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Partial Least Square Algorithm (PLS) with Technology Acceptance Model (TAM) in User Analysis of Public Health Center Management Information System (SIMPUS) Applications

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Abstract.
Purpose: The most important information system application at the health center is the health center management information system which can be called SIMPUS. The SIMPUS is an application program specifically designed to help facilitate the recording of patient data, processing and presenting data into information in a short time. With the SIMPUS application, it is necessary to examine whether the application is very helpful for users in completing work at the public health center or Puskesmas. Therefore, this study aims to analyze the SIMPUS application users by combining the Partial Least Square (PLS) algorithm with the Technology Acceptance Model (TAM) method.
Methods: SIMPUS application user analysis combines the Partial Least Square (PLS) algorithm with the Technology Acceptance Model (TAM) method. The variables used are Perceived Usefulness, Perceived Ease of Use, Attitude Towards Using, Behavioral Intention to Use, and ActualUse. Data collection techniques by distributing closed questionnaires and taking samples with the solvency formula. Sampling was carried out using a multistage random sampling technique, the number of 12 Puskesmas in each Puskesmas from the calculation results determined 40 samples.
Results: From the statistical test results, the effect of perceived usefulness on ease of use has the highest level of influence, obtaining a test value of 3.6. Furthermore, the effect of the attitude towards using on the behavioral intention to use has the lowest level of influence, which obtained a test value of 1.2.
Novelty: Analysis and testing of variables that influence user acceptance of the SIMPUS application using the Partial Least Square (PLS) algorithm and the Technology Acceptance Model (TAM) approach, that the level of usability and ease of use of the application influences acceptance of the SIMPUS application.

Keywords: Public health information system, SIMPUS, TAM, PLS
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INTRODUCTION

With the advent of technology, first-level health services, especially the public health center or Puskesmas, are required to deliver the highest level of service and report accurate and precise data. The Puskesmas are also required to use technology in all work performed to support faster, more accurate, and correct performance [1], [2]. The Puskesmas should use the SIMPUS application to manage its data. The Puskesmas Management Information System is called SIMPUS.

With the presence of the SIMPUS application at the health center, it can have a positive impact and help complete tasks in managing patient data at the Puskesmas so that users feel satisfied with implementing SIMPUS. In implementing SIMPUS, organizations in health centers must also consider the level of acceptance of SIMPUS application users. The level of user acceptance can be measured to determine the extent of acceptance of the SIMPUS application [3]–[6] because it is also one of the benchmarks in service quality, namely knowing the level of user acceptance of the SIMPUS application.

Some cases occur in the SIMPUS implementation that has failed. One of them is that the system running is not by the needs of data management, and there is a system that has not accommodated the appropriate

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information needed, only looking for data [7]–[9]. According toTangke (2004) the human resource factor as an information system user is very important to note in implementing a new system. Because the level of readiness for use to accept a new system is very influential in determining the success or failure of developing the system [10].

In measuring the level of user acceptance of the SIMPUS application, it can be measured using the Technology Acceptance Model (TAM) method [11], [12]. TAM itself was coined by Davis in 1989, and TAM variables include Perceived Usefulness, Perceived Ease of Use, Attitude Towards Using, Behavioral Intention to Use, and ActualUse [13]. One tool to test the TAM variable is using Partial Least Square (PLS), which is a derivative of SEM [14], [15]. In this study, using TAM as a method and combining variables, the results are hypotheses. Where will the hypothesis results be obtained between which variables have a significant effect on the acceptance of information technology, and which variables have no/less effect on the acceptance of information technology.

TAM is the most widely used model in information technology research. TAM can explain the determination of computer acceptance in general and the behavior of user attitudes in a population [16]. Research by Maria Kyritsi in 2014discusses Internet banking which has been widely adopted by bank customers worldwide [17]. Then Said Al Gahtani, 2009 in his research, tried to integrate the technology acceptance model using TAM [18]. Farahat Taher in 2012 Research was also conducted by identifying the determinants of students' intentions to use online learning and investigating the relationship between students' intentions in practicing online learning [19].

This study uses the TAM method with the variables Perceived Usefulness, Perceived Ease of Use, Attitude Towards Using, Behavioral Intention to Use, and ActualUse. One tool to test the TAM variable is using Partial Least Square (PLS), a derivative of SEM.

METHODS

The population in this study were the SIMPUS users at the district health office and users at the Puskesmas. Researchers distributed closed questionnaires to carry out calculations and use the solving formula. Based on calculations from the solvency formula, 40 samples were obtained to be used. Sampling was carried out using the Multistage Random Sampling technique in several health centers in the district; there were 12 health centers. This study compares the variables in the modivied TAM model by Vakantesh and Davis, which can be seen in Figure 1, a measuring instrument for testing variables using the partial least square algorithm.

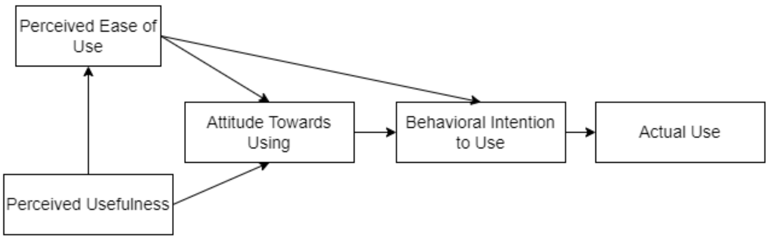

Figure 1. The variable of technology acceptance model

The TAM model in this research is the development of the Vakantesh and Davi modifications taking the following variables, which consist of Perceived Usefulness (PU), Perceived Ease of Use (PEU), Attitude Towards Using (ATU), Behavioral Intention to Use (BIU), Actual Use (AU) [20], [21]. Furthermore, this study modeled the hypothetical structure of the TAM model variables, which are presented in Figure 2.

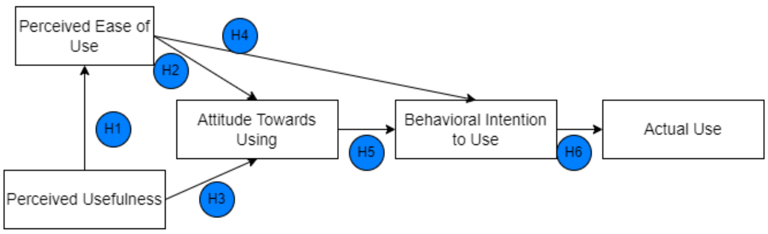

Figure 2. TAM research model

Internal consistency reliability will be explained from Cronbach's alpha and AVE values; discriminant validity will be explained in the cross loading and fornell-locker Criterion values. Testing on the partial least square algorithm, the results obtained by the reliability indicator are explained by the outer loading value. . Then, in testing the Inner Model or Resampling Bootstrapping, you will get path coefficients, which will show the value of R-square (R2) to assess how much an exogenous construct can explain an endogenous construct, where the T-statistics value is more than 1.64 (one-tailed) and 1.96 (two-tailed) with a probability value (p-value) of less than 0.05 or 5%.
Partial least square Algorithm with SmartPLS 3.0 software. As for the order in use:
1. Questionnaire data is converted to Note or CSV form
2. New Project in SmartPLS 3.0
3. Input CSV data into SmartPLS 3.0
4. Draw the model structure from the desired latent variables
5. Test the Quality of the measurement model (PLS Algorithm)
6. Hypothesis Testing (Resampling Bootstrapping)

RESULTS AND DISCUSSIONS

The researcher's stage was to process questionnaire data from data in Excel form and convert it into .csv or note form. Then draw the model structure by selecting latent variablesby entering indicators already available in the variable, which can be seen in Figure 3.1.

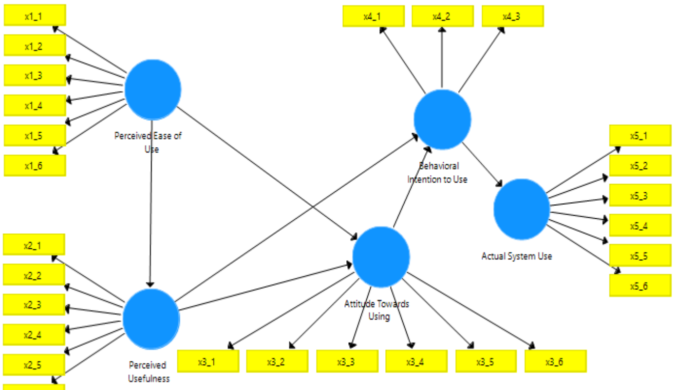

Figure 3.1 Structure model

There are question indicators in each variable. Variables in Perceived Ease of Use have 6 question indicators which in the picture are mentioned x1_1, x1_2, x1_3, x1_4, x1_5, x1_6, then for the variable Perceived Usefulness there are 6 question indicators in the picture mentioned with x2_1, x2_2, x2_3, x2_4, x2_5, x2_6. The Attitude Towards Using variable has 6 question indicators in the picture, which are mentioned as x3_1, x3_2, x3_3, x3_4, x3_5, and x3_6. For Behavioral Intention to Use, there are 3 question indicators in the picture, which are mentioned as x4_1, x4_2, and x4_3. Also, in ActualUse, there are 6 question indicators in the picture mentioned with x5_1, x5_2, x5_3, x5_4, x5_5, and x5_6. Furthermore, the quality test of the PLS algorithm was carried out. With calculation, then algorithm PLS. The results of the PLS quality test calculations are shown in Figure 3.2.

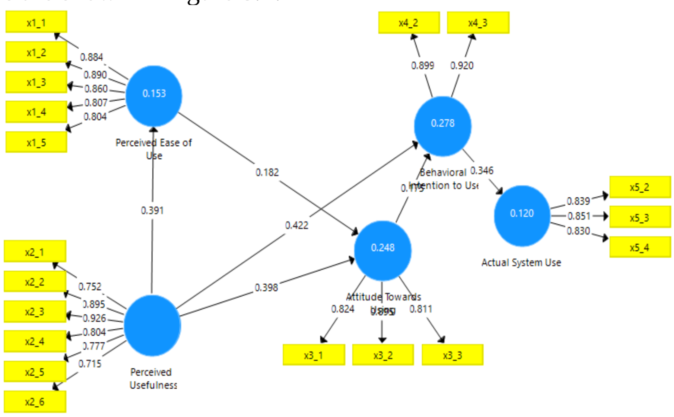

Figure 4. Structure model

The results of the quality test of the output PLS algorithm, the reliability indicator results that will be seen are the outer loading values. The reliability indicator evaluates the dependability of indicators used to measure hidden variables. If the loading value is more than 0.7, the construct can account for more than 50% of the indicator variation [22], [23]. The following is the result of the indicator that produces this variable by looking at the outer loading value presented in Table 1.

Table 1. Indicator loading value

Variable	Indicator Loading
x1_1	0,884
x1_2	0,890
x1_3	0,860
x1_4	0,807
x1_5	0,804
x2_1	0,752
x2_2	0,895
x2_3	0,926
x2_4	0,804
x2_5	0,777
x2_6	0,715
x3_1	0,824
x3_2	0,895
x3_3	0,811
x4_2	0,899
x4_3	0,920
x5_2	0,839
x5_3	0,851
x5_4	0,830

Then it will be seen that the value of internal consistency reliability measures the ability of latent constructs [24]. The internal consistency reliability value is 0.6-0.7[24], and Cronbach's alpha value is more than 0.7 [25] Cronbach's alpha value, composite reliability, and AVE value.

Table 2. Construct reliability and validity

Variable	Cronbach's Alpha	Composite Reliability	AVE
Perceived Ease of Use	0,905	0.928	0.722
Perceived Usefulness	0,898	0,922	0,664
Attitude Towards Using	0,801	0,881	0,706
Behavioral Intention to Use	0,792	0,905	0,827
Actual Use	0,792	0,878	0,706

Table 2's calculation results show that each latent variable's value of Cronbach's Alpha, Composite Reliability, and AVE is greater than 0.060. Thus, each latent variable has good composite reliability, and reliability meets the measurement criteria.

The next measurement is the evaluation of the inner model or hypothesis testing. Evaluation Inner model has a function to predict the relationship between latent variables. The most basic effect can be explained by changes in the R square value, as presented in Figure 3.3.

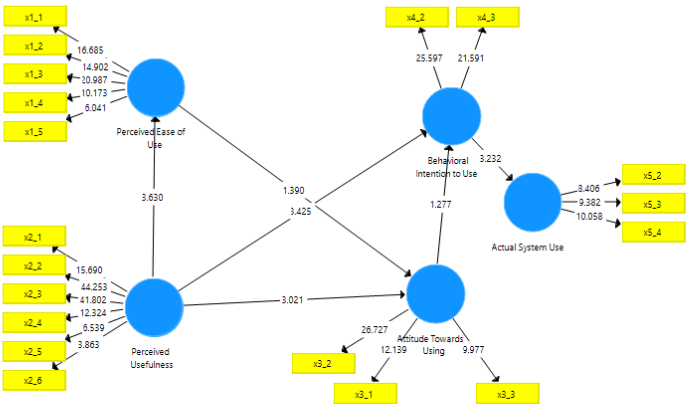

Figure 3.3. Bootstrapping

The following is a table of R square values in Table 3.

Table 3. R square performance

Variable	R square
Actual Use	0,120
Attitude Towards Using	0,248
Behavioral Intention to Use	0,278
Perceived Ease of Use	0,153

Next is hypothesis testing. The basis for testing the value hypothesis is contained in the results of the path coefficients with the model in this study. And with the Rule of thumbs:
a. If the original sample value shows the coefficient or direction of the variable relationship in line with the research hypothesis.
b. If the t-statistic value is more than 1.64 (two-tailed) or 1.96 (one-tailed) and the probability value (p-value) is less than 0.05 or 5%.

Table 4. Statistical result of hypothesis testing

Variable	Original Sample	Sample Mean	Std. Deviation	T Statistic	P Values
ATU → BIU	0.175	0.170	0.137	1.277	0.202
BIU → AU	0.346	0.377	0.107	3.232	0.001
PEU → ATU	0.182	0.186	0.131	1.390	0.165
PU → ATU	0.398	0.409	0.132	3.021	0.003
PU → BIU	0.422	0.442	0.123	3.425	0.001
PU → BIU	0.391	0.426	0.108	3.630	0.000

The description of the results of the processing of the presentation is as follows:
1. Perceived Usefulness, the R2 value is 0.391, and the coefficient value is said to be moderate
2. Perceived Ease of Use, the R2 value is 0.182, and the coefficient value is said to be moderate
3. Behavioral Intention to Use, the R2 value is 0.346, and the coefficient value is said to be moderate
4. Attitude Towards Using the value of R2 is 0.175, the coefficient value is said to be moderate

Table 5. Significance of Relations between Models

	Hypothetical Relationship	O	T-statistic	Result
H1	Attitude Towards Using-->Behaviorel Intention to Use	0,175	1,227	H1 Approved
H2	Behavioral Intention to Use ->Actual Use	0,346	3.323	H2 Approved
H3	Perceived Ease of Use -> Attitude Towards Using	0,182	1,390	H3 Approved
H4	Perceived Usefulness -> Attitude Towards Using	0,398	3.021	H4 Approved
H5	Perceived Usefulness-> Behavioral Intention to Use	0,422	3.425	H5 Approved
H6	Perceived Usefulness-> Perceived Ease of Use	0,391	3,630	H6 Approved

CONCLUSION

Based on the results of the discussion, it can be concluded that testing of user acceptance of the SIMPUS application with the TAM model and the Partial Least Square (PLS) algorithm is influenced by usability and convenience. Judging from the test results in the discussion, namely the statistical test, which becomes a higher level of influence, is the usability of use for convenience, as evidenced by a test value of 3.6. Furthermore, the lower level of influence is the attitude of use towards the behavioral intention to use, with a test value of 1.2. For futher studies so that broader coverage can add hipothesis variables, so that you can find out the differences from this study.

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