Expectation-Confirmation Model (ECM) to See Satisfaction and Continued Intention of e-Learning ("Cyber")

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Abstract— **The Expectation-Confirmation Model (ECM) has been widely used to test technology adoption by many researchers. This study aims to examine the ECM used for e-learning used at Soegijapranata Catholic University Semarang. The respondents used in this study were Soegijapranata Catholic University students from various study programs, both D3, S1, S2, and S3. The methodology used in this study is to distribute questionnaires to cyber user respondents at Soegijapranata Catholic University, then test the data with statistical tests using Smar PLS, the expected results are models that are compiled based on hypotheses from literature studies as expected. Based on the hypothesis test, it turns out that all the hypotheses that have been prepared can be accepted because all P Value prices are below 5% or 0.05. The results of this study turned out to be a correlation between cyber user satisfaction on the sustainability of cyber use in the future.**

Keywords— technology adoption; e-learning; ECM; Service Quality; System Quality.

I. INTRODUCTION

Due to the COVID-19 pandemic, university studies are now conducted to online or hybrid, including at Soegijapranata Unika Semarang. Soegijapranata Unika currently uses an e-learning called Cyber which needs to be researched so that it can continue to be used in ECM in the future.

This study examines the cyber usage of Soegijapranata Catholic University using ECM. This ECM is widely used by researchers to use techniques other than the TAM (Technology Acceptance Model) or UTATUT (Unified Theory of Acceptance and Use of Technology) models [1-4].

The purpose of this study is to determine whether the cyber used by Unia Soegijapranata can be further utilized with ECM. The purpose and sustainable use of cyber is a key factor in this ECM.

Research urgency

During this time of pandemic, a good online learning system that accommodates different interests is essential especially for students who need to study remotely. Determine whether online learning will continue or not is based on the satisfaction factor. Therefore, this survey was conducted to ensure that cyber satisfaction meets student expectations, from a student's point of view. If they (students) are satisfied and interested, it means the learning system can be continued, i.e. they can continue to use it in the future.

II. LITERATURE REVIEW

By adding more variables Affecting Perceived Utility from the Technology Acceptance Model (TAM), IS-ECM from Expectancy Confirmation Theory, and the framework is based on four variables (1) Confirmation (2) Perceived Usefulness (3) consisting of satisfaction, and (4) The Purpose of the Continuation of Information System. Perceived usefulness refers to the cognitive beliefs that influence one's intentions. In fact, an Information System user's decision is similar to a consumer's decision to purchase an item or service again. This is influenced by user experience which can encourage reuse after the initial decision or after [5]. This model is widely used for digital products, including sustainable e-learning [4,6,7].

Rationale – Expectation Confirmation Model (ECM) Previous research has applied various technology use models to study users' persistent intentions. UTAUT2 [8] and TAM [9,10]. These

studies provide insight into the understanding of users who continue to use fitness and health applications, especially by implementing a single model and incorporating limited factors, whereas studies are insufficient to explain individual behavior after implementation [11,12,13,14,15]. IM overcomes the limitations of ECM, which focuses on user perceptions of IT products/services [16]. However, IM theory has not been used to study the relationship between users and applications. Therefore, this study integrates ECM and IM to discuss the utilitarian perspective and involvement in the use of individual fitness and health applications [17,18].

The basic theory of the Expectation Confirmation Model (ECM) Bhattacherjee (2001) [12] is a further development of the Technology Acceptance Model (TAM) [19,20] by adding Satisfaction and Confirmation variables. The basic ECM has four variables. Confirmation, perceived benefits, satisfaction, and willingness to continue. The use of basic and developed ECM has been practiced by many researchers when using technology studies [21].

In a study by Samar Mouakket (2016) [22], ECM used personality trait variables (awareness, experiential, neuroticism, reading, and reading) to motivate users' persistent intentions to Facebook) is used with

Expectancy Confirmation Theory (ECT) was also used to understand the main drivers of Mooc's satisfaction and intention to continue using it. In this model, the variables 'Perceived Interest', 'Flow' and 'Intention to Recommend' are added to the ECT (Yunfan Lu (2019)[23]). ECM is also used to measure user satisfaction in e-learning (M. Nasri 2017)[24].

In his research, Suzianti, A., 2021[25], ECM is also used to continue e-learning in conditions related to open innovation. The variables used are the same as in this study, the difference is the quality score with usability and satisfaction variables. SE is SE teacher, not student.

III. RESEARCH METHODOLOGY

The method used in this research is to build a model that is used based on the existing journal literature. After the model is created, the next step is to create variables and indicators that exist in the model. In this case they are students. After the index (question list) is complete, the next step is to distribute the questionnaire to Sogijapranata Catholic University students.

Next, after data from students, the next step is to test the statistical data that has been obtained. Statistical tests were carried out using PLS-SEM, to test the validity, reliability also tested whether the hypothesis that had been prepared was accepted or rejected. Next, make a research report and finally the publication of the results of this research, a flow chart can be seen in Figure 1.

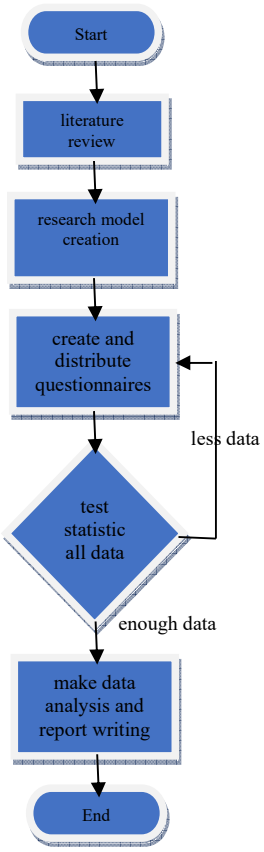

Figure 1. Flowchart of Research Methodology.

IV. RESULT AND DISCUSSION

In this study, a statistical test was conducted to see whether the hypothesis that had been carried out was acceptable or not. The model used in this study is as follows:

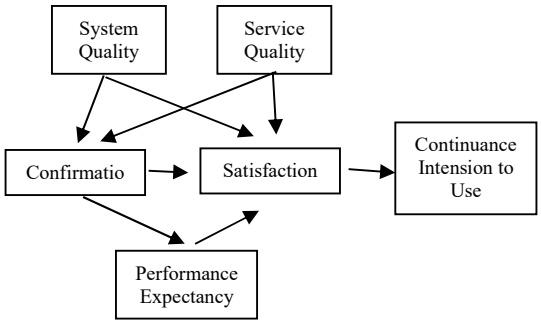

Fig. 2. The model used in this study

The variables used in this study are System Quality (SQ), Service Quality (SrQ), Confirmation (Conf), Satisfaction (Sat), Performance Expectancy (PU) and Continued Intention to use (CUI).

There are 3 statistical tests carried out in this study, namely the measure model test, the structure model test and the last is the hypothesis test.

A. Measurement Model Test

A.1. Validity test

Testing is carried out using smart PLS. This research model when described in smart PLS can be seen in Figure 3.

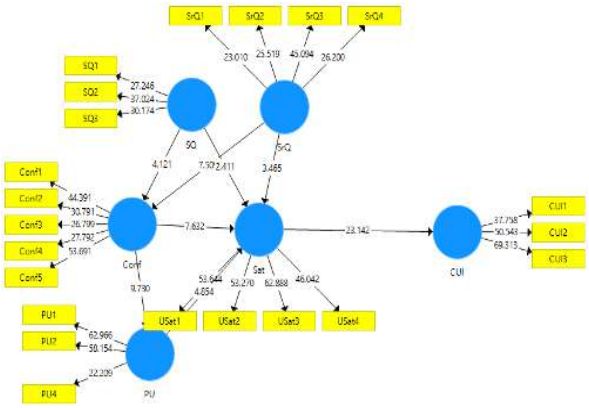

Fig. 3. This research model

a. Convergent validity

If the above model is run with PLS, the results of the outer loading can be seen in table 1 below:

TABLE I. THE VALUE OF THE LOADING FACTOR TO TEST THE VALIDITY OF THE INDICATOR

	CUI	Conf	PU	SQ	Sat	SrQ
CUI1	**0.837**					
CUI2	**0.875**					
CUI3	**0.902**					
Conf1		**0.857**				
Conf2		**0.820**				
Conf3		**0.786**				
Conf4		**0.774**				
Conf5		**0.855**				
PU1			**0.908**			
PU2			**0.933**			
PU4			**0.731**			
SQ1				**0.782**		
SQ2				**0.858**		
SQ3				**0.802**		
SrQ1						**0.754**
SrQ2						**0.770**
SrQ3						**0.850**
SrQ4						**0.731**
USat1					**0.871**	
USat2					**0.885**	
USat3					**0.871**	
USat4					**0.865**	

It can be seen that the value of each indicator of the loading outer value is greater than 0.7 which means that all indicators used are valid, the threshold value of the loading outer is 0.7.

TABLE II. AVERAGE VARIANCE EXTRACTED (AVE) VALUE.

	Average Variance Extracted (AVE)
CUI	**0.760**
Conf	**0.671**
PU	**0.743**
SQ	**0.664**
Sat	**0.762**
SrQ	**0.605**

Based on Table II, all variables have an AVE value above 0.5. From table 1 and table 2 it can be seen that this model meets the requirements of convergent validity.

b. Discriminant Validity

To test discriminant validity, what is seen is the cross loading value of this variable, the results can be seen in table III.

TABLE III. CROSS LOADING VALUE

	CUI	Conf	PU	SQ	Sat	SrQ
CUI1	**0.837**	0.456	0.488	0.480	0.597	0.478
CUI2	**0.875**	0.597	0.453	0.573	0.651	0.587
CUI3	**0.902**	0.593	0.464	0.593	0.658	0.617
Conf1	0.464	**0.857**	0.422	0.586	0.572	0.636
Conf2	0.484	**0.820**	0.343	0.560	0.546	0.642
Conf3	0.400	**0.786**	0.243	0.492	0.548	0.495
Conf4	0.567	**0.774**	0.304	0.520	0.683	0.557
Conf5	0.641	0.855	0.483	0.597	0.729	0.653
PU1	0.518	0.359	0.908	0.502	0.559	0.423
PU2	0.444	0.383	0.933	0.536	0.520	0.435
PU4	0.417	0.414	0.731	0.492	0.457	0.419
SQ1	0.388	0.550	0.409	0.782	0.495	0.617
SQ2	0.539	0.544	0.575	0.858	0.619	0.590
SQ3	0.604	0.559	0.459	0.802	0.599	0.617
SrQ1	0.378	0.545	0.309	0.597	0.476	0.754
SrQ2	0.397	0.572	0.221	0.575	0.449	0.770
SrQ3	0.566	0.624	0.458	0.598	0.670	0.850
SrQ4	0.638	0.534	0.520	0.553	0.618	0.731
USat1	0.620	0.655	0.550	0.631	0.871	0.646
USat2	0.638	0.744	0.476	0.629	0.885	0.684
USat3	0.680	0.560	0.538	0.555	0.871	0.529
USat4	0.612	0.680	0.524	0.641	0.865	0.656

Based on Table III, it can be seen that each indicator has the largest value on the related variable compared to other variables.

Next, Table 4 will show the values of the Fornell-Larcker criteria. Based on the values listed in Table IV, each variable has the largest value by itself compared to other variables. Therefore, this model meets the requirements of discriminant validity.

TABLE IV. FORNELL-LARCKER CRITERIA VALUE

	CUI	Conf	PU	SQ	Sat	SrQ
CUI	0.872					
Conf	0.632	0.819				
PU	0.536	0.447	0.862			
SQ	0.631	0.676	0.593	0.815		
Sat	0.729	0.757	0.597	0.704	0.873	
SrQ	0.645	0.733	0.495	0.746	0.721	0.778

A.2. Reliability Test

Reliability refers to the consistency or stability of an indicator. Reliability is measured by the value of composite reliability and Cronbach's alpha. Table V will display the composite reliability and Cronbach's alpha values for each construct

TABLE V. CRONBACH'S ALPHA AND COMPOSITE RELIABILITY

	Cronbach's Alpha	Composite Reliability
CUI	0.841	0.905
Conf	0.877	0.911
PU	0.820	0.896
SQ	0.746	0.855
Sat	0.896	0.928
SrQ	0.782	0.859

According to Table V, it can be seen that all constructs have a composite reliability value above 0.7

A.3. Multicollinearity

Multicollinearity is a state of very high intercorrelation or between associations between independent variables. In PLS by using the VIF value.

TABLE VI. VIF OUTER VALUE

	VIF
CUI1	1.787
CUI2	2.079
CUI3	2.390
Conf1	2.875
Conf2	2.547
Conf3	2.097
Conf4	2.094
Conf5	2.366
PU1	2.212
PU2	2.639
PU4	1.318
SQ1	1.460
SQ2	1.718
SQ3	1.437
SrQ1	1.725
SrQ2	1.885
SrQ3	1.942
SrQ4	1.538
USat1	2.474
USat2	2.619
USat3	2.499
USat4	2.380

Based on Table VI and Table VII, it can be seen that all variables and indicators have met the requirements of the absence of collinearity, namely having values below 3.5 and 10.

TABLE VII. INNER VIF VALUE

	CUI	Conf	PU	SQ	Sat	SrQ
CUI						
Conf			1.000		2.354	
PU					1.560	
SQ		2.251			2.827	
Sat	1.000					
SrQ		2.251			2.892	

B. Structural Model Test

After carrying out the measurement model and this model has passed the measurement model test, the next step is to conduct a structural model test. The structural test of this model is to analyze the structural relationship between the measured variable and its latent variable. The structural model test includes the path coefficients and coefficient of determination tests.

B.1. Test path coefficients

The basis for determining whether or not a hypothesis is accepted is by using path coefficients. The results can be seen in table VIII.

TABLE VIII. PATH COEFFISIENTS VALUE

	CUI	Conf	PU	SQ	Sat	SrQ
CUI						
Conf			0.447		0.414	
PU					0.231	
SQ		0.291			0.137	

Sat	0.729					
SrQ		0.516			0.202	

No path coefficients are negative.

B.2. Coefficient of Determination

Testing the coefficient of determination or R^2 aims to find out how accurate the predictions of the model made in this study are. The value of the coefficient of determination explains how much the independent variable's ability to explain the variance of the latent variable is. The results of the interpretation of the coefficient of determination can be classified into 3 levels, namely small, medium or large effect size. In Table 9 there is a coefficient of determination of the three factors used in the research model.

TABLE IX. COEFFICIENT OF DETERMINATION VALUE

	R Square	R Square Adjusted	Information
CUI	0.532	0.531	Strong
Conf	0.575	0.572	Strong
PU	0.200	0.198	currently
Sat	0.693	0.689	Strong

There is only one value of determination below 0.26 or 26%, namely the other PU variable, large effect size (strong)

C. Hypothesis testing

Two-tailed test was carried out for Hypothesis testing by comparing p-values at a significance level of 5%. The results of hypothesis testing using SmartPLS provide mean, standard deviation, and p-value. Hypothesis testing was conducted to determine the accepted and rejected hypotheses to verify the validity of the structural model and the comparison of p-values and significance levels. If the p-value is less than 5%, the hypothesis is accepted, and if the p-value is greater than 5%, the hypothesis is rejected. Based on the results of hypothesis testing in Table X, all hypotheses proposed in this model are accepted.

TABLE X. HYPOTHESIS TESTING RESULTS

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	P Values	Hypothesis
Conf -> PU	0.447	0.451	0.046	**0.000**	**Accepted**
Conf -> Sat	0.414	0.411	0.054	**0.000**	**Accepted**
PU -> Sat	0.231	0.231	0.048	**0.000**	**Accepted**
SQ -> Conf	0.291	0.292	0.071	**0.000**	**Accepted**
SQ -> Sat	0.137	0.140	0.057	**0.016**	**Accepted**
Sat -> CUI	0.729	0.730	0.032	**0.000**	**Accepted**
SrQ -> Conf	0.516	0.516	0.069	**0.000**	**Accepted**
SrQ -> Sat	0.202	0.201	0.058	**0.001**	**Accepted**

V. CONCLUSION

In this study, there are findings related to research on the adoption of e-learning technology. According to the hypothesis that the satisfaction variable is positively correlated with CI, while system quality, service quality, and performance expectancy are positively correlated with confirmation and satisfaction, and confirmation is positively correlated with satisfaction.

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