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Confirmatory Factor Analysis of Electronic Word of Mouth in Private College Students in Medan

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ABSTRACT

Electronic word of mouth (e-WOM) is a word-of-mouth promotion using internet-connected electronic devices. However, e-WOM among students has not been effective as it has not created any impacts on universities concerned. The purpose of this research is to evaluate e-WOM among students and direct the occurrence of positive e-WOM which will ultimately impact universities, especially private universities in Medan. This study used the confirmatory factor analysis (CFA) method to test how well measured variables represent constructs or the preformed factors. This research is quantitative involving 210 students of the fourth semester above. The data collected were processed with AMOS Program. The confirmatory factor analysis tests showed as many as 21 indicators remained in the model. The goodness-of-fit value of all models for each variable is received after the modification process.

Keywords: Confirmatory Factor Analysis, Electronic Word of Mouth

INTRODUCTION

Electronic word of mouth (e-WOM) is the dissemination of information through internet media (Schiffman & Kanuk, 2010), where customers give information to each other through internet media intermediaries. The difference between WOM and e-WOM can be distinguished based on the media used. Traditional WOM usage is usually face-to-face marketing while e-WOM is online through cyberspace. The high accessibility of e-WOM can reach millions of people for a long period, and can be found by anyone interested in a particular product or company. Likewise, e-WOM among students can happen if students are satisfied. That satisfaction will be conveyed to others, namely prospective students. If students are satisfied, they will deliver a positive e-WOM. When they are not satisfied, then they will deliver a negative e-WOM. A student's satisfaction can come from the services they receive at a college. Especially at a private college with more fees they should pay, they hope for better services.

In measuring the success of e-WOM, student satisfaction and service quality must go through indicators for each variable. The use of indicators for each variable will measure whether the indicator represents the variable. Therefore, before use, every indicator in the variable needs to be tested (validity and reliability test).

Validity tests describe the accuracy of a collection of measurable items that theoretically describe variables. The indicators are described through factor loading (estimate) values greater than 0.6 (Hair, Jhoseph, Black, & Babin, 2010). Reliability test is referred to the reliability and stability of a test device, the extent to which the test instrument can produce

a consistent and stable assessment score. Besides, reliability can also be interpreted as a form of consistent news, reliability, trustworthiness, in any test or measurement of an object both internally and externally. The rallying criteria are 0.7 (Ferdinand, 2013).

Confirmatory Factor Analysis (CFA)

Confirmation Factor Analysis is one of the multivariate analysis methods to confirm whether the measurement model is built according to the hypothesized. In the analysis, there are latent variable and variable indicators. Latent variables are those that cannot be formed and built directly while indicator variables are those that can be observed and measured directly (Ghozali, 2013).

Assumption Confirmatory Factor Analysis (CFA)

The estimated parameters in confirmatory factor analysis (CFA) are generally based on the maximum likelihood (ML) method. The ML method requires the assumption of a multivariate normal distribution.

The hypotheses used are as follows:
H0: the data follows a normal distribution.
H1: the data does not follow the normal distribution.

Goodness of Fit Criteria

Overall model fit is called the model feasibility test. As stated by Hair et al. (2010), there are several methods of goodness according to the overall model, namely:

1) Chi-Square Statistics
   The most basic measurement is the chi-square statistic likelihood-ratio. The model tested will be considered good if the chi-square value is low. Since chi-square is low /small and insignificant, the zero hypotheses are difficult to reject and the basis of acceptance is the probability with a cut-off value of $p \geq 0.05$.
2) Probability
   The acceptable probability value is $p \geq 0.05$
3) Root Mean Square Error of Approximation (RMSEA)
   It is a measure that tries to correct the static tendency of chi-square reject models with many samples. A value of RMSEA between 0.05 and 0.08 indicates a good index to accept the suitability of a model.
4) Goodness of Fit Index (GFI)
   It is an index which describes the overall model suitability rate calculated from the residual squares of the predicted model compared to the actual data. A GFI higher than 0.90 indicates the model tested is of good suitability.
5) Adjusted Goodness Fit of Index (AGFI).
   This index is a development of the Goodness Fit of Index (GFI) which has been adjusted to the ratio of the degree of freedom (Schiffman & Kanuk, 2010). Analogous to R2 in multiple regressions. The recommended value is AFGI > 0.90, the greater the AFGI value, the better suitability the model has.
6) CMIN/DF is one of the indicators for measuring a model's fitness level, resulting from Chi-Square (CMIN) statistics divided by degree of freedom (DF). The expected CMIN/DF is ≤ 2.0 indicating acceptance from the model.
7) Tucker Lewis Index (TLI)
   TLI is an incremental conformity index that compares the model tested with the baseline model. It is used to solve problems arising from the complexity of the model. The recommended acceptance value is the TLI value > 0.90. TLI is an index that is less influenced by sample size.

8) Comparative Fit Index (CFI)

CFI is also an incremental conformity index. The size of this index is in the range of 0 to 1 and a value close to 1 indicates the model has a good level of conformity. This index is highly recommended to use because it is relatively insensitive to sample size and is less influenced by the complexity of the model. The recommended acceptance value is CFI > 0.90.

RESEARCH METHOD

This research is quantitative descriptive measuring the strength of relationships between two or more variables to describe the properties (characteristics) of research objects conducted through data collection and analysis.

The population in this study consisted of 26,538 students of five private universities in Medan. According to Wijanto (2008), sampling is determined five to ten times an indicator. The study consisted of 21 indicators and the researchers took 10 indicators thus producing 210 samples.

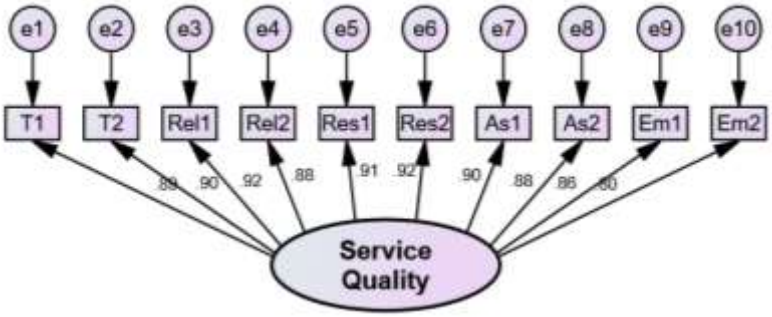
The study used the structural equation model and AMOS 16 to identify validity and reliability or CFA (Confirmatory Factor Analysis) and latent variable relationships simultaneously that could answer research questions (the purpose of this study explained earlier).

RESULTS AND DISCUSSION

Confirmatory Factor Analysis (CFA)

CFA Service Quality Variable

Service quality variables have ten indicators to be tested. It consisted of tangible dimensions (two indicators), reliability dimensions (two indicators), responsibility dimensions (two indicators), assurance dimensions (two indicators), and empathy dimensions (two indicators). Figure 1 describes confirmatory factor analysis test of service quality construct.



Source: Amos Output, 2020

Figure 1. CFA Service Quality Variable

Based on Figure 1 it can be known that all indicators of data service quality variables are valid. It is known from the loading factor value of all indicators of the service quality variable nothing is below 0.60. Table 1 below shows the detail.

Table 1. Factor Loading Value of Service Quality Variables

			Estimate	Cut of Value	Result
T1	<---	Service_Quality	.888	0.60	Valid
T2	<---	Service_Quality	.901	0.60	Valid
Rel1	<---	Service_Quality	.918	0.60	Valid
Rel2	<---	Service_Quality	.878	0.60	Valid
Res1	<---	Service_Quality	.909	0.60	Valid
Res2	<---	Service_Quality	.916	0.60	Valid
As1	<---	Service_Quality	.903	0.60	Valid
As2	<---	Service_Quality	.879	0.60	Valid
Em1	<---	Service_Quality	.862	0.60	Valid
Em2	<---	Service_Quality	.797	0.60	Valid

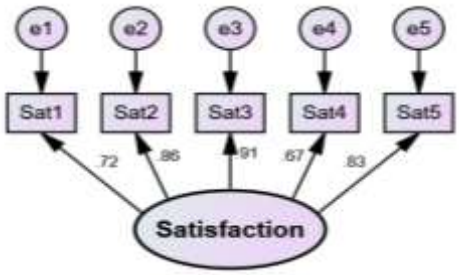
Source: Amos Output, 2020

Table 1 indicates that all indicators of data service quality variables are valid. The loading factor value of all indicators of the service quality variable nothing is below 0.60. If all indicators of construct forming service quality are significant, they can be used in representing data analysis. The indicators retained in the model for service quality variables are:

1) Complete learning facilities
2) Library with a complete collection of books
3) Services provided following the needs of students
4) Services provided by private universities are on time
5) This private university has employees who provide fast service to students
6) This private university has lecturers who provide fast service
7) This private university guarantees a short study time
8) This private college provides convenience to get a job after graduating from college
9) Scholarships for outstanding students
10) Scholarships for underprivileged students

CFA Student Satisfaction Variable

Student satisfaction variables have five indicators to be tested. Figure 2 below described the CFA test of student satisfaction.



Source: Amos Output, 2020

Figure 2. CFA Satisfaction Variable

Figure 2 shows that all indicators of student satisfaction variable data are valid. The loading factor value of all indicators of student satisfaction variable no one is below 0.60. For more details, please see table 2 below:

Table 2. Value Factor Loading Value of Student Satisfaction Variables

			Estimate	Cut of Value	Result
Sat1	<---	Satisfaction	.718	0.60	Valid
Sat2	<---	Satisfaction	.863	0.60	Valid
Sat3	<---	Satisfaction	.913	0.60	Valid
Sat4	<---	Satisfaction	.666	0.60	Valid
Sat5	<---	Satisfaction	.834	0.60	Valid

Source: Amos Output, 2020

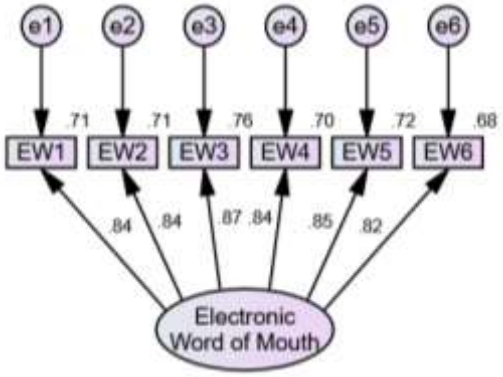
Table 2 shows that all indicators of student satisfaction variable data are valid as no loading factor value of all indicators of student satisfaction variable is below 0.60. If all indicators of student satisfaction construct forming are significant, it can be used in representing data analysis.

The satisfaction variable consists of five indicators, and all these indicators are maintained in the model. They are:

a) Students are happy to study at this private college
b) Overall, this private university provides satisfaction to students
c) This private university has provided performance following the expectations of students
d) Private universities serve students according to student needs
e) This private university has provided services as ideal as students expect.

CFA Electronic Word of Mouth Variable

The electronic word of mouth variable has 6 (six) indicators to be tested. The following will be described the CFA test of electronic word of mouth construction as in Figure 3 below.



Source: Output Amos, 2020

Figure 3. CFA Variabel Electronic Word of Mouth

Figure 3 indicates all indicators of electronic word of mouth data variables are valid since no loading factor value of all indicators of the electronic word of mouth variable is below 0.60. Table 3 below provides the detail.

Table 3. Value Factor Loading Variable Electronic Word of Mouth

			Estimate	Cut of Value	Result
EW1	<---	Electronic Word of Mouth	.842	0.60	Valid
EW2	<---	Electronic Word of Mouth	.841	0.60	Valid
EW3	<---	Electronic Word of Mouth	.873	0.60	Valid
EW4	<---	Electronic Word of Mouth	.839	0.60	Valid
EW5	<---	Electronic Word of Mouth	.851	0.60	Valid
EW6	<---	Electronic Word of Mouth	.822	0.60	Valid

Source: Amos Output, 2020

Table 3 explains that all indicators of electronic word of mouth data variables are valid since no loading factor value of all indicators of electronic word of mouth value is below 0.60. If all indicators of electronic word of mouth construct forming are significant, it can be used in representing data analysis.

All six indicators are retained in the model, which consists of frequent access to various information about these private universities on the internet, frequently interacting with other users about these private colleges on the internet, the recommendation to choose this private college on the internet, the number of positive comments about these private universities on the internet, information about the accreditation of courses on the internet, and information on tuition fees for each course on the internet.

Goodness of Fit Criteria

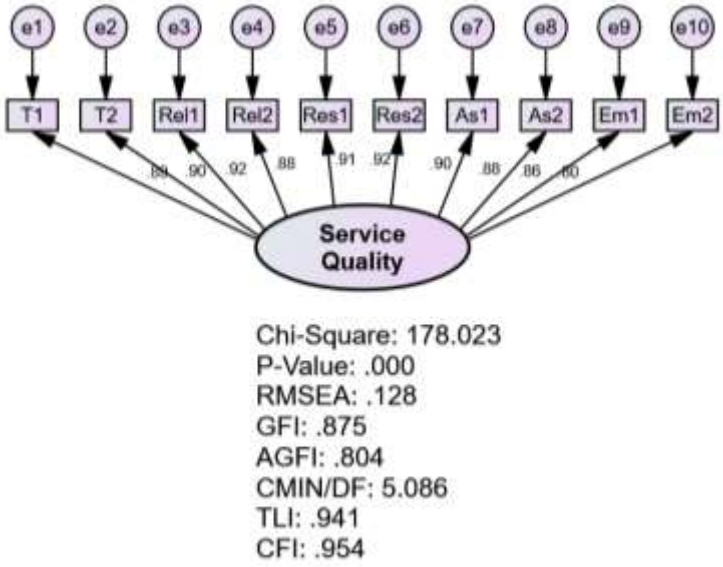
Overall model fit is called the model feasibility test, there are several methods of goodness according to the overall model, namely (Hair et al, 2010):

Table 4. Model Feasibility Testing Index

No.	The goodness of Fit Index	Cut off Value
1.	The goodness of Fit Index	≤ 67,50
2.	Significant Probability	≥ 0,05
3.	RMSEA	≤ 0,08
4.	GFI	≥ 0,90
5.	AGFI	≥ 0,90
6.	CMIN/DF	≤ 2,00
7.	TLI	≥ 0,95
8.	CFI	≥ 0,95

Source: Ferdinand, 2013

The Goodness of Fit Service Quality Variable



Source: Output Amos, 2020

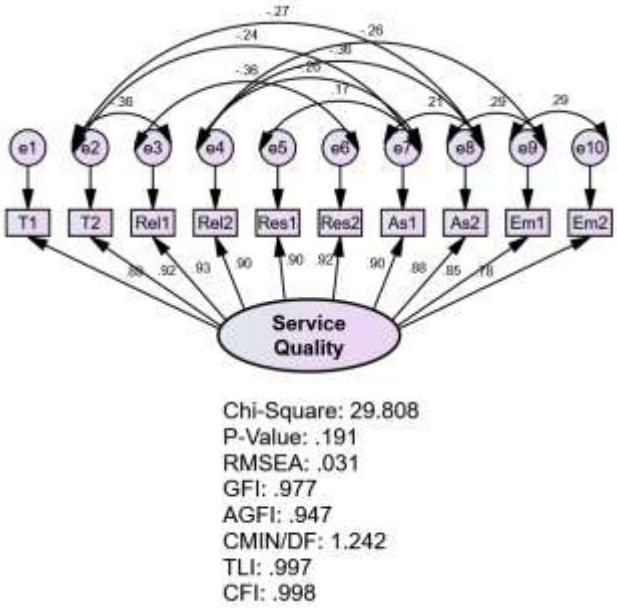
Figure 4. The goodness of Fit Service Quality Variable

Table 5.1. The goodness of Fit Model Service Quality Variable

Criteria	Cut-Off Value	Result	Description
CHI-SQUARE	≤ 67.505	178.023	No Fit
P-VALUE	≥ 0.050	0.000	No Fit
RMSEA	≤ 0.080	0.128	No Fit
GFI	≥ 0.900	0.875	No Fit
AGFI	≥ 0.900	0.804	No Fit
CMIN/DF	≤ 2.000	5.086	No Fit
TLI	≥ 0.950	0.941	No Fit
CFI	≥ 0.950	0.954	Fit

Source: Ferdinand, 2013

Table 5.1. indicates that the model formed is not yet acceptable. It shows that almost all criteria are less good than eight criteria based on AMOS simulation results. Therefore, modification of service quality variable meter analysis is required. Index modification aims to obtain a value that corresponds to the reference value of the model equation below.



Source: Output Amos, 2020

Figure 5. The Goodness of Fit Service Quality Variable after Modification

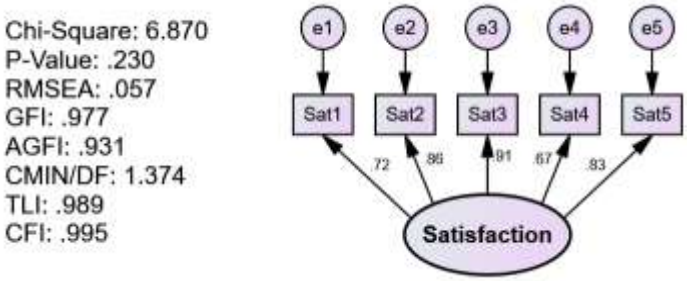
Table 5.2. The Goodness of Fit Service Quality Variable After Modified

Criteria	Cut-Off Value	Result	Description
CHI-SQUARE	≤ 67.505	29.808	Fit
P-VALUE	≥ 0.050	0.191	Fit
RMSEA	≤ 0.080	0.031	Fit
GFI	≥ 0.900	0.977	Fit
AGFI	≥ 0.900	0.947	Fit
CMIN/DF	≤ 2.000	1.242	Fit
TLI	≥ 0.950	0.997	Fit
CFI	≥ 0.950	0.998	Fit

Source: Ferdinand, 2013

Table 5.2. indicates that confirmatory factor analysis is acceptable based on the criteria used to test the feasibility of the model.

Goodness of Fit Student Satisfaction Variables



Source: Output Amos, 2020

Figure 6. The Goodness of Fit Satisfaction Variable

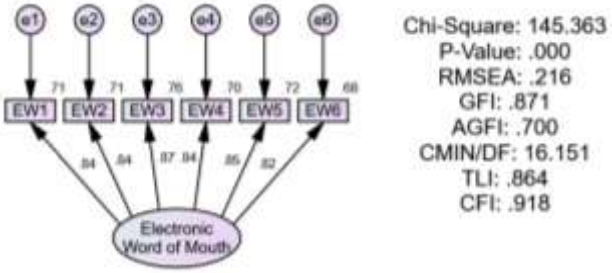
Table 5.3. The Goodness of Fit Model Satisfaction Variable

Criteria	Cut-Off Value	Result	Description
CHI-SQUARE	≤ 67.505	6.870	Fit
P-VALUE	≥ 0.050	0.230	Fit
RMSEA	≤ 0.080	0.057	Fit
GFI	≥ 0.900	0.977	Fit
AGFI	≥ 0.900	0.931	Fit
CMIN/DF	≤ 2.000	1.374	Fit
TLI	≥ 0.950	0.989	Fit
CFI	≥ 0.950	0.995	Fit

Source: Ferdinand, 2013

Table 5.3. indicates that confirmatory factor analysis is acceptable based on the criteria used to test the feasibility of the model.

The goodness of Fit Electronic Word of Mouth Variable



Source: Output Amos, 2020

Figure 7. The goodness of Fit Electronic Word of Mouth Variable

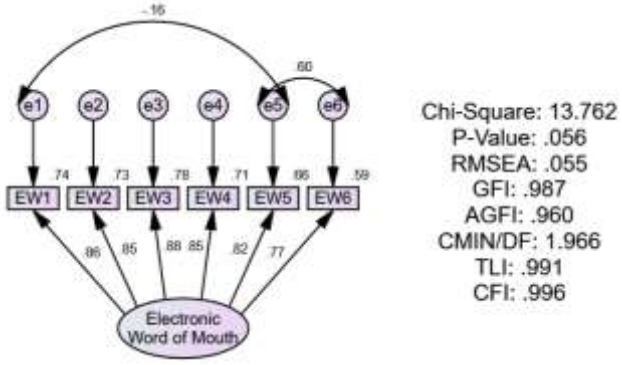
Table 5.4. The goodness of Fit Model Electronic Word of Mouth Variable

Criteria	Cut-Off Value	Result	Description
CHI-SQUARE	≤ 67.505	145.363	No Fit
P-VALUE	≥ 0.050	0.000	No Fit
RMSEA	≤ 0.080	0.216	No Fit
GFI	≥ 0.900	0.871	No Fit
AGFI	≥ 0.900	0.700	No Fit
CMIN/DF	≤ 2.000	16.151	No Fit
TLI	≥ 0.950	0.864	No Fit
CFI	≥ 0.950	0.918	No Fit

Source: Ferdinand, 2013

Table 5.4. indicates that the model formed is not yet acceptable. It shows that almost all criteria are less good than eight criteria based on AMOS simulation results. Therefore, modification of service quality variable meter analysis is required. Index modification

aims to obtain a value that corresponds to the reference value of the model equation below.



Source: Output Amos, 2020

Figure 20. The Goodness of Fit Electronic Word of Mouth after Modification

Table 5.5. Modification of Goodness of Fit Index E-WOM Variable Model

Criteria	Cut-Off Value	Result	Description
CHI-SQUARE	≤ 67.505	13.762	Fit
P-VALUE	≥ 0.050	0.056	Fit
RMSEA	≤ 0.080	0.055	Fit
GFI	≥ 0.900	0.987	Fit
AGFI	≥ 0.900	0.960	Fit
CMIN/DF	≤ 2.000	1.966	Fit
TLI	≥ 0.950	0.991	Fit
CFI	≥ 0.950	0.996	Fit

Source: Ferdinand, 2013

Table 5.5 shows that an analysis of confirmatory factors is acceptable based on the criteria used to test the feasibility of the model.

Construct Reliability & Variance Extracted

Table 6. Construct Reliability and Variance Extracted Values for Service Quality

Variable	Indicator	Loading Factor	(Loading Factor)^2	Measurement Error	Construct Reliability	Variance Extracted
Service Quality	T1	0.888	0.789	0.211	**0.973**	**0.785**
	T2	0.901	0.812	0.188		
	Rel1	0.918	0.843	0.157		
	Rel2	0.878	0.771	0.229		
	Res1	0.909	0.826	0.174		
	Res2	0.916	0.839	0.161		
	As1	0.903	0.815	0.185		
	As2	0.879	0.773	0.227		

	Em1	0.862	0.743	0.257		
	Em2	0.797	0.635	0.365		
	∑	**8.851**	**7.846**	**2.154**		
	∑^2	**78.340**	**10.000**	**80.495**		

Source: Processed Data, 2020

Table 6 shows the results of composite reliability analysis conducted through construct reliability (CR) and average variance extracted (AVE) calculations. It shows that construct reliability value (CR) is 0.973, above the limit value (cut off = 0.70) and Variance Extracted value is 0.785, above the limit value (cut off = 0.50). Thus, it can be stated that the reliability of service quality variables is good. This means that the indicators have high consistency in measuring latent constructs. From the analysis above, namely the analysis of the overall suitability of the model, validity and reliability analysis, it concludes that the proposed measurement model is reflective, i.e., observed variables/indicators are a measure of the related latent variables.

Table 7. Construct Reliability and Variance Extracted Values for Satisfaction

Variable	Indicator	Loading Factor	(Loading Factor)2	Measurement Error	Construct Reliability	Variance Extracted
Satisfaction	Sat1	0.718	0.516	0.484	**0.900**	**0.647**
	Sat2	0.863	0.745	0.255		
	Sat3	0.913	0.834	0.166		
	Sat4	0.666	0.444	0.556		
	Sat5	0.834	0.696	0.304		
	∑	**3.994**	**3.233**	**1.767**		
	∑^2	**15.952**	**5.000**	**17.719**		

Source: Processed Data, 2020

Table 7 shows the results of composite reliability analysis conducted through construct reliability (CR) and average variance extracted (AVE) calculations. The result is that construct reliability value (CR) is 0.900, above the limit value (cut off = 0.70) and Variance Extracted value is 0.647, above the limit value (cut off = 0.50). Thus, it leads to a conclusion that the reliability of satisfaction variables is good. This means that indicators have high consistency in measuring latent constructs. From the analysis above, namely the analysis of the overall suitability of the model, the validity and reliability analysis, it concludes that the proposed measurement model is reflective, i.e., observed variables/indicators are a measure of the related latent variables.

Table 8. Construct Reliability and Variance Extracted values of Electronic Word of Mouth

Variable	Indicator	Loading Factor	(Loading Factor)^2	Measurement Error	Construct Reliability	Variance Extracted
Electronic Word of Mouth	EW1	0.842	0.709	0.291	0.928	0.721
	EW2	0.841	0.707	0.293		
	EW3	0.873	0.762	0.238		
	EW4	0.839	0.704	0.296		
	EW5	0.851	0.724	0.276		
	EW6	0.822	0.676	0.324		
	∑	4.246	3.606	1.394		
	∑^2	18.029	5.000	19.422		

Source: Processed Data, 2020

Table 8 shows the results of composite reliability analysis conducted through construct reliability (CR) and average variance extracted (AVE) calculations. It signifies the result that construct reliability value (CR) is 0.928, above the limit value (cut off = 0.70) and Variance Extracted value is 0.721, above the limit value (cut off = 0.50). Therefore, it draws to a conclusion that the reliability of electronic word of mouth variables is good. This means that indicators have high consistency in measuring latent constructs. From the analysis above, namely the analysis of the overall suitability of the model, the validity and reliability analysis, it concludes that the proposed measurement model is reflective, i.e., observed variables/indicators are a measure of the related latent variables.

CONCLUSIONS

The model formulation is formed from three latent variables consisting of one exogenous latent variable namely service quality and two latent endogenous variables, namely satisfaction and electronic word of mouth. There are 21 indicators of three latent variables analyzed using the AMOS Program. The model tested using CFA obtained several conclusions, that the validity and reliability tests show all indicators are valid and reliable so that all indicators remain in the model. Furthermore, the model match results show all fit variables through index modification first, thus this model can be processed further.

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