Factors Influencing Students Adoption of E-Learning in Indonesian Secondary Schools

by Zaenal Abidin

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Abstract—E-learning is one type of educational service created to facilitate the learning process for all groups. They can do teaching and learning activities only through the smartphone or laptop/ computer they have. The acceptance of this technology is analyzed through suitability between e-learning technology and current technology, and satisfaction of users' e-learning. To examine correlation between latent variables or variable indicator, this study uses Partial Least Square (PLS) as a conceptual test equipment. This study uses the integration model of the unified of acceptance and usage of technology 2 (UTAUT 2) and expectation confirmation model (ECM). The results showed that students were less interested in digital learning. The results showed that electronic devices such as computers, laptops, yet stole great interest from Indonesian students to support their learning process. A high e-learning cost is also a factor that reduces students' interest in continuing to use e-learning. The use of appropriate media and equitable distribution of internet use play an important role in the adoption of e-learning systems among students. The factors that exist in the two models used in this study are considered important in explaining the adoption of e-learning technology, but as far as the author's knowledge there has been no research that integrates the two models to explain technological adaptation to e-learning. Therefore, this study will contribute to the literature on technology adoption for e-learning by integrating the factors of both models and testing models in developing country contexts exemplified in this study by Indonesia.

Keywords— e-learning, UTAUT 2, ECM, technology acceptance

I. INTRODUCTION

The pervasive nature of information and communication technology has transformed the way people learn and connect to learning resources. The advancement of technology has also served as a catalyst for transformation and innovation in education. Many academic institutions are now becoming actively involved in e-learning, as they are starting to realize how impactful and rewarding it is in expanding the traditional mode of learning [1]. E-learning can be defined as flexible learning experience that abuse information and communication technology that is used to help the learning process that can be accessed anytime, in the past, by anyone [1]. The adoption of e-learning has been widely applied in both developed and developing countries. The level of adoption of e-learning in developed countries such as the US, Japan, South Korea, China, and India is greater than in developing countries. These countries became the top buyers of mobile learning and services products in 2012. According to e-learning infographic report [3] the online education industry in Indonesia ranks eighth in the world with 25% adoption of e-learning. While India is in the the first position with the adoption rate of e-learning by 55%.

A report by the Indonesian Internet Network Organizing Association [4] states that penetration of internet users in Indonesia amounted to 64.8% of the total Indonesian population of 264,16 million. The survey results revealed that the Internet usage in education sector was used for reading articles (55.30%), accessing video tutorials (49.67%), sharing articles/educational videos (21.37%), attending online courses (17.85%) and enrolling to schools (14.63%). These data indicated that the use of e-learning to support teaching and learning process in Indonesia is relatively low.

A number of challenges regarding the implementation of e-learning in educational context has been identified, one of which is the high dropout rate in online classes [5] [6]. The level of dismissal of students in online classes 10% - 20% higher than in traditional classes [6]. Therefore, identification factors that impeded and enhanced the implementation of e-learning to enhance student learning experiences need to be carried out [7].

Technology, as the backbone of e-learning, is necessary to facilitate flexible and ongoing student learning activities. However, not all schools have easy access to technology. In addition, differences in school policies, such as restrictions on using mobile devices and limited technical infrastructure, which hindered students and teachers from fully leveraging e-learning [8]. Construct of student's behavioral intention to use e-learning is central to any discussion of the success of the implementation of e-learning system [1]. A number of studies related to student's behavioral intention towards e-learning have been conducted, including using UTAUT and Concept of digital literacy [9], UTAUT, integration between UTAUT 2, Trust and Self Efficacy [10], integration between technology acceptance model (TAM), ECM and Theory of Planned Behavior [4], ECM [12], UTAUT 2 [13]. These studies have examined ECM and UTAUT 2 independently in explaining the use of e-learning.

Therefore, based on the above studies using UTAUT, UTAUT 2 and ECM models, This study incorporated the UTAUT 2 and ECM models together to examine the student's perception of the use of e-learning.

II. LITERATURE REVIEW

A. The Unified Theory of Acceptance and Use of Technology 2 (UTAUT 2)

UTAUT model is technology acceptance model developed by [14]. UTAUT comprises four constructs, namely performance expectancy, social influence, effort expectancy and facilitating conditions. Venkatesh et al. (2003) describe performance expectancy as the level of trust a person has in using the e-learning system that will help someone to get a lot of benefits and help users to do their jobs; effort expectancy refers to the efforts made to facilitate the use of the system; social influence describes social factors that affect users in the use of technology; facilitating conditions explain about the things that are necessary to facilitate the users to support the use of the new system.These four constructs have impacts on users' behavioral intentions to use technology.

The UTAUT model was extended by introducing three new constructs, namely hedonic motivation, price value, and habit [15]. The construct of hedonic motivation (intrinsic motivation) explains that the use of technology can provide pleasure or can be used as entertainment tools. The price value construct refers to factor in which the users must bear the costs incurred for purchasing the device and to access services. The habit construct describes a measure of how regularly and how often users do something [15]. In the research [15] states that these three constructs was added to overcome the limitations in UTAUT model.

B. Expectation Confirmation Model (ECM)

ECM is an effective model to examine the behavioral intention of people to continually using technology [16]. ECM theory arises from the adaptation of expectation confirmation theory (ECT). ECM is useful to predict information system continuance usage [18]. There are three main constructs used to predict and define individual intentions to continually using technology, namely satisfaction, confirmation of expectations and perceived usefulness. Bhattacherjee (2001) had conducted research on the intention of ongoing use of online banking in the largest state bank in the United States [18]. Bhattacherje used four constructs consisted of confirmation, perceived usefulness, satisfaction and the intention to use. Confirmation explains the extent to which users confirm their expectations in using the technology. Satisfaction refers to the level of user satisfaction towards technology. The satisfaction construct is gain from comparing the technology performance with its expected level. Post-adoption expectation (perceived usefulness) is the extent to which someone believes that using e-learning will improve its performance and benefit the user

III. HYPOTHETICAL FORMULATION

A. Relationship between confirmation with perceived usefulness and satisfaction

User's confirmation is a match between users' perceptions of the use of e-learning expectations with reality [18]. Meanwhile, user satisfaction is the factor that is used to take the decision to continually using the service. E-learning users will compare their expectations before using e-learning with their experiences after using e-learning towards the benefits of the e-learning system. If users perceive their expectations and experiences are comparable, it can be said that, e-learning is useful then users will tend to be satisfied with the system. If it matches the expectations, the user will feel happy using e-learning. This pleasure shows that the user is satisfied using e-learning. So, confirmation has positive impact on the satisfaction of using e-learning.

The confirmation construct describes the correspondence between the benefits desired by the user and the benefits that have been obtained after using the system. When the perceived benefits of the user is not concrete because it does not correspond to what is expected user before using the system. ECM concept explains that confirmation of user expectations to use a system will have a positive impact on the benefits felt after using the system, which is known as the expectations of technology performance [17]. Thus, user's expectations are met when they feel that the use of e-learning is beneficial.. But if the users feel that they do not get any benefits from using e-learning, then their expectations are not fulfilled. Therefore, the confirmation has a positive impact on perceived usefulness. The hypotheses appear as follows:

H1 : Confirmation has a positive impact related to satisfaction
H2 : Confirmation has a positive impact related to perceived usefulness

B. Relationship between perceived usefulness and satisfaction

Perceived usefulness explains about the users' belief that using e-learning will improve users' learning performances to achieve their learning goals. This construct is the strongest predictor of behavioral intentions and determinants of user adoption intentions [19] [16]. This construct also affects e-learning user satisfaction which is used as the basis for confirmation assessment references. According to [19], user satisfaction is determined by confirming expectations of user experiences in using system and user perceived usefulness after using the system (performance expectations). The higher the expectations of users, the greater the level of user satisfaction with the use of the system [16]. This study adapts what [16] have been studied that is if users feel that using e-learning is helpful, then users will feel satisfied with e-learning performance. Therefore, this study proposes a hypothesis:

H3 : Perceived usefulness has a positive impact on satisfaction on the use of e-learning systems.

C. Relationship between satisfaction and continued technology usage intention

Construct satisfaction reflects a person's level of satisfaction when using e-learning. A study conducted by [16] revealed that the main reason for re-purchase a product is their level of satisfaction. If users are satisfied with the system, the intentions to keep using the system are also getting higher

[18]. Adapted to the study, if users are satisfied with the e-learning, then they will continue to use it. Therefore, this study proposes a hypothesis:

H4 : Satisfaction has a positive impact on continued technology usage intention on the use of e-learning systems

D. Relationship between effort expectancy and perceived usefulness

The construct of effort expectancy has similarities to the construct of perceived ease of use in the technology acceptance model (TAM) and it positively affects perceived usefulness [20]. A study conducted by [21] contends that perceive usefulness can be considered that if users believe that e-learning is useful, they may think that particular system is difficult to use, but in the context of a business, it is comparable to the benefits they receive [21]. In this study, users may have a perception that e-learning is easy to use and produce more benefits, but they need more effort to use it. So, effort expectancy affects the perceived usefulness. Therefore, the hypothesis appears as follows:

H5 : Effort expectancy has a positive impact related to perceived usefulness

E. Relationship between UTAUT 2 and continued technology usage intention

For accessing e-learning, it requires electronic devices connected to the internet. In addition, factors in terms of technology use can also affect users to continue using e-learning, such as ease of use, benefits provided from technology use, influence from the surrounding environment, etc. To analyze the factors in terms of technology use, the appropriate model is UTAUT 2. In this study, only six constructs were used, including performance expectancy (PE), effort expectancy (EE), social influence (SI), hedonic motivation (HM), price value (PV) and habit (H). The construct of facilitating condition is considered less relevant for this study because to get access to e-learning, someone is required to use a device to connect with its users directly. This is supported by research conducted [6] which states that facilitating conditions have no effect on the use of e-learning.

Performance expectancy refers to the level in which someone believes e-learning systems will improve their educational performance. Performance expectancy has similarities with the concepts of perceived benefits and relative benefits [23]. Perceived benefits are defined as the level of consumer believes in the benefits obtained from the use of the application [7]. Relative benefits can be considered as adapted to this study, users will continue to use e-learning if users feel that e-learning is useful. Therefore, this study proposes a hypothesis:

H6 : Performance expectancy has a positive impact on continued technology usage intention on the use of e-learning systems.

Social influence is defined as the level of one's belief in the importance of using a new system for that person [14]. Social influences drive desire and have a significant influence on sustainable use of technology [25] [26] [27]. In this study, if social influence from users who are using e-learning is getting bigger, then other users will continue to use e-learning. Therefore, the hypothesis appears as follows:

H7 : Social Influence has a positive impact on continued technology usage intention on the use of e-learning systems.

According to [14] explain that costs and prices may affect the use of technology. The price value construct can be regarded as the exchange between the benefits and costs to use applications. In this regards, users will learn that the benefits obtained is very much at an inexpensive cost of using e-learning. For this reason we propose to link the price value with continued technology usage intention, because the costs associated with e-learning may affect e-learning users. Therefore, the hypothesis appears as follows:

H8 : Price value has a positive impact on continued technology usage intention on the use of e-learning systems.

Users who have experiences in using information system usually have a habit to promote the continuation of the same type of behavior [28]. According to [23], continued technology usage intention can be predicted by the extent the extent to which a person uses technology continuously because they are familiar with previous learning, namely habits. Habit can be explained doing something often and regularly. If users have a habit of using e-learning, then users are satisfied with the results. This in turn will make a individual's habit to use e-learning. In this respect, the hypothesis appears as follows:

H9 : Habit has a positive impact on continued technology usage intention on the use of e-learning systems.

The construct of hedonic motivation explains that users find the e-learning system is fun to use. In [29] found that perceived pleasure similar to hedonic motivation is the main determinant of user behavior intentions in using digital or electronic devices. In this study, we made e-learning more fun for users, and encouraged them to continually using e-learning. Accordingly, we propose the following hypothesis:

H10 : Hedonic motivation has a positive impact on continued technology usage intention on the use of e-learning systems.

F. The Proposed Research Model

This study proposes the integration of UTAUT 2 and ECM. The construct of performance expectancy (PE), social influences (SI), habit (H), hedonic motivation (HM) and price value (PV) are directly related to the construct of the ECM model, namely continued technology usage intention (CTUI). While the construct of effort expectancy from the UTAUT 2 model is related to perceived usefulness of the ECM. Confirmation (C) is related to perceived usefulness (PU) and satisfaction (SAT) from ECM models, while construct perceived usefulness is corresponded to construct satisfaction, and construct satisfaction is directly corresponded to continued technology usage intention (CTUI) of the ECM model. The proposed model is depicted in Figure 1.

IV. METHODS

A. Participants And Data Collection

This study employed quantitative method in collecting, analyzing and interpreting data [30] to understand the

students' perceptions in using e-learning systems. A cluster random sampling was used to collect data from Java Island (i.e., Central Java, Yogyakarta, West Java and Jakarta) and outside Java Island. The respondents were students from junior high schools and senior high schools. Total of 308 respondents were voluntarily et involved in this study, of which 212 respondents have used e-learning and the rest of them were regarded invalid data because they have never used e-learning. The latter was excluded from the data analyses. Table I presents demographic data of the respondents.
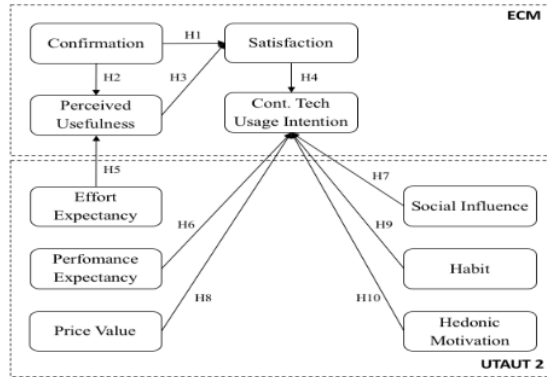

Fig. 1. Proposed model

TABLE I.   RESPONDENT DEMOGRAPHICS

Information		Total	Percentage
Level of	JHS*	9	4,2%
education	SHS*	203	95,8%
Area	Central Java and Yogyakarta	113	53,3%
	West Java and Jakarta	66	31,1%
	Outside Java	33	15,6%
E-learning	0-1 year	95	44,8%
usage	1-2 year	49	23,1%
duration	>2 years	68	32,1%
Gender	Male	99	46,7%
	Female	113	53,3%

*JHS = junior high school, SHS = senior high school

B. Research Instrument

The analysis of this study uses exploratory analysis. This exploratory analysis is used to build structural models consisting of many variables. In exploratory factor analysis where the researcher does not or does not yet have knowledge or theory or a hypothesis that constructs the structure of the factors that will be formed or formed, thus exploratory factor analysis is a technique to help build new theories. The questionnaire consisted of 34 Likert-scale questions, including performance expectancy, effort expectancy, social influence, hedonic motivation, and continued technology usage intention respectively measured using four statements. Whereas for price value, habit, confirmation, satisfaction, and the perceived usefulness of each is measured using 3 statements. The statements in the questionnaire were adopted from the several studies, including [5][6][8] [9] [10] [11] [1] [14] [15]. The measurement of the instrument uses a 5-point Likert scale, each of which has different answers for each scale.

V. RESULTS AND DISCUSSION

A. Measurement Model

Measurement model is divided into two tests, namely testing validity and construct reliability. The parameters used in the measurement model testing them by looking at each value of convergent validity, discriminant validity, composite reliability, Cronbach's alpha, Q-Square (Q^2) and R-Square (R^2). Table II presents the results of the outer model, which consists of AVE values, Cronbach's alpha and composite reliability for each construct. The reliability of the scale (Cronbach's alpha > 0.60 and composite reliability > 0.70, AVE values > 0.50) can be considered as acceptable [14], so that testing can continue to the inner model testing stage. While in Table III represent a comparison between the root values of AVE with the value of the latent variable correlation. For the value of discriminant validity seen from the cross loading value and the comparison of AVE root values with the latent variable correlation [15].

TABLE II.   MEASUREMENT MODEL RESULTS

Construct	AVE	Cronbach alpha	Composite reliability
C	0,782	0,861	0,915
SAT	0,736	0,820	0,893
PU	0,746	0,829	0,898
CTUI	0,695	0,853	0,901
EE	0,672	0,837	0,891
PE	0,587	0,767	0,850
HM	0,676	0,800	0,883
H	0,716	0,842	0,893
SI	0,607	0,600	0,833
PV	0,713	0,780	0,860

TABLE III.   DISCRIMINANT VALIDITY WITH COMPARISON OF AVE SQUARE ROOT AND LATENT VARIABLE CORRELATION

	C	SAT	PU	CTUI	EE	PE	H	HM	PV	SI
C	**0,884**	0	0	0	0	0	0	0	0	0
SAT	0,728	**0,858**	0	0	0	0	0	0	0	0
PU	0,661	0,657	**0,864**	0	0	0	0	0	0	0
CTUI	0,642	0,656	0,638	**0,834**	0	0	0	0	0	0
EE	0,564	0,561	0,481	0,396	**0,820**	0	0	0	0	0
PE	0,565	0,646	0,717	0,614	0,512	**0,766**	0	0	0	0
H	0,634	0,592	0,572	0,641	0,470	0,546	**0,822**	0	0	0
HM	0,697	0,632	0,684	0,571	0,518	0,630	0,538	**0,846**	0	0
PV	0,393	0,347	0,479	0,365	0,315	0,439	0,315	0,401	**0,844**	0
SI	0,522	0,489	0,428	0,560	0,276	0,402	0,529	0,374	0,354	**0,779**

*Diagonals in bold are square roots of AVE from items; off diagonal are correlations between constructs.

B. Inner Model Testing

Inner model measurements are performed to show the relationship between endogenous latent variables or dependent constructs that have been evaluated using R^2. The results from R^2 are categorized into 3, including 0.67 to explain that the evaluated model belongs to the good category, 0.33 for the moderate category, and 0.19 for the weak category [32]. The second step of inner model measurement is by looking at the value of Q^2 predictive relevance for the construct model. Q^2 is used to measure how well the results of the research results are generated by the model and whether it is in accordance with the parameters that have been determined but if the Q^2 value is less than 0, it can be said that the model lacks predictive relevance. To get the value of Q^2 can be done through the

process of blindfolding on smartPLS to see cross validated construct redundancy. Table IV shows the result of testing the inner model using R^2 and Q^2. All dependent variables CTUI, PU and SAT have a Q^2 value of more than 0. It shows that the dependent variable has a value of a good predictive relevance. The results from R^2 show that CTUI has a R^2 value of 0.593. It explains that CTUI variables affect the SAT, PE, PV, SI, H, and HM variables by 59.3%, and the remaining 40.7% is influenced by other variables outside the model. PU variable has an R^2 value of 0.466. PU variables have an effect on variables C and EE of 46.6%, and the remaining 53.4% is influenced by other variables outside the model. SAT variable has a R^2 value of 0.585. This explains that the SAT variable affects the C and PU variables by 58.5%, and the remaining 41.5% is influenced by other variables outside the model.

TABLE IV. INNER MODEL TEST RESULTS

Construct	R^2	Q^2
CTUI	0,593	0,385
PU	0,466	0,315
SAT	0,585	0,395

C. Hypothesis testing

To carry out the hypothesis testing stage in this study by comparing the output values of smartPLS, namely t-statistics with t-table values. To perform hypothesis testing phase, it can be done by comparing the value of t-statistic with t-table value generated by smartPLS. P-value is used to declare the acceptance or rejection of the hypothesis. T-table value for testing this hypothesis is equal to 1.96 with a significance level α = 5% and a confidence level of 95%. If the t-statistic value is less than 1.96 then the hypothesis is rejected. Whereas if the t-statistic value is more than 1.96 then the hypothesis will be declared accepted. Table V displays the value of original sample anda t-statistic for each hypothesis and results of hyphotesis testing with t-statistics value.

TABLE V. HYPOTHESIS TEST RESULTS WITH P VALUE < 0,05

Hipotesis		Original Sample (O)	t-Value	Result
H1	C → SAT	0,522	6,121	Supported
H2	C → PU	0,561	6,981	Supported
H3	PU → SAT	0,312	3,346	Supported
H4	SAT → CTUI	0,227	2,154	Supported
H5	EE → PU	0,198	2,279	Supported
H6	PE → CTUI	0,185	2,028	Supported
H7	SI → CTUI	0,206	2,065	Supported
H8	PV → CTUI	0,018	0,226	Not Supported
H9	H → CTUI	0,239	2,349	Supported
H10	HM → CTUI	0,098	0,995	Not Supported

This study produces (H6, H7, H9) hypotheses that connect the UTAUT 2 construct to the ECM construct, that is the construct of performance expectancy, social influence and habit significantly influences the construct of ECM model, continued technology usage intention and construct effort expectancy have a significant effect on the perceived usefulness of ECM model. The results of the construct hypothesis of performance expectancy have a significant effect on continued technology usage intention consistent with previous research [9], the results of the construct hypothesis of effort expectancy have a significant impact on perceived

usefulness consistent with the results of previous studies [11]. From the constructs that influence the intention of sustainability to use e-learning, habit constructs have the greatest influence than the other constructs.

The four hypotheses of ECM model (H2, H7, H8, H9) were accepted. This results indicated that the construct of perceived usefulness and confirmation significantly affect satisfaction construct, construct confirmation significantly influence the perceived usefulness construct, and constructs satisfaction significantly affect the continued construct technology usage intention. The acceptance of the four hypotheses is consistent with previous study conducted by [16] which showed perceived usefulness affect satisfaction, [19] showed that confirmation affect satisfaction and perceived usefulness.

For the acceptance of e-learning technology is directly influenced by several factors. However, this research shows that hedonic motivation have no effect on continued technology usage intention. This shows that there is still a lack of interest from students in learning activities using electronic devices. To overcome this, it should be the developer of e-learning to develop a system of e-learning more interesting. To find out the wishes of students so that they are interested in using e-learning, e-learning system developers can conduct surveys first, such as distributing questionnaires about using e-learning to schools. Then when viewed from the side of user satisfaction, user satisfaction directly affects the intention to continue using e-learning. If e-learning is useful in accordance with user expectations, even more than expected, the user will feel satisfied and will continue to use e-learning again.

D. Research Implications

Seen from a theoretical standpoint, this study integrates between UTAUT 2 and ECM to explain the acceptance technology and satisfaction of using e-learning for students. Based on the research that has been done, this research shows that that in addition to the perception of technology such as expectancy performance, social influence and habit, satisfaction also significantly influences the intention to continue using e-learning. In addition, the construct of effort expectancy also significantly influences the perceived usefulness construct. By connecting these two constructs, it will affect user satisfaction in using e-learning. Satisfaction will affect the continued use of e-learning.

Seen from a practical standpoint, this study shows that e-learning technology has succeeded in meeting the expectations of users after using e-learning. The expectation of the users referred to here is a kind of user expectations before using e-learning. In addition e-learning technology is also easy to use, and provides benefits for students, including being able to help students achieve their learning goals, helping students to complete tasks faster. E-learning is also useful to increasing learning effectiveness for students. But on the other hand, cost of accessing e-learning is still relatively expensive for students in Indonesia. In addition, students are also less interested in using e-learning. These conditions can be utilized by e-

learning developers to create e-learning with a cost that is cheaper with a more attractive appearance.

VI. CONCLUSIONS

After doing research on the acceptance of e-learning technology and the level of satisfaction of the use of e-learning through the integration of UTAUT 2 and ECM models it can be concluded that construct of performance expectancy, social influence, and habit affecting to continued technology usage intention, the construct of effort expectancy significantly give effect to perceived usefulness constructs, construct confirmation significantly give effect to construct satisfaction and perceived usefulness, constructs of perceived usefulness significantly give effect to construct satisfaction, and constructs satisfaction significantly give effect to construct continued technology usage intention. This research also shows that students in Indonesia are less interested in digital learning. This can be used by e-learning developers to develop e-learning to be more attractive according to the needs of students.

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