e-learning with the aim of improving student learning outcomes, student satisfaction, and the quality of educational services [3].

E-learning is defined as a system in education that applies electronic applications to encourage the process of learning so that what is taught is fully conveyed to students who receive it. E-learning applications use internet, computer networks or standalone computers as an operating tool with the lecturer as the main actor, so that lecturers in this case must understand how to operate it [4]. The adoption of electronic learning like BeSmart has been shown to improve student performance [5].

However, not all learning processes carried out by lecturers and students use the portals that have been provided. In fact, Cheung & Hew (2015); Geng, Law & Niu (2019) revealed that online lectures can enhance the quality of educational services and outcomes of student learning [6], [7]. Improving the quality of service through the use of BeSmart must be supported by the intention to use the learning media. Intention is defined as the desire to conduct behavior [8]. Skiner defines behavior as a response or reaction to a stimulus (stimulation from outside). This is in accordance with Planned Behavior Theory (PBT) which affirms that behavior is an action carried out based on the factors that influence it. Thus, user behavior in this case is the key to success in implementing the use of the system or technology.

Much of the literature has discussed the factors associated with the process of adoption of information technology. The model of technology acceptance or TAM is one of the most dominating models of research. TAM consists of several variables that explain behavioral intentions and the use of technology both directly and indirectly. Schepers and Wetzels (2007) divide the TAM

DOI: 10.18421/TEM93-50
https://doi.org/10.18421/TEM93-50

Corresponding author: Mar'atus Sholikah,
Postgraduate Student, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia.
Email: maratussholikah.2019@student.uny.ac.id

Received: 25 June 2020.
Revised: 11 August 2020.
Accepted: 17 August 2020.
Published: 28 August 2020.

variable into two. First, internal variables, namely perceived usefulness, perceived ease of use, and attitudes toward technology [9]. Meanwhile the second is an external variable, namely self-efficacy, norms of subjective, and conditions of technology use. Conforming to the above opinion, there are two main constructs in TAM, namely ease of use and usefulness [8].

Usability constructs are interpreted as the level at which an individual believes that adopting a particular system can maximize their performance, while the construct of EoU (perceived ease of use) is the level at which an individual understands that in applying a system, no effort is needed [8]. Perception of usefulness (perceived usefulness) will reinforce individuals to know the usefulness (U) of electronic learning better where e-learning is designed by the campus. Perception of usefulness according to Szajna (1996) become one of the influential factors that shape behavior to use a technology with the hope that when using the utilization system, it will improve the job and performance quality [10]. EoU will affect perceptions of usability so that it encourages students to better use e-learning as a product that is needed [11].

Accessibility of e-learning itself can be used anywhere and anytime as long as the internet network is connected. Therefore, ease of access in the midst of busyness will further increase the perception of the user's usefulness. In addition, the perception of ease in the use process (EoU) encourages students to use e-learning more often [12]. Against this background it is needed to conduct research on how TAM factors can influence student satisfaction and learning outcomes. This study tries to relate the factors of the TAM model to the satisfaction and improvement of outcomes of student learning in the use of BeSmart.

2. Methodology

Quantitative research is carried out with the aim to measure and test empirically the influence between variables. The questionnaire used was online with 50 statement items identified through a literature review of TAM factors, student satisfaction, and quality of education services. The study population was 4,218 students where the sample used cluster sampling of 365 respondents at Yogyakarta State University. The selection of respondents is found on the use of BeSmart with a minimum of three times access.

Table 1. Measuring independent construct

Construct		Source
Ease of use(EoU)		
E1	Easy to learn	[8]
E2	Controllable	
E3	Clear and understandable	
E4	Flexible	
E5	Easy to become skillful	
E6	Easy to use	
Usefulness (U)		
U1	Makes job easier	[8]
U2	Work more quickly	
U3	Increase productivity	
U4	Effectiveness	
U5	Improve job performance	
U6	Usefull	

Table 2. Measuring Dependent Construct

Construct		Source
Students' Satisfaction (SS)		
S1	Self-efficacy	[13]
S2	Enjoyment	
Education Service Quality (ESQ)		
ESQ1	Reliability	[14]
ESQ2	Responsiveness	
ESQ3	Assurance	
ESQ4	Empathy	
ESQ5	Tangibles	

Hypothesis

This study tested four variables, namely ease of use (X1), usefulness (X2), education service quality (Y), students' satisfaction (M). From these four variables the following hypothesis is formulated.

H1 : Ease of use (EoU) directly influences education service quality (ESQ)
H2 : Use (U) directly influences education service quality education service quality (ESQ)
H3 : Ease of use (EoU) influences education service quality (ESQ) through students' satisfaction (SS)
H4 : Use (U) influences education service quality (ESQ) through students' satisfaction (SS)

Data Analysis

SEM modeling approaches are used to test the model. Because the data obtained meets the test requirements using SEM with AMOS 2.4. then the data can be analyzed using the model. This study uses online survey tools to ensure confidentiality, comfort, and effectiveness. In addition, we also use SPSS 24 to test the validity and reliability of research instruments. An outline of the findings of the reliability analysis is displayed in Table 3. A Cronbach's value is higher than 0.70 for all constructs.

Table 3. Result of reliability

Item	Cronbach's α
EoU	0.769
Usefulness	0.770
Students' Satisfaction	0.774
Education Service Quality	0.760

We also use the KMO (Kaiser-Mayer-Olkin) test to measure adequacy in sampling. The KMO test results show that the p value is 0,000 where this value is less than 0,05 while the value of KMO is 0,976 which means it is greater than 0.050 so a factor analysis can be performed.

Table 4. Summary of KMO Test Results

KMO		0.976
Bartlett's Test	Approx. Chi-Square	19822.888
	Df	1540
	Sig	0.000

The analysis of confirmatory factor (CFA) was conducted to examine the effect between observed and unobserved variables [15]. CFA test results and fit value models is presented in Table 5.

Table 5. CFA test result and fit value models

			Estimates	SE	CR	P
SS	<---	EoU	0.008	0.022	0.361	***
SS	<---	U	0.020	0.016	1.217	***
ESQ	<---	SS	0.052	0.043	1.211	***
ESQ	<---	U	0.815	0.177	4.612	***
ESQ	<---	EoU	0.405	0.229	1.766	***
E6	<---	EoU	1.000			
E5	<---	EoU	1.729	0.481	3.592	***
E4	<---	EoU	0.142	0.298	0.476	***
E3	<---	EoU	0.988	0.418	2.366	***
E2	<---	EoU	3.279	1.697	1.932	***
E1	<---	EoU	1.492	0.692	2.154	***
U6	<---	U	1.000			
U5	<---	U	1.040	0.178	5.837	***
U4	<---	U	0.936	0.166	5.648	***
U3	<---	U	0.839	0.171	4.892	***
U2	<---	U	0.961	0.227	4.227	***
U1	<---	U	0.738	0.198	3.738	***
S2	<---	SS	1.000			
S1	<---	SS	17.026	8.773	1.941	***
ESQ1	<---	ESQ	1.000			
ESQ2	<---	ESQ	1.255	0.194	6.486	***
ESQ3	<---	ESQ	0.907	0.217	4.186	***
ESQ4	<---	ESQ	0.708	0.195	3.636	***
ESQ5	<---	ESQ	0.634	0.168	3.782	***
Chi-square = 50.40 df = 147 CFI = 0.944 IFI = 0.946 RMSEA = 0.054						

Before conducting SEM testing, we confirm the validity of convergent using construct reliability or CR and estimated variance or AVE [16]. A summary of the results of CR and AVE is shown in Table 6.

Table 6. The validity of convergent result

Constructs	Indicators	Loading Factor	CR	AVE
Ease of use	E1	0.870	0.819	0.998
	E2	0.864		
	E3	0.895		
	E4	0.867		
	E5	0.895		
	E6	0.905		
Usefulness	U1	0.920	0.862	0.972
	U2	0.932		
	U3	0.919		
	U4	0.929		
	U5	0.921		
	U6	0.918		
Students' Satisfaction	S1	0.270	0.525	0.569
	S2	0.922		
Education Service Quality	Q1	0.909	0.822	0.954
	Q2	0.940		
	Q3	0.888		
	Q4	0.884		
	Q5	0.866		

The value of AVE and CR is higher than 0,4-0,5 and 0,7 so this means that both of them exceed the specified value [15], [16]. The GoF index of the structural model is demonstrated in Table 7. which produced a higher value than received, so it can be said that our model is passed the test.

Table 7. Structural model GoF indices

Fit Index	Values	Critical of Acceptable Value	Acceptability
Chi2/ Df	0.342	0.002-4.80	Yes
Probability	0.150	≥ 0.05	Yes
CFI	0.944	≥ 0.90	Yes
IFI	0.946	≥ 0.90	Yes
RMSEA	0.054	≤ 0.08	Yes

3. Findings

Path model analysis in this study exposed an appropriate structural model so that hypothesis testing is carried out using SEM (Structural Equation Modeling). The basis for making a hypothesis test is to compare the coefficient with the value of p less than 0.05. All hypothesis test results were declared significant because they were less than 0.050.

Table 8. Hypotheses result

	β	p	Decision
H1	0.186	0.019	Supported
H2	0.202	0.009	Supported
H3	0.136	0.026	Supported
H4	0.921	0.012	Supported

Based on the finding of testing hypothesis in Table 8., all hypotheses are accepted and supported, namely EoU and U have a positive effect on ESQ. Results of testing the first hypothesis (H1), EoU affect ESQ. This proves that the easier the electronic learning usage, the quality of educational services will also improve. Supported by [17] note that significantly, the quality of service is influenced by ease of use (EoU) significantly. For the second hypothesis (Hypothesis 2), U has a positive effect on ESQ. These results are supported by the finding of [18], [19] which revealed that a person is more likely to use something because they think it is beneficial for them.

Table 9. Model of effect outcome

Outcome	Input	Direct	Indirect	Effect Total
SS	U	.020	0	.020
SS	EoU	.058	0	.008
ESQ	SS	0	.069	.000
ESQ	U	.815	.001	.816
ESQ	EoU	.405	0	.405

Thus, specifically, EoU and U have a direct and significant effect on improving the quality of service [20],[21], [22]. Similar findings from AL-Nawafleh, ALSheikh, Abdulllah, & Abdul (2019) also reveal that service quality is positively influenced by the factors of the TAM such as EoU and U [23]. Therefore, service quality positively influences user intentions to use BeSmart. As such, it is very important for the University to place appropriate resources into various activities in order to advance the service quality. This is because the quality of service is very dependent on customers and customers are the most important stakeholders in universities. Customer opinions relating the various services offered consist of quality of service [24].

Significantly, we also find a positive effect between EoU on Education Service Quality through Students' Satisfaction (Hypothesis 3). Our findings are reinforced by Adams et al. (2018) and Panyajamorn (2018), in which the study found that ease has a positive and significant effect on service quality through consumer satisfaction by [25], [26]. Improved service quality is identified with EoU of technology that supports academic activities. Ease has a potentially positive effect on buyer satisfaction [27]. In addition, our results also illustrate that Usefulness has a positive and significant effect on Education Service Quality through Students' Satisfaction (Hypothesis 4). This is confirmed by Mahi Uddin, Kalsom Ali, and Mohammad Aktaruzzaman Khan (2018) who found that the effect of Usefulness on the technology usage in improving service quality directly [28]. Therefore, our findings prove that to improve the education service quality (ESQ), it is necessary to be alert to the TAM factors and client satisfaction as service recipients.

Theoretical Contributions

Theory contributions require certain research results that are able to contribute original insights into a phenomenon that is studied beneficial for developing organization [29]. This study grants original insight depend on empirical data about the effect of EoU and U on ESQ through SS. EoU and U are able to identify ESQ from an empirical perspective. Therefore, this research makes an important contribution in this field. Specifically, this study contributes to variables that affect service quality in improving organizational performance.

Implications for Management

Our study results have implications in education and management fields. Some of the practical implications from these findings are first, we found that determinants of the electronic learning adoption systems (perceived U and EoU) had a significant influence on the ESQ. Therefore, it can be suggested to BeSmart system developers to design a system that is easy and useful to use to improve ESQ and also enhance outcomes of student learning. The research established that the system development is easy for students as well. Despite it is also suggested to educators that increasing the use of BeSmart in learning systems may not lead to better and more effective learning.

Therefore, educators must choose learning strategies that are appropriate to the characteristics of the material being taught. Second, educational institutions are advised to encourage and facilitate educators to use e-learning optimally, and ensure users use e-learning effectively. To achieve this goal, educational institutions must be responsible for providing socialization or training for students regarding the use of BeSmart systems so that they can utilize the system effectively. In addition, the research findings emphasize the influence of EoU and U on ESQ and SS. This shows that the priority for each higher education institution in the service context is to focus efforts on developing e-learning on the needs of users and institutions.

Thus, universities should be able to assess the extent to which the development of their services is useful. Next, they must focus on EoU of the site. Another implication for management with regard to the influence of EoU and U seems to have a strong effect on quality of service and user satisfaction, because technological development in the sector of service has a strong influence on satisfaction. In addition, BeSmart as an educational service is able to provide information and facilities as the core of services in the academic field. This research shows that if e-learning services are able to offer convenience and usefulness then these factors will be able to stimulate continued use. Further research is needed to investigate other factors that can improve service quality and customer satisfaction.

4. Conclusion

This study has examined the influential factors of electronic learning, namely EoU, U, ESQ, SS. Hinge on the hypothesis testing results, it is known that EoU and U has a significant positive effect on Education Service Quality. In addition, the Students' Satisfaction variable is able to interfere the effect of EoU and Usefulness on Education Service Quality. Thus, Yogyakarta State University must alert to the needs and customers' satisfaction. This is because customer satisfaction is an asset and includes the quality of the service they provide. In this regard, quality in service is one of the highest investments for an organization and therefore efforts to improve it become a crucial role. In addition, user satisfaction in utilizing services is a guaranteed organizational asset. The findings of this study also indicate some limitations, namely that this study only investigated the effect of basic factors of the TAM related to the use of electronic learning systems. Further research needs to be done to discover the influence of other important factors related to the use of electronic learning systems. For example, research on how UTAUT factors are linked with the electronic learning usage as a system of learning [30].

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