

The Enhancement of Learning Management System in Teaching Learning Process with the UTAUT2 and Trust Model

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Abstract— The use of the Learning Management System (LMS) in the teaching learning process in the university has been widely used, but the intensification of the use of the LMS to become a culture in the universities has its own challenges. The main objective of this study is how to find the factors that influence the behavior of lecturers when receiving and using the LMS. This study uses the UTAUT 2 and Trust method to identify the factors that influence the acceptance and use of LMS for university lecturers. The data was collected and analyzed using SEM-PLS. The results of this study indicate that performance expectancy, habit and trust have the significant influence on the acceptance of the application (behavioral intention), while habit and behavioral intention are the influential factor in the use of the application (use behaviour).

Keywords—learning management system, teaching learning process, university, UTAUT2, trust, SEM-PLS

I. INTRODUCTION

The rapid progress of the internet has changed human behavior. Human beings not only use the internet to work and buy, but also to learn. The use of the Internet in the context of learning is often referred to as e-learning, which is an online learning concept that includes technology and digital content. The technology in e-learning is of two types, namely the learning management system (LMS) and the content management system (CMS). Learning Management System (LMS) is define as an online portal that brings together lecturers and students in the teaching learning process that can be used to replace the face-to-face function in the classroom [1]. The LMS is widely used by universities to improve the quality of learning and information services.

The object of this research is the LMS used by BINUS University, namely BinusMaya. BINUS University is one of the private universities in Indonesia with active students reaching 35,000 students and 1200 lecturers. BINUS University has 5 campuses in Jakarta, 1 campus in Alam Sutra, Tangerang, and 1 campus in the Bekasi area. Since 2001, BINUS University has implemented a learning management system to help deliver learning content and information services to students and lecturers. Even BINUS

University has implemented a mobile version of LMS for students and lecturers. In its development, the LMS that has been applied has undergone 4 changes (BINUSMaya 1, BINUSMaya 2, BINUSMaya 3 and BINUSMaya 5). Technological developments require the need to evaluate the quality of BINUSMaya so that it can be improved according to the needs of lecturers in the future. The evaluation model for the BinusMaya application uses the UTAUT2 model [2] and also the trust [3].

This research was conducted to see what factors influenced the acceptance and use of BINUSMaya by lecturers, as well as what factors did not influence. The final result of this research is in the form of recommendations on what things should be improved from the LMS for future needs.

II. THEORETICAL BACKGROUND

A. Learning Management System (LMS)

Refer to [4], LMS is a combination of pedagogical facilities, human interaction, learning content and evaluation support to improve teaching and learning activities in schools or universities. LMS must be able to meet user needs, especially in the distribution of learning content.

B. Technology Acceptance

Technology Acceptance can be interpreted as the willingness of people or users to use technology for jobs designed to support it [5]. Whereas according to [6], the technology acceptance refers to the relationship between human beings and technology or complicated artifacts. The technology acceptance plays a crucial role in the implementation of any information systems [7].

From several previous theories, it can be concluded that the technology acceptance is the level of acceptance of technology on how a technology can help to provide comfort and speed at work.

The following are some models for the acceptance of existing technology:

1. Technology Acceptance Model (TAM)

2. Unified Theory of Acceptance and Use of Technology (UTAUT)
3. Model of Adoption and Technology in Household (MATH)
4. Extended Unified Theory of Acceptance and Use of Technology (UTAUT2).

C. *Extended Unified Theory of Acceptance and Use of Technology (UTAUT2)*

UTAUT2 (Extended Unified Theory of Acceptance and Use of Technology) is an extended version or an addition to the UTAUT proposed by [2]. UTAUT has 4 constructs: they are Effort Expectancy, Performance Expectancy, Social Influence and Facilitating Conditions that influence Behavioral Intention and Use Behavior.

By joining the variants of Behavioral Intention and Use Behavior and the number of people who tried the UTAUT model and finished adding and critiquing the model to match their research, [2] decided to add 3 constructs to UTAUT2, the 3 constructs were; (1) Hedonic Motivation (2) Price Value (3) Habit. With the addition of these 3 constructs, UTAUT2 is designed to focus more on consumers [2].

D. *Performance Expectancy*

Performance expectancy is benefits level obtained by consumers when using technology to carry out their daily activities [2]. The performance expectancy is one of the original variables that belong to UTAUT, which Venkatesh developed. In this evaluation, the performance expectancy will be used to investigate people's trust that the technology use will give benefit to them. In the Performance Expectancy, there are 3 dimensions or sub-variables. The first is usefulness, which means that the benefits obtained by using technology in everyday life [2]. The second is quickness, which is a level of technology that can accelerate the work done [8]. The third is productivity, which is defined as an increase in productivity related in terms of the user's work when a technology is used [2].

E. *Social Influence*

Social influence refers to how much the level of people who are close to us such as family or good friends think that we must use the technology [2]. Social influence is also the original variable that belongs to UTAUT. In this evaluation, social influence is measured based on the level of acceptance of the application by people who are influenced by other people around them. There are 2 dimensions in social influence, first is the social factor which means the level of influence of people who are close to the user in the use of technology [2]. The second is a subjective norm. Subjective norms are the influence of important people who relate to users in the use of technology [8].

F. *Effort Expectancy*

Effort expectancy is effort level or effort that must be used to operate a particular technology [2]. The effort expectancy is the original variable part of UTAUT. In this evaluation, the effort expectancy is used to discover the beliefs of the people that using this application is free from difficult efforts. The two dimensions found in effort expectancy are complexity and ease of use. Complexity is how complicated a technology is difficult to learn [8].

Whereas ease of use is the ease that is felt when using technology [2].

G. *Facilitating Conditions*

Facilitating conditions are the user's perception that there is a source and support to use existing technology [2]. It will provide the needed of external resources to facilitate the behavior performance [9]. In this evaluation, the facilitating conditions will be measured by people's perceptions that they can obtain the resources needed to use this application. There are 3 dimensions of facilitating conditions, namely, resource, knowledge, and compatibility. Resource is the presence of external sources that influence the use of technology [2]. Knowledge is the existence of external sources of knowledge to use technology [2], and the third, compatibility is the level of suitability of the system with the technology used today [8].

H. *Hedonic Motivation*

The hedonic motivation is explained as the pleasure or satisfaction obtained when using technology [2]. In this evaluation, hedonic motivation will be measured based on the level of people who use this application as fun. There are 3 dimensions in hedonic motivation. The first is fun, which is defined as the level of pleasure obtained by using technology [2]. The second is enjoyment, which means how much pleasure is obtained when using technology [2]. And the latter is entertaining, which is to what extent the use of the system can entertain users [2].

I. *Price Value*

The price value is a comparison obtained from the benefits of using technology with money or fees that must be paid for using the technology [2]. In this evaluation, the price value will be measured based on how many people consider that the money spent is proportional to the convenience obtained when using the application. The dimensions found are 2, which is reasonable, which means the system has a reasonable price [2] and worth, which means the value obtained from using the system is proportional to the price paid [2].

J. *Habit*

Refer to [10], habit is defined as routine or habit. But in the context of information systems, the habit is the habit of users to make habits in using information systems automatically because they have passed the learning process [2]. In this evaluation, the habit will be measured by observing the tendency of people to use the application as a habit. In the habit there are 2 dimensions, namely addictiveness and must. Addictiveness is the level of addiction obtained by users using the system [2]. Must is a feeling of necessity from users to use the system [2].

K. *Behavioral Intention*

Behavioral intention is one of the main objectives of technology acceptance models. The definition of behavioral intention itself is the degree to which people have consciously planned to do or not to take certain actions in the future [11]. In this evaluation, behavioral intention will be measured by seeing whether people will use or integrate a technology into their lives. There are 2 dimensions in behavioral intention. The first is intention, which is the level

of user compliance to keep using the system [2]. The second is the continuation, which is defined as the extent to which users plan to keep using the system [2].

L. Use Behaviour

The use behavior is the level of variation and the frequency of the use of technology by consumers [2]. There are 2 dimensions in use behavior. The first is depth of use, which is interpreted as the frequency of use of technology by users [2]. The second is breadth of use, which is the extent to which technology can provide increased knowledge and skills to users [2].

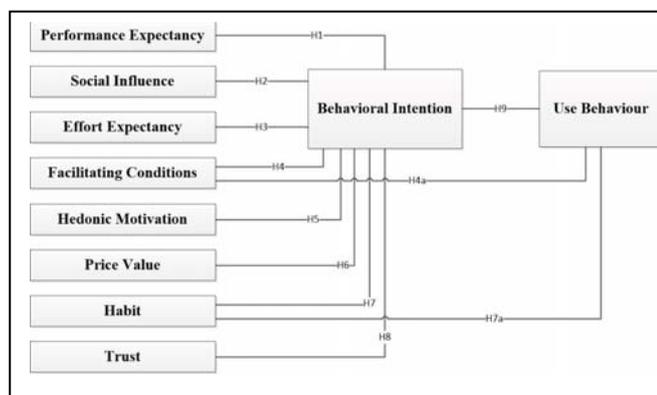
M. Trust

According to [12], trust is the willingness of someone who trusts (trustor) to be more vulnerable to the actions of a trusted party (trustee), based on expectations of those who are trusted to take certain actions. Trust in information systems can be interpreted as a feasible concept because it can reflect the willingness of someone who trusts (trustor) to have behaviors that are dependent on a software or software in performing a task [13]. Seeing the research conducted by [9] and [3], with the addition of trust variables in this study will add the completeness of the UTAUT2 model itself.

III. RESEARCH METHODOLOGY

A. Research Model

This research uses quantitative methods using the UTAUT2 and Trust models. This study uses the UTAUT 2 model because it wants to see the factors that will influence the level of acceptance and use of LMS applications by lecturers. This study has 11 hypotheses that connect 10 variables which were revealed to 34 questionnaire



statements.

Fig. 1. Proposed Model

B. Research Instruments

This study uses close-ended questions written in Bahasa, which are then translated by forward translation and double translation. The respondents were asked to fill out this questionnaire using a 6-scale Likert, where a scale of 1 means strongly disagree and scale 6 means strongly agree.

C. Data Collection

The total population of lecturers at the BINUS University who used BinusMaya was 1187 lecturers with the number of samples distributed 301 questionnaires. The sampling

technique used is non-probability sampling. The questionnaire is given in the form of a hardcopy and a softcopy (google docs). Of the 301 questionnaires distributed, only 190 returned from 42 invalid questionnaires, so the number of questionnaires sampled for the calculation of this study were 148 questionnaires. This research was conducted from March to October 2018.

D. Data Analysis

The data collected from respondents were analyzed using Structured Equation Model - Partial Least Square (SEM-PLS). The software used for testing is SmartPLS version 3.0.

IV. RESULTS AND DISCUSSION

A. Respondent Demography

Table 1 shows that gender is more male than female lecturer (60%). While in terms of age, it can be seen that the lecturers at BINUS University are still productive, that is, 54% are between 25-40 years old. In terms of level of education, lecturers with master's degree (S2) are very dominant (68%), which is in accordance with government regulations that minimum education level to teach bachelor degree (S1) must be a lecturer with master degree (up one level). And in terms of length of time teaching, lecturers with experience from 0 to 10 years are the most dominant (73%). This is in line with the rapid growth of BINUS University so that it continues to need new qualified lecturers.

TABLE I. RESPONDENTS' DEMOGRAPHICS

Sex	%-age	Education level	%-age
Male	60	S1 (Bachelor)	18
Female	40	S2 (Master)	68
		S3 (Doctor)	14
Age	%-age	Length of Teaching	%-age
25 – 40 years old	54	0 – 10 years	73
41 – 55 years old	38	11 – 20 years	19
56 – 70 years old	7	21 – 30 years	5
> 70 years old	1	> 30 years	3

B. Results

Level of correlation between different measurement instruments is called as convergent validity and used to measure the same construct [14]. Convergent validity occurs when the results obtained through data processing are two research instruments or variables that are related [15].

Refer to [16], Convergent validity principle related to the indicators (variables) of a construct should be highly correlated. Test of the convergent validity of reflexive indicators can be seen from the value of loading factors for each construct indicator. It is said that the individual reflective measure is high if it correlates more than 0.70 with the construct you want to measure.

TABLE II. OUTER LOADING

IND	OL	IND	OL	IND	OL	IND	OL
PE1	0.935	EE4	0.847	PV2	0.913	TR5	0.827
PE2	0.96	FC1	0.868	PV3	0.853	TR6	0.836
PE3	0.914	FC2	0.803	HT1	0.908	BI1	0.911
SI1	0.917	FC3	0.862	HT2	0.862	BI2	0.923
SI2	0.962	FC4	0.803	HT3	0.890	BI3	0.954
SI3	0.969	HM1	0.968	TR1	0.928	U1	0.947
EE1	0.908	HM2	0.965	TR2	0.932	U2	0.956
EE2	0.932	HM3	0.901	TR3	0.882		
EE3	0.881	PV1	0.933	TR4	0.905		

The next validity test is to look at the value of Average Variance Extracted (AVE) on each variable. According to [16], The values of AVE must be greater than 0.5, which means that 50% or more of the variance of the indicator can be explained. AVE values can be seen in Table III, which shows that all AVE values are above 0.5.

After measuring validity, we need to measure reliability. Refer to [16], there are 2 ways to measure reliability, with cronbach's alpha and composite reliability. First by using cronbach's alpha, which assumes that all indicators are equally reliable. In this case, all the indicators that reflect a construct must have the same outer loading value. However, due to the value of Cronbach's alpha, which tends to underestimate the reliability of internal consistency, then other methods are introduced, namely, composite reliability [17].

According to [17], the cronbach's alpha and composite reliability values of 0.6 to 0.7 can be accepted in the exploration research, while the values of 0.7 to 0.9 can be considered satisfactory. Table III shows that the cronbach's alpha and composite reliability values used are greater than 0.7 or can be said to be reliable.

TABLE III. AVE, CA, AND CR

VAR	AVE	CA	CR
PE	0.877	0.930	0.955
SI	0.901	0.945	0.965
EE	0.797	0.916	0.947
FC	0.697	0.855	0.902
HM	0.893	0.940	0.962
PV	0.810	0.883	0.928
HT	0.786	0.864	0.917
TR	0.785	0.945	0.956
BI	0.864	0.921	0.950
U	0.905	0.895	0.950

Refer to [16], changes in the value of R-Squares or R2 can be used to explain the influence of certain exogenous latent variables on endogenous latent variables whether they have substantive effects. The values of R2 0.75, 0.50, and 0.25 can be concluded that the models are "high", "moderate", and "low". The results of PLS, R2 represent the number of variances of the construct described by the model. In table IV, it can be seen that the R2 value of the behavioral intention and the use behavior are 0.883 and 0.737. In accordance with the regression equation that has been made before, this means that the behavioral intention is influenced by 88.3% by eight variables (Performance Expectancy, Social Influence, Facilitating Conditions, Effort Expectancy, Hedonic Motivation, Price Value, Habit and Trust) and 11.7% by other variables which were not included in this research. While the use behavior is influenced by 73.7% by three variables (Facilitating Conditions, Habit and Behavioral Intention) and 26.7% by other variables that are not present in this research.

TABLE IV. R² VALUE FOR EACH ENDOGEN LATENT VARIABLE

VAR	R-Squared	Description
Behavioral Intention (BI)	0.883	High
Use Behavior (U)	0.737	High

Finally, to test this hypothesis will be seen based on the path coefficient values for the path diagram (original sample / O), T-statistics, and hypothesis conclusions. Refer to [18], the strength and significance of the path coefficients are evaluated for the relationship (structural path) hypothesis between constructs. The values of the standard path coefficients vary from -1 to +1, and the coefficients that approach +1 represent meaning that the relationship is positive strong and the coefficients closest to -1 show that the relationship is strong negative. According to [16], if the significance value of the T-Statistics weight is greater than 1.96, it can be concluded that the construct indicator is valid. Testing the hypothesis to determine whether the hypothesis that has been submitted previously can be accepted or rejected. To analyze these hypotheses, the standard value used is a T-Statistics value greater than 1.96 and the path coefficient value above 0.05 (5%) which shows the level of significance in testing the hypothesis.

TABLE V. HYPOTHESIS TEST RESULT

Hypothesis	Path	Original Sample (O)	T-Statistics	Conclusion
H1	PE → BI	0.194	3.283	Significant
H2	SI → BI	-0.119	1.768	Not significant
H3	EE → BI	0.067	0.967	Not significant
H4	FC → BI	0.002	0.035	Not significant
H4a	FC → U	0.015	0.263	Not significant
H5	HM → BI	0.114	1.243	Not significant
H6	PV → BI	-0.023	0.271	Not significant
H7	HT → BI	0.478	6.721	Significant
H7a	HT → U	0.353	2.916	Significant
H8	TR → BI	0.309	3.562	Significant
H9	BI → U	0.520	4.160	Significant

C. Discussion

The results of testing 11 hypotheses show that there are 6 hypotheses that show "not significant" results. The findings of the results that show the conclusions of "not significant" are not in harmony with the results of the research from [2]. Social influence does not have a significant effect on behavioral intention because, regardless of the influence of people around them, such as co-workers or superiors, each lecturer at BINUS University is required to use BinusMaya as a supporting tool to carry out teaching and learning activities, and this application can only be used for lecturers and students of BINUS University. Effort expectancy does not have a significant effect on the behavioral intention because the use of the BinusMaya application is mandatory, even though the application is difficult or easy to use or learn, so the effort made by the lecturer becomes meaningless. The facilitating conditions do not have a significant effect on the behavioral intention because BinusMaya is only used in the teaching and learning process on campus and all the necessary resources have been provided by the BINUS University. The hedonic motivation does not have a significant effect on the behavioral intention because each lecturer must use the BinusMaya application regardless of whether they feel happy or not using it. The

price value does not have a significant effect on the behavioral intention because BinusMaya is an e-Learning application that must be used by all lecturers at BINUS University for free or without expenses. And the facilitating condition also does not have a significant result on the use behavior because whatever the conditions are, whether there are or no adequate resources, all lecturers are required to use BinusMaya. Therefore, all the results of hypothesis testing that show "not significant" are caused by the use of LMS applications that are mandatory to be accepted and used by all lecturers without exception. But the good side is that the use of the LMS application has become a habit and all lecturers believe in this application. The overall impact of this research for LMS is that the use of LMS should be a necessity for lecturers to become a habit in the teaching and learning process. To be a habit, the LMS should be as attractive as possible (in terms of UI / UX and easy access, such as mobile applications) and very reliable (very good application performance). In addition, the content development strategy should also be considered because interesting and good content will make all lecturers and students want to continue using this LMS.

V. CONCLUSION

From the results of the research, it can be concluded that the biggest influence that affects the behavioral intention variable is the habit variable because each lecturer is required to use the BINUSMaya application in the teaching and learning process at BINUS University without seeing the faculty and study program so that it has become a habit for them. The next biggest influence for behavioral intention variable is performance expectancy because each time the teaching and learning activities, the performance of the BINUSMaya application is expected to be able to run well so that the lecturers can obtain the real benefits of the application while teaching. While the biggest influence for the use behavior variable is the behavioral intention variable. This means that the frequency of using the BINUSMaya application by the lecturer begins with the obedience and the continuity of the use of the application.

For recommendations that can be given based on the results of this evaluation is to improve the performance of the BINUSMaya application to be more reliable in the teaching and learning process, especially the stability of the application because it is related to the variable performance expectancy. The specific ways to improve the performance of the BinusMaya application are to maintainance the BINUSMaya application, revise the code and queries on the BINUSMaya website, and also optimize the BinusMaya server. The BinusMaya application needs to be evaluated regularly by involving users so that the BinusMaya application can continue to be developed based on the user-oriented concept. In addition, it is necessary to test other models to evaluate this LMS in order to obtain more accurate results. Whereas the research contribution of this research is to provide a comprehensive understanding of the development and improvement in the future for LMS from the lecturer side. The limitation of this research is the need to increase the number of respondents according to the proportion of study programs so that the opinions of all study programs can be represented. The future research that will be

carried out is to continue this investigation with the students surveyed to accommodate the interests of all the actors in the learning process.

REFERENCES

- [1] N. A. Adzharuddin and L. Hwei Ling, "Learning Management System (LMS) among University Students: Does It Work?," *International Journal of e-Education, e-Business, e-Management and e-Learning*, vol. 3, no. 3, pp. 248-252, 2013.
- [2] V. Venkatesh, J. Y. L. Thong, and X. Xu, "Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology," *MIS Quarterly*, vol. 36, no. 1, pp. 157-178, 2012.
- [3] A. A. Alalwan, Y. K. Dwivedi, and N. P. Rana, "Factors influencing adoption of mobile banking by Jordanian bank customers: Extending UTAUT2 with trust," *International Journal of Information Management*, vol. 37, no. 3, pp. 99-110, 2017.
- [4] A. Marko and A. M. Honkaranta, "Bridging the Gap between Advanced Distributed Teaching and the Use of Learning Management Systems in the University Context," in Proc. of Seventh IEEE International Conference on Advanced Learning Technologies (ICALT 2007), 18-20 July 2007, Niigata, Japan [Online]. Available: IEEE Xplore, <http://www.ieee.org>. [Accessed: 12 Dec. 2018].
- [5] T. Teo, *Technology Acceptance in Education*, Singapore: Sense Publisher, 2011.
- [6] M. Harz and A. Vesper, "Acceptance of Technology?," *Energy Procedia*, vol. 40, pp. 312-319, 2013.
- [7] S. A. Nikou and A. A. Economides, "Mobile-Based Assessment: Integrating acceptance and motivational factors into a combined model of Self-Determination Theory and Technology Acceptance," *Computers in Human Behavior*, vol. 68, pp. 83-95, 2017.
- [8] V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly*, vol. 27, no. 3, pp. 425-478, 2003.
- [9] M. El-Masri and A. Tarhini, "Factors affecting the adoption of e-learning systems in Qatar and USA: Extending the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2)," *Educational Technology Research and Development*, vol. 65, no. 3, pp. 743-763, 2017.
- [10] A. Vance, M. Siponen, and S. Pahnla, "Motivating IS security compliance: Insight from Habit and Protection Motivation Theory," *Information & Management*, vol. 49, pp. 190-198, 2012.
- [11] S. Sankrusme, *Tourism Management of Russian Behavioral Intention toward Thailand*, Hamburg: Diplomica Verlag, 2017.
- [12] R. C. Mayer, J. H. Davis, and F. D. Schoorman, "An integrative model of organizational trust," *The Academy of Management Review*, vol. 20, no. 3, pp. 709-734, 1995.
- [13] E. S. Kassim, S. F. A. K. Jailani, H. Hairuddin, and N. H. Zamzuri, "Information System Acceptance and User Satisfaction: The Mediating Role of Trust," *Procedia - Social and Behavioral Sciences*, vol. 57, pp. 412-418, 2012.
- [14] C. D. McDaniel and R. H. Gates, *Marketing Research Essentials (8th ed.)*. New York: John Wiley & Sons, 2013.
- [15] U. Sekaran and R. Bougie, *Research Methods for Business: a skill-building approach (6th ed.)*, Chichester: John Wiley & Sons, 2013.
- [16] H. Latan and I. Ghozali, *Partial Least Square: Konsep, Teknik, dan Aplikasi SmartPLS 2.0 M3*. Semarang: Badan Penerbit Universitas Diponegoro, 2012.
- [17] J. F. Hair, C. M. Ringle, and M. Sarstedt, "PLS-SEM: Indeed a Silver Bullet," *The Journal of Marketing Theory and Practice*, vol. 19, no. 2, pp. 139-152, 2011.
- [18] M. Sarstedt, C. Ringle, D. Smith, R. Reams, and J. F. Hair, "Partial least squares structural equation modeling (PLS-SEM): A useful tool for family business researchers," *Journal of Family Business Strategy*, vol. 5, no. 1, pp. 105-115, 2014.