Acceptance Analysis of School Procurement System (SIPLah) Using the UMEGA Model: Based on the Perspective of Users in Education Units

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Abstract—The Work Unit for Procurement (UKPBJ) of the Indonesian Ministry of Education and Culture has developed a Procurement Information System in Schools (SIPLah) to create effectiveness, efficiency, transparency, and accountability of the procurement ecosystem in education units. 103,619 education units have used SIPLah, this achievement has not met the target of 220,283 schools in 2019 which has increased to 442,960 education units in 2020. The level of user acceptance has a significant influence on achieving the target number of users, but UKPBJ has never conducted research related to this factor. As a result, user acceptance has not become a reference in determining strategies in the socialization and development of SIPLah. This study aims to determine the factors that influence the adoption of SIPLah from the user's perspective in educational units using the Unified Model of E-Government Adoption (UMEGA). In this exploratory research, the perceived risk variable on UMEGA which in the hypothesis has a negative effect, be changed to perceived security so that it has a positive effect and is in line with other hypotheses. There were 150 valid respondents who were analyzed statistically using PLS-SEM with SmartPLS 3.0 software. The results of the study can be concluded that factors of performance expectancy, social influence, facilitating conditions, perceived security, and attitude are factors that must be considered by UKPBJ in determining strategies to socialize and develop SIPLah, because these factors have a significant positive impact on user intentions in education unit to adopt SIPLah.

Keywords— umega, kemendikbud, siplah, sem-pls, e-procurement, e-government

I. INTRODUCTION

The Indonesian government through Presidential Decree number 16 of 2018 has encouraged Ministries/Institutions /Regional Institutions to carry out the process of procuring goods and services (PBJ) electronically by developing an e-marketplace. The procurement process aims to produce the right goods/services for every budget spent, measured in terms of quality, quantity, time, cost, location, provider, and reporting, which have not been fully implemented through traditional methods [1]. Based on the aforementioned policy and to address various problems related to traditional procurement transactions, The Work Unit for Procurement (UKPBJ) of the Indonesian Ministry of Education and Culture has developed a Procurement Information System in Schools (SIPLah). SIPLah has initiated transformation of the procurement process in educational units by presenting transactions through an online system, non-cash payments, proof of transactions that can be downloaded and printed, and easier monitoring methods [2].

One of the important targets that must be achieved by UKPBJ is to increase the number of users and transactions through e-procurement or SIPLah [3]. Especially with the emergence of the Indonesian pandemic and recession in 2020, The President directed the acceleration of budget absorption, one of which is through the procurement process in schools [4]. The target to increase active users and transactions is strongly influenced by the level of user acceptance, especially in educational units. Socialization and technical guidance to increase user acceptance is a strategy that has been implemented by UKPBJ [3]. However, only 23% or 103,619 schools have conducted procurement transactions using SIPLah from the total target of 220,283 schools in 2019 which has increased to 442,960 education units in 2020, with the number of transactions 536,316 [5]. These things indicate the low level of participation of SIPLah users in educational units.

Currently, UKPBJ does not yet have basic data or information regarding what factors cause low or high levels of SIPLah adoption from the perspective of educational units [6]. This causes the development of SIPLah to focus more on internal processes whose impact cannot be felt directly by users in schools [5]. Actually, factors and their impact on the intention to adopt SIPLah can be used as the basis to create a socialization strategy and develop the SIPLah ecosystem so that it is more easily accepted and on target to increase user participation in educational units. In addition, this research can be a consideration for application developers in building similar applications.

Several studies regarding user acceptance or adoption of an information system have been done before. From that various models, UMEGA is a model designed and

validated by [7] specifically for the adoption of e-government systems. [8], used the UMEGA model to understand the adoption of 'Pak-Identity', a transactional service system to create identity documents for Pakistani citizens. The results of this study indicate that facilitating conditions greatly affect effort expectancy, but effort expectancy, facilitating conditions, social influence, and perceived risk have no significant effect on the adoption of e-government services. Other studies have been conducted by [9] and [10]. The results of these studies indicate that performance expectancy, effort expectancy, facilitating conditions, and attitude have a significant influence in adopting an e-government system. Based on the research above, UMEGA is one of user acceptance model for the e-government system, and it has a tendency to be suitable as the basic model of this study to found the factor that influencing users in using the one of the e-government application, in this case SIPLah.

The purpose of this study is to examine whether the UMEGA model is appropriate for the acceptance of SIPLah users in education units and answer the following questions: (1) What factors affect the acceptance of SIPLah application users in educational units? and (2) What recommendations can be given to the development of SIPLah from the perspective of users in education units? The framework of the UMEGA model is used in this study which is expected to provide information about the factors that influence user acceptance. The factors and recommendations from this study are expected to be the basis for UKPBJ in formulating strategies and developing SIPLah to be more easily accepted by users in educational units, so that the target of increasing the number of users is easier to achieve.

In this study, the target respondents were limited to educational units only. This is based on the target achievement of the Ministry of Education and Culture which is more focused on increasing the number of users in education units [11]. An educational unit may expend funds procurement through SIPLah with no limit value procurement package [12], so this research does not limit the value of transactions. This research was conducted using supporting data taken in November to December 2020.

II. Literature Review

A. Procurement Information System in School (SIPLah)

SIPLah is an ecosystem used by education units to execute the process of procuring goods and online services whose funds come from all education funds, especially the School Operational Assistance (BOS) funds [13]. There are four main actors who are directly involved in the SIPLah ecosystem, namely:

1) *The Education and Culture Ministry (Kemendikbud):* In charge of distributing the BOS budget, UKPBJ Kemendikbud sets service standards and identities of online market partners and supervises the implementation of SIPLah.

2) *Online Market Partners:* Kemendikbud partners who provide the SIPLah platform. Until now, UKPBJ has collaborated with 6 partners: Blanja.com, Blibli.com, INTI, Pesona Edu, Eureka Book House, and the Farm Shop. Online market partners also collaborate with payment partners regarding their payment systems.

3) *Education Unit (Satdik) or school:* Is the main target of the SIPLah. Satdik can implement a procurement process, which is more transparent, easy, with guaranteed quality of goods, and accountable.

4) *Providers:* SMEs or shops around the school that sell goods or provide services for school needs.

B. Unified Model of Electronic Government Adoption (UMEGA)

UMEGA is a model used to evaluate e-government adoption proposed and validated by [7]. This model is the result of a synthesis of nine existing models and has been adapted to the e-government system. The nine models are Theory Reasoned Action (TRA), Technology Acceptance Model (TAM), Social Cognitive Theory (SCT), Theory of Planned Behavior (TPB), Decomposed TPB (DTPB), Innovation Diffusion Theory (IDT), TAM2, Diffusion of innovation (DOI), and Unified Theory of Acceptance and Use of Technology (UTAUT) [7]. At UMEGA, there are five main variables that have an influence on attitude and behavioral intention, namely Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, and Perceived Risk [7].

C. Structural Equation Modeling for Partial Least Square (SEM-PLS)

Structural Equation Modeling (SEM) is a statistical technique used to build and test statistical models which are usually in the form of causal models [14]. Partial Least Square, abbreviated as PLS, is a component-based type of SEM analysis with formative construct/indicator properties (causes) [15]. PLS is suitable for predictive analysis in conditions where the sample size is large enough, but has a weak theoretical basis and the data does not meet the covariance-based SEM assumptions, or in conditions where the relationship between variables is very complex, but the data sample size is small [15]. Although Partial Least Square is used to confirm the theory, it can also be used to explain the relationship between latent variables. In SEM-PLS there are two types of measurement models, namely measurement outer models and measurement inner models (structural models) [16].

III. Research Model

This study focuses on evaluating the adoption of e-government from the perspective of users in education units of SIPLah application services. The UMEGA model was chosen as a research model with several considerations:

● UMEGA is purely developed in the context of an e-government system, making it suitable for measuring SIPLah acceptance,

● UMEGA is a synthesis of nine models acceptance that existing,

● This model has reframed the UTAUT model as a more meaningful alternative to understanding the adoption of e-government systems,

● The results of research by Khurshid et al and Dwivedi et al show that UMEGA is a suitable model in measuring the adoption of e-government technology [7][8].

In Fig. 1., there are three variables that have a correlation with attitude, one variable has a correlation with effort

expectancy, and three variables have a correlation with behavioral intention.
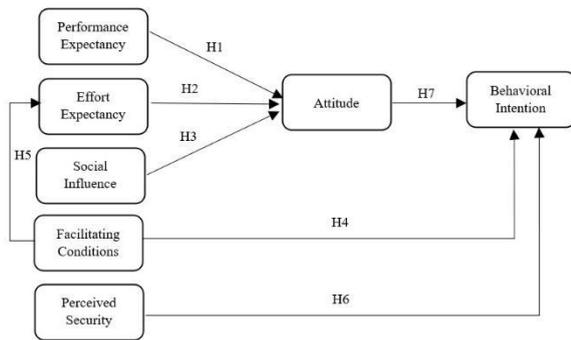
Fig. 1. Research model based on UMEGA [7]

1)   Performance Expectancy (PE): Performance expectancy is a person's level of trust stating that the use of a system or technology will help improve performance [7][17]. The user's attitude to using the e-government system is influenced by the benefits obtained from the system. Previous research has shown that PE has a positive and significant influence on users' attitudes in adopting e-government [7][10][8]. Based on that study, the first hypothesis was formulated H1: Performance expectancy has a positive and significant effect on the user's attitudes in using SIPLah.

2)   Effort Expectancy (EE): Effort expectancy is a measure of the ease and simplicity of a system or technology [7][17]. This variable has been used in previous studies to understand the attitudes of using e-government from the amount of user effort [7][9][10][8]. The results of these studies indicate that EE has a great impact on the attitude of users in adopting e-government, so the second hypothesis is formulated as H2: Effort expectancy has a positive and significant effect on the user's attitude in using SIPLah.

3)   Social Influences (SI): Social influences describe the relationship between users' decisions in adopting technology and relationships with friends, relatives, or parties who have important influence [7][17][18]. In the PBJ in educational units, social relationships are established with superiors and colleagues. Several studies have shown that social influence has a high influence on attitude [7][17], however, other studies show that it does not have a significant effect on these variables [10][8]. Therefore, the third hypothesis is formulated as H3: Social influences have a positive and significant effect on the user's attitude in using SIPLah.

4)   Facilitating Conditions (FC): Facilitating conditions are the level of user confidence in the organization infrastructure and service/support facilities provided in the e-government system [7][17]. Facilities are not only in the form of tools to use the system, but also in helpdesk services provided by the system manager. The significant impact of facilitating conditions on behavioral intention and effort expectancy in adopting e-government has been proven by [7][9][18]. Based on these, the researcher formulated the following hypothesis H4: Facilitating conditions have a positive and significant

effect on user behavioral intention to use the SIPLah application and H5: Facilitating conditions have a positive and significant effect on the effort expectancy of users in using SIPLah.

5)   Perceived Security (PS): Perceived Security refers to the user's perception that the system has sufficient security standards, related to data and transaction processes in the system [19][20]. Previous research has proven that perceived security has a significant effect on behavioral intention [19][20][21]. Dwivedi et al also recommend that perceived security can be added to the model according to e-government needs. Therefore, the researcher formulated the following hypothesis H6: Perceived security has a positive and significant effect on user behavioral intention to use SIPLah.

6)   Attitude (ATT): The attitude described as the extent to which users have a positive or negative evaluation of their involvement or interaction with the e-government system [7][8][18]. Previous research has shown a direct impact of attitudes on behavioral intentions to use e-government [7][9][10][8][18]. Therefore, the researcher formulated a hypothesis H7: Attitude has a positive and significant influence on user behavioral intention in implementing SIPLah.

IV. METHODOLOGY

A.   Research Methods

This research was conducted with a quantitative approach through a questionnaire, which was supported by document studies and interviews to explore problems. Models and indicators are compiled based on previous studies which are then adjusted to the research context in order to have a more precise understanding [22]. Before being distributed online to respondents in education units, validation and readability trials were carried out involving potential SIPLah user respondents, procurement experts from UKPBJ Kemendikbud, and one linguist from SEAMEO QITEP in Language.

Several adjustments were made so that the models and indicators used are in accordance with the current conditions of SIPLah implementation. The language expert from SEAMEO QITEP in Language suggested that the perceived risk variable, which in the hypothesis has a negative effect, be changed to perceived security so that it has a positive effect and is in line with other hypotheses. This change was also approved by the SIPLah expert from UKPBJ, so that indicators related to risk factors were changed to indicators related to transaction data security and user privacy data security. Other adjustment recommendations are related to indicators on social influence variables. Indicators regarding support from relatives or family and indicators of influence from social media are eliminated because they do not have a direct relationship with the system.

Questionnaire data were obtained from respondents, were selected to produce valid data. The valid data then processed using Microsoft Excel application to generate *.csv file format to be analyzed using the SmartPLS 3.0 application. The analysis step using the SEM-PLS technique was adopted from previous studies conducted by [22], [23], and [24], by evaluating the Reflective & Formative Measurement Model and evaluating the Structural Model. In the evaluation of the Reflective &

Formative Measurement Model (Outer Model), there was testing for indicators reliability, convergent validity, discriminant validity, and composite reliability. As for the evaluation of the Structural Model (Inner model) test, measurements of R-Square, Path Coefficients, T-Statistic (Bootstrapping), and Hypothesis testing are conducted [23].

B. Population and Sample

The population in this study were SIPLah users in education units from various provinces in Indonesia who directly interacted with the SIPLah application. The procurement implementer is an additional position for the respondents, the majority of whom are school principals, teachers, school treasurers, administrative staff, and school operators. The number of users in each educational unit is unlimited, so the population of this study is unknown. To calculate the minimum sample size in an unknown population, the Lemeshow formula is used [25] with a standard 95% confidence level, so the minimum sample size is 97 respondents.

The questionnaire was made online through the google form application. Distribution of questionnaires through the WhatsApp Group that was created by the UKPBJ Kemendikbud team. From the data collection activities held on November 11 to December 16, 2020, there were 150 respondents who had filled in the data and appropriate the research criteria.

C. Instrument

The research was composed of 7 variables with 7 hypotheses involving 28 indicators. The research instrument is a closed questionnaire type, which can only be accessed by procurement implementers of the education unit. The questionnaire consists of two parts, the first is the identity of the respondent and the second is the research questions. Research questions can be answered on a Likert scale of 1-5, which describes the answers of strongly disagree, disagree, neutral, agree, and strongly agree.

V. Analysis and Results

A. Respondent Demographics

There were 150 respondents from various regions or provinces in Indonesia who have filled in the questionnaire data validly. Furthermore, valid respondent data can be analyzed. The demographic characteristics of respondents consist of respondents in the age range 31-40 years old who are at the top in filling out the questionnaire, with 48% of the data. The female gender dominated the filling of this questionnaire with a percentage of 54%. Most respondents came from Java and Bali island at 54.66%, user institutions that filled out the most questionnaires were at the Senior High School level with a percentage of 44.67 and the main positions users mostly as school treasurers, with a percentage of 27.3%.

B. Evaluation of Reflective & Formative Measurement Model (Outer Model)

1) Indicator Reliability: This evaluation used to measure the relationship between indicators and their latent variables. The validity and reliability of an indicator can be seen from the outer loading factor value, which is > 0.7 [23]. The evaluation results from the reflection of the

indicators outer model on the loading factors are shown in Table I at the outer loading column.

TABLE I
LOADING FACTOR VALUES

Indicator	Loading factor		
	Outer Loading	Fornel Larcker	Cross Loading
PE1	0.862	0.875	0.875
PE2	0.902	0.920	0.920
PE3	0.86	Eliminated	Eliminated
PE4	0.853	Eliminated	Eliminated
PE5	0.858	0.878	0.878
PE6	0.9	0.903	0.903
PE7	0.831	Eliminated	Eliminated
PE8	0.857	0.882	0.882
EE1	0.874	0.898	0.898
EE2	0.789	Eliminated	Eliminated
EE3	0.838	Eliminated	Eliminated
EE4	0.858	0.895	0.895
EE5	0.884	0.886	0.886
SI1	0.935	0.934	0.934
SI2	0.924	0.925	0.925
FC1	0.845	0.827	0.827
FC2	0.714	Eliminated	Eliminated
FC3	0.853	0.890	0.890
FC4	0.884	0.911	0.911
PS1	0.966	0.966	0.966
PS2	0.972	0.972	0.972
AT1	0.956	0.970	0.970
AT2	0.948	0.971	0.971
AT3	0.906	Eliminated	Eliminated
BI1	0.928	0.934	0.934
BI2	0.862	Eliminated	Eliminated
BI3	0.939	0.953	0.953
BI4	0.939	0.952	0.952

2) Convergent Validity (Construct Reliability): Reliability of variables is measured by the Average Variance Extracted (AVE), that each latent variable must be able to explain the variance of each indicator at least 50% [16]. Convergent validity requirements are met if the AVE value is > 0.5 [23].

TABLE II
AVE, RHO_A, CA, AND CR VALUE

Variable	AVE	rho_A	CA	CR
PE	0.796	0.937	0.936	0.951
EE	0.797	0.874	0.873	0.922
SI	0.864	0.845	0.843	0.927
FC	0.768	0.854	0.849	0.909
PS	0.94	0.943	0.936	0.969
ATT	0.941	0.938	0.938	0.97
BI	0.896	0.942	0.942	0.963

3) Discriminant Validity: Discriminant validity for the Fornell Larcker criterion is obtained by comparing each variable's correlation value with the variable itself against the correlation value of the variable with other variables in the model [24]. The correlation value of a variable with the variable itself must be higher than the correlation of the variable with other latent constructs/variables [23]. Results of the loading factors indicators after elimination are shown in Table I at the Larcker Fornel column.

The next step is to conduct a Cross Loading assessment or correlation between indicators and variables. The correlation value between indicators and their variables

must be higher than the correlation values between indicators and other variables. The results of the indicator loading factors on this study after elimination are shown in Table I of the Cross Loading column.

4)   Composite Reliability: This section aims to measure the consistency and accuracy of the instruments used to assess the validity of the variables. This is performed by evaluating the values of Cronbach's alpha (CA) and Composite Reliability (CR). Table II shows consistency and good accuracy of the instrument, with all CA and CR values already exceeding the required value limit of 0.7 [23].

C.   Evaluation of Structural Model (Inner Model)

1)   R-Square: The structural model is evaluated by calculating the percentage of the effect of a variable which is explained by the value of R-Square (R^2) which is also known as the coefficient of determination [23]. The results of this part explained that facilitating conditions affect the effort expectation by 70%. As much as 82% of attitude is affected by performance expectancy, effort expectancy, and social influences. 89% of behavioral intention is affected by attitude, facilitating conditions, and perceived security. While the remaining 11% of behavioral intention is affected by other variables outside of research.

2)   Path Coefficients: Path coefficients are used to determine whether a hypothesis has a positive (between 0 to 1) or negative (between -1 and 0) effect [23]. Analysis results of all hypotheses in this study are valued between 0 and 1, which means that all have a positive effect, as shown in Table III.

3)   Hypotheses Testing: Hypotheses testing is performed to determine the significance level of the hypothesis influence using T-statistics through the bootstrapping procedure. Using a 95% confidence level (significance level = 5%), so the reference value used is 1.96 [23]. If the T-statistic value is greater than 1.96, then the hypothesis has a significant impact. The results of hypothesis testing using path coefficients and T-statistics are shown in Table III.

TABEL III
HYPOTHESIS TEST SUMMARY

	Path	PC	TS	Impact Type	Summary
H1	PE - ATT	0.630	7.406	Positive, Significant	Accepted
H2	EE - ATT	0.171	1.950	Positive, Not Significant	**Rejected**
H3	SI - ATT	0.191	3.450	Positive, Significant	Accepted
H4	FC - BI	0.146	2.730	Positive, Significant	Accepted
H5	FC - EE	0.839	30.163	Positive, Significant	Accepted
H6	PS - BI	0.234	4.031	Positive, Significant	Accepted
H7	ATT - BI	0.621	9.474	Positive, Significant	Accepted

VI. DISCUSSION AND IMPLICATIONS

This study using the UMEGA model has presented determinant factors that can be used to identify directions and strategies for increasing user intention in educational units to adopt SIPLah. The influence of these factors is shown in Table III which shows that six hypotheses are accepted and one hypothesis is rejected.

From the collected sample data, it cannot prove that effort expectancy has a significant effect on attitude, even though the results only have a difference of 0.01 from the reference limit. These results are relevant to other studies that adopt the UMEGA model, conducted by [8] and [18] that the effort expectancy factor does not have a significant effect on the user's attitude to adopt an e-government system.

H1 is accepted, indicating that there is a strong relationship between performance expectancy and user's attitude to adopting SIPLah. Thus, user perceptions of performance will play an important role in building positive attitudes, which will lead to the intention of adopting SIPLah. The SIPLah application must be ensured to have a fast response, a more effective and efficient transaction process, provide better quality products and be more complete than today, and provide reports according to the needs of educational units, which will have an impact on improving user performance in educational units.

In contrast with the results of research [10][8], H3 is accepted, which proves that the influence of the social environment, especially superiors and colleagues, will positively build user attitudes, which will increase the intention to adopt SIPLah, in accordance with the accepted hypothesis H7. Therefore, SIPLah should be specifically socialized to school principals, so that executives will be more supportive of implementing SIPLah.

Adequate facilities are one of the success keys in adopting SIPLah. This has been proven by the positive and significant effect of facilitating condition factors on behavioral intention (H4) and effort expectation (H5), in line with previous studies [7][9][10][18]. Suggestions for developing SIPLah, it is better to provide responsive customer complaint service facilities, for example by providing virtual assistants with artificial intelligence technology or displaying a telephone number that is easy to contact. Applications should be "light" and "simple" so that they can be easily accessed using devices with low specifications and limited internet access.

The analysis of this study also supports the hypothesis H6, which means that the user's intention to adopt is strongly influenced by the level of security of the system. Validation on the SIPLah application is not only provided at the time of login and confirmation of payment, but also for every input from the user. Validation is also carried out in selected stores or SMEs as providers, so SIPLah only provides trusted providers. Another SIPLah application development is that libraries, plugins, and application frameworks must be updated within a certain period of time. Then changing the user's password must be required at a certain time, for example, once every 6 months and with authentication to the user's mobile number. By improving some of these security functions, the level of perceived security by users will increase and have a positive impact on the intention to adopt SIPLah.

These recommendations aim to improve SIPLah's ability to be more easily accepted by users in educational units. With better acceptance, the level of adoption and

transactions using SIPLah will increase, which will create a procurement climate in education units that is effective, efficient, transparent, fair, and accountable. In addition, the UKPBJ target related to increasing the number of users and transactions in SIPLah will be easier to achieve.

VII. CONCLUSION

This research has specifically presented the factors that influence user acceptance in education units to adopt e-procurement applications (SIPLah). The analysis was conducted by adopting the UMEGA model and using the SmartPLS tools to process data. Results of the research on seven hypotheses confirm that facilitating conditions significantly affect the effort expectation by 70%; Performance expectancy, effort expectancy, and social influences have a significant positive impact on attitude by 82%. Furthermore, this study proves that three factors have a significant positive impact on behavioral intention users in education units by 88%, namely the attitude factor, facilitating conditions, and perceived security. Six factors in this study whose hypotheses are accepted or proven correct should be used as a reference for UKPBJ when formulating socialization strategies and SIPLah development plans, so more easily accepted by users in educational units. From the many accepted hypotheses, it proves that UMEGA model is relevant to the research context of user acceptance of the implementation of e-government systems, especially SIPLah application.

Based on the results obtained and the limitations of the study, the adoption of the UMEGA model can be suggested as a measurement model for user acceptance in e-government systems. This research model can be developed in further research by adding other variables, for example, job relevance, subjective norm, task & technology characteristics.

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