

Generalized structured component analysis (GSCA) method in evaluating service satisfaction at FMIPA Syiah Kuala University

EVI RAMADHANI^{1*}, NURJARIATI¹, NURHASANAH¹, NANY SALWA¹,
LATIFAH RAHAYU SIREGAR¹

¹Statistics Department, Faculty of Mathematics and Natural Science, Syiah Kuala University, Banda Aceh, Indonesia

Abstract. This research focuses on the Generalized Structured Component Analysis (GSCA) method in evaluating service satisfaction at FMIPA Syiah Kuala University (USK). FMIPA USK is expected to have good service quality to satisfy stakeholders with the services provided. FMIPA USK needs to know the factors that affect service satisfaction. An internal survey of the integrity zone is one way to determine the quality and satisfaction of the services provided by FMIPA USK. However, this survey uses indirect variables, so the structural equation model (SEM) can be used. The SEM method used in this study is component-based SEM, namely Generalized Structured Component Analysis (GSCA). GSCA is used because questionnaires do not fulfill existing assumptions in general research, and the GSCA method does not require many assumptions. This research aims to form a model, determine the relationship between indicators and latent variables, and know the relationship between latent variables and the factors significantly affecting student satisfaction with services at FMIPA USK. The results of this study show that the indicators used are valid and reliable. Reliability, assurance, empathy, and tangibles is a factor that affects service satisfaction. Models formed in this study have a GFI value of 0.962 and SRMR of 0.365, so the model used is suitable.

Keywords: generalized structured component analysis (GSCA), service satisfaction, structural equation model (SEM), survey

INTRODUCTION

Multivariate analysis is an analysis that involves many variables or multiple variables. Multivariate analysis methods depend on the problem to be answered and the form of data and variables measured for analysis. One of the methods in a multivariate analysis that allows for the examination of the relationship between complex variables is Structural Equation Model (SEM). SEM is a collection of statistical tools or methods that not only get a model of the relationship but also allow for simultaneously testing a series of relatively complicated relationships [1]. SEM can carry out trying together, namely the structural and measurement models.

Structural models are used to measure the relationship between the independent variable

and the dependent variable. In contrast, the measurement model estimates the relationship between the indicator variable and the latent variable [2]. SEM is divided into two types, namely covariance-based SEM or CBSEM (Covariance Based SEM) and variant-based SEM or VBSEM (Variance Based SEM), variant-based SEM is known as component-based SEM. CBSEM has limitations because it requires a relatively large number of samples, the data must be normally distributed multivariate, indicators must be reflective, models must be based on theory, and indeterminacy [3]. Therefore, VBSEM was developed to resolve the limitations of CBSEM.

Component-based SEM comprises Partial Least Square (PLS) and Generalized Structured Component Analysis (GSCA). The research [4] with the title A Comparative Study Between GSCA-SEM and PLS-SEM, which aims to compare the two methods, obtained the result that the GSCA SEM is better than the PLS-SEM in terms of consistency, the resulting standard error, and the estimated parameter values. The research uses primary data on tourism health obtained through surveys and

*Corresponding Author:
evi.ramadhani@gmail.com

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consists of four latent variables. Another study related to the GSCA method is the research [5] titled Application of the Generalized Structured Component Analysis Method on Consumer Satisfaction (Case Study: Clinical Patient Q).

This research uses the Generalized Structured Component Analysis method to establish a model and determine the factors influencing satisfaction and loyalty. This research uses secondary data and primary data. The secondary data in this study was the patient database for Clinic Q, while the primary data used were offline and online questionnaires (Google Forms) for selected Clinic Q patients. Based on the two research, it can be concluded that the GSCA method can be applied to survey data.

Quality of service is an effort to fulfill the needs and desires of consumers and the accuracy of their delivery in balancing consumer expectations [6]. Meanwhile, according to Oliver in [7], customer satisfaction is a customer fulfillment response, meaning a statement that a product (goods or service) has been able to provide something pleasant by fulfilling the consumption of the product. Kotler and Keller [8] state that four methods can be used to measure customer satisfaction: customer complaint analysis, ghost (mystery) shopping, lost customer analysis, and customer satisfaction surveys. Faculty of Mathematics

and Natural Sciences (FMIPA) Syiah Kuala University (USK) is expected to have good service quality so that stakeholders are satisfied with the services provided, especially for students. An internal survey of the integrity zone is one way to determine the quality and satisfaction of the services offered by FMIPA USK. One of the studies conducted by Pasuraman et al. [9] states that there are five dimensions of service quality: reliability, responsiveness, assurance, empathy, and tangibles. Therefore, the survey uses five dimensions to measure service quality and determine the factors that affect service satisfaction. The dimensions used in the study are the dimensions of reliability, responsiveness, assurance, empathy, and tangibles. This dimension cannot be measured directly, so it needs to be measured using indicators or questions that reflect these dimensions. Based on the description above, the GSCA method is one method that can be used to analyze the data or answers given by students in the internal zone survey integrity FMIPA USK. Therefore, this study aims to evaluate the measurement model to determine the relationship between indicators and their latent variables and the structural model to determine the relationship between latent variables and factors that significantly affect service satisfaction at FMIPA USK using the GSCA method.

Table 1. The number of research samples for each study program

Level	Study Program (Strata)	Total Population of Each Strata (N_i)	Number of Samples (n_i)
Undergraduate	Informatics Management	115	19
	Electrical Engineering	37	6
Bachelor	Mathematics	279	45
	Physics	215	35
	Chemistry	258	42
	Biology	248	40
	Informatics	391	63
	Statistics	249	40
	Pharmacy	226	37
	Mathematics	1	0
Postgraduate	Physics	14	2
	Chemistry	16	3
	Biology	24	4
	Total	2073	336

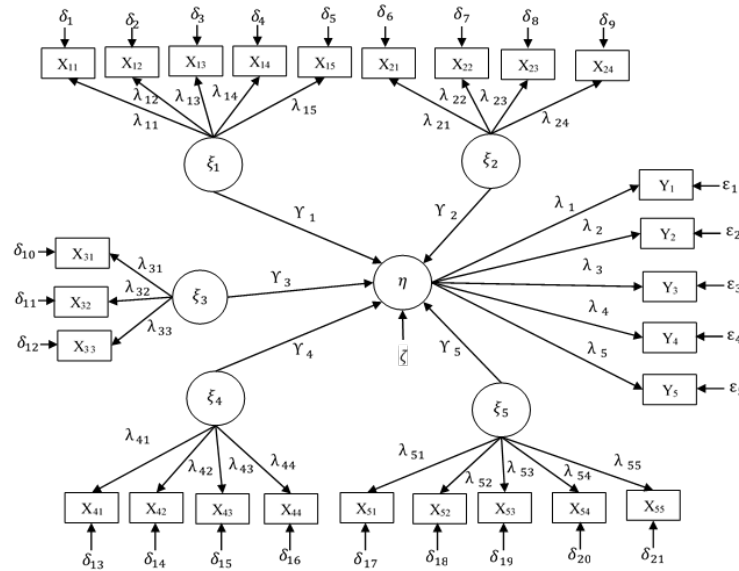


Figure 1. The conceptual model

METHODOLOGY

Location and time

Data is collected at FMIPA USK by completing the questionnaire directly or online. Data collection has been carried out from November 9, 2021, to May 12, 2022. The online questionnaire can be accessed via the link <https://bit.ly/surveiinternalZIFMIPAUSK>.

Data and variables

The data used in this study are primary data from the Internal Survey of Anti-Corruption Services and Perceptions of the Faculty of Mathematics and Natural Sciences USK Year 2021 conducted by the FMIPA USK integrity zone survey team. Respondents in this study are active students of FMIPA USK batch 2014, 2015, 2016, 2017, 2018, 2019, and 2020 in 14 existing study programs at FMIPA USK. The total population in this study was 2073 students. Determined the number of samples in this study using the Slovin formula, the formula is [10] :

$$n = \frac{N}{1 + N(e)^2}$$

Where N is the population and e is the tolerance for inaccuracy (in percent) so that the sample was as many as 336 students. The sampling technique used in this study is probability sampling, namely proportional stratified random sampling, with the program study at FMIPA USK, which is the stratum. The formula used to determine the number of samples in each stratum is as follows [11]:

$$n_i = n \left(\frac{N_i}{\sum_{i=1}^I N_i} \right) = n \left(\frac{N_i}{N} \right)$$

Table 2. A score on the Likert scale

No.	Likert Scale	Score
1	Strongly agree (SS)	5
2	Agree (S)	4
3	Moderately agree (CS)	3
4	Disagree (TS)	2
5	Strongly disagree (STS)	1

The number of samples selected from each study program is shown in Table 1.

Respondents in this study were asked to provide an assessment related to service satisfaction at FMIPA USK. The statements are arranged using a Likert scale. According to Malhotra [12], generally, the number of responses used on the Likert scale to measure is five response categories. These categories range from “strongly agree” to “strongly disagree” to obtain numerical data, a score or value is given. Categories using a scale of 1-5. The scores in question are as shown in Table 2.

The variables used in this study consisted of 6 latent variables, five exogenous latent variables, one endogenous latent variable, and 26 indicator variables. Each latent variable contains several indicators, including five indicators to explain the latent variable reliability (ξ_1), four indicators to explain the latent variable responsiveness (ξ_2), three indicators to explain the latent variable assurance (ξ_3), four indicators to explain the latent variable latent empathy (ξ_4), five indicators to explain the latent variable of

Table 3. Variable operational definitions

Latent Variable	Indicator Variable	Symbol
Reliability (ξ_1)	The services provided are as promised.	X_{11}
	The data or information provided is accurate.	X_{12}
	The services provided are by applicable procedures.	X_{13}
	The services provided are according to your needs/your work unit.	X_{14}
	Products/services at FMIPA USK received are by the list of products/services available/requested.	X_{15}
Responsiveness (ξ_2)	Information was provided quickly.	X_{21}
	FMIPA USK helps solve your problems/work units quickly and responsively.	X_{22}
	FMIPA USK provides a consultation path for you/your work unit.	X_{23}
	Available anti-corruption media and information.	X_{24}
Assurance (ξ_3)	FMIPA USK staff are competent, can be trusted, and are polite.	X_{31}
	FMIPA USK employees have good communication skills.	X_{32}
	You feel safe and comfortable when dealing with employees at FMIPA USK.	X_{33}
Empathy (ξ_4)	Employees serve you/your work unit sincerely and attentively.	X_{41}
	Employees understand your needs/your work unit.	X_{42}
	The established service procedures are not discriminatory and cannot potentially cause corruption, collusion, and nepotism (KKN).	X_{43}
	There are no fraudulent practices and brokers/unofficial intermediaries.	X_{44}
	Up-to-date facilities and infrastructure are available.	X_{51}
Tangibles (ξ_5)	Employees wear neat and professional clothes.	X_{52}
	The rooms at FMIPA USK look clean, neatly arranged, and attractive.	X_{53}
	The environment at FMIPA USK is clean, beautiful, and neat.	X_{54}
	Safe campus environment.	X_{55}
Service Satisfaction (η)	The services provided by the work unit at FMIPA USK are adequate, reliable, timely, and as promised.	Y_1
	The response of service providers provided by work units at FMIPA USK has been good, such as being responsive, fast, and responsive.	Y_2
	The services provided by the work unit at FMIPA USK guarantee safety and comfort.	Y_3
	The attitude of the service providers provided at FMIPA USK is satisfactory.	Y_4
	The facilities and infrastructure provided by FMIPA USK are adequate.	Y_5

tangibles (ξ_5), and five indicators to explain the latent variable of service satisfaction (η). These variables are described in Table 3. A conceptual research model based on the variables used is shown in Figure 1.

Data analysis procedure

Data analysis must be carried out systematically, directed, and orderly so that the procedure is required to guide the research

process. Microsoft Excel 2016 and R software are used to assist in this research. Microsoft Excel 2016 is used to input data from questionnaires and perform descriptive analysis, while R is used to analyze the data obtained by the GSCA method. The steps taken to analyze the data in this study are as follows:

1. Conducting the preparation of research instruments.

Table 4. The measurement of the validity and reliability

Measure	Minimum Score
convergent validity	0.7
discriminant validity ($\sqrt{AVE}$)	$\sqrt{AVE} >$ Correlation between latent variables
Composite reliability	0.7

2. Testing the questionnaire: this study's questionnaire is valid and reliable. Therefore the questionnaire can be used to collect research data.

3. Data collection.

4. Prepare data by separating, cleaning, and converting data to be used for the analysis process.

5. Analyze data

Data analysis is carried out after the data has been collected and inputted to be ready for use. Data analysis is divided into two, namely descriptive analysis and inferential analysis. Inferential analysis was performed using the Generalized Structured Component Analysis (GSCA) method. The software used to analyze the data is R-Studio.

The stages that must be passed in analyzing data using the GSCA method are as follows:

- 1) Designing measurement models and structural models
- 2) Estimating parameters
- 3) Evaluate the formed model. Three stages must be passed to evaluate the GSCA model [5].
 - a. Measurement model fit (outer model)
The measurement model was carried out to test the validity and reliability of latent variables through confirmatory factor analysis [13]. Validity is measured using convergent validity and discriminant validity, while reliability is calculated using composite reliability. If the item in the model does not meet the minimum score value, then the item needs to be deleted and retested. The loading estimate (loading factor) is used to test convergent validity. The formula used to determine the value of the loading factor is as follows [14]:

$$\lambda_i = r_{XY} = \frac{N(\sum_{j=1}^n X_{ij}Y_i) - (\sum_{j=1}^n X_{ij})(\sum_{i=1}^n Y_i)}{\sqrt{(N\sum_{j=1}^n X_{ij}^2 - (\sum_{j=1}^n X_{ij})^2)(N\sum_{i=1}^n Y_i^2 - (\sum_{i=1}^n Y_i)^2)}}$$

Where i is the latent variable in the study ($i = 1, 2, 3, \dots, n$) with n is the number of latent variables, and j is the indicator variable on a latent variable

Table 5. Score interpretation criteria

No.	Percentage	Criteria
1	0%-20%	Not satisfied
2	21%-40%	Less satisfied
3	41%-60%	Moderately satisfied
4	61%-80%	Satisfied
5	81%-100%	Very satisfied

in the survey ($j = 1, 2, 3, \dots, m$) with m is the number of indicator variables, discriminant validity compares the Average Variance Extracted (AVE) square root value for each latent variable with the correlation between latent variables in the model. The following is a formula for calculating the AVE value [15]:

$$AVE = \frac{\sum_{i=1}^n \lambda_i^2}{\sum_{i=1}^n \lambda_i^2 + \sum_{i=1}^n (1 - \lambda_i^2)}$$

The formula used to measure composite reliability when using the resulting GSCA output is as follows:

$$\rho_c = \frac{(\sum_{i=1}^n \lambda_i)^2}{(\sum_{i=1}^n \lambda_i)^2 + \sum_{i=1}^n (1 - \lambda_i^2)}$$

The following requirements must be met to test the measurement model's validity and reliability [15].

- b. Structural model fit (inner model)
The structural model (inner model) is evaluated by testing the significance of the parameters and looking at the R-Square value of the model. The hypotheses in this study are:
 $H_0 : \beta_i = 0$ (the parameter coefficient γ_i is not significant)
 $H_1 : \beta_i \neq 0$ (the parameter coefficient γ_i is significant)
Where β is the estimated parameter value, γ is a parameter to describe the direct relationship between exogenous variables to endogenous variables, and i is the latent variable in the study ($i = 1, 2, 3, \dots, n$) with n is the number of latent variables. The parameter is said to be significant if the value of $CR > Z_{\alpha/2}$, with a significance level of 5%, the value of $Z_{\alpha/2}$ used is 1.96 [16]. At this stage, if the latent variable in the model is not significant, then the variable must be deleted and retested until all variables contained in the model are significant.
- c. The overall goodness of fit

The overall model (overall goodness of fit) or the size of the fit model provided by the GSCA is evaluated by looking at the resulting FIT, AFIT, GFI, and SRMR values. FIT and AFIT values range from 0 to 1; the greater the value, the better the resulting model. Based on [17], a specific cutoff value is that a good FIT and AFIT value is greater than or equal to 0.5. According to [18], a GFI value close to 1 and an SRMR value close to 0 indicates the model fits well. According to [19], no standard value indicates a good GFI value. Still, many researchers recommend a GFI value above 90% to measure a good fit, and a good SRMR value is less than 0.08 [18].

6. Draw a conclusion

RESULTS AND DISCUSSION

Descriptive Analysis

Descriptive analysis was conducted to know the general description of the characteristics of the data provided by the respondents. The variable that measures service satisfaction in this study is a variable consisting of statements about the

services offered by the work unit at FMIPA USK are adequate, reliable, timely, and, as promised, the response of service providers provided by the work unit at FMIPA USK is

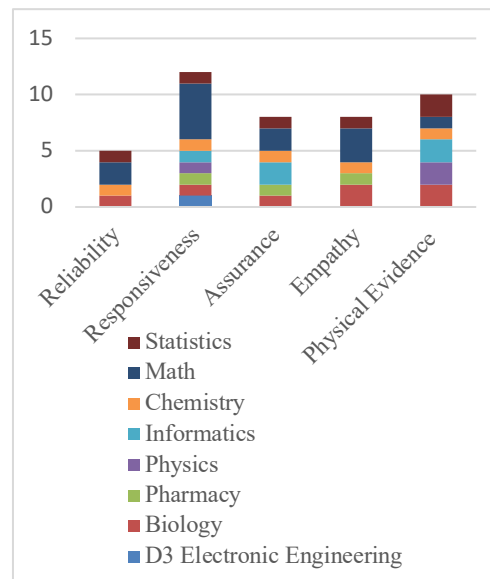


Figure 2. Recapitulation of the results of respondent's answers with categories of very dissatisfied (STS) and dissatisfied (TS) for service satisfaction variables

Table 6. Recapitulation of respondent's answers for service satisfaction variables

Study Program	Answer Distribution						Category
	TS		CS		S		
	f	%	f	%	f	%	
Undergraduate of Informatics Management	0	0	22	23.16	73	76.84	Satisfied
Undergraduate of Electrical Engineering	1	3.33	4	13.33	25	83.34	Very Satisfied
Bachelor of Biology	7	3.5	22	11.00	171	85.50	Very Satisfied
Bachelor of Pharmacy	3	1.62	15	8.11	167	90.27	Very Satisfied
Bachelor of Physics	3	1.71	33	18.86	139	79.43	Satisfied
Bachelor of Informatics	5	1.59	32	10.16	278	88.25	Very Satisfied
Bachelor of Chemical	5	2.38	22	10.48	183	87.14	Very Satisfied
Bachelor of Mathematics	13	5.78	54	24.00	158	70.22	Satisfied
Bachelor of Statistics	6	3	27	13.50	167	83.50	Very Satisfied
Postgraduate of Biology	0	0	0	0	20	100	Very Satisfied
Postgraduate of Physics	0	0	0	0	10	100	Very Satisfied
Postgraduate of Chemical	0	0	0	0	15	100	Very Satisfied

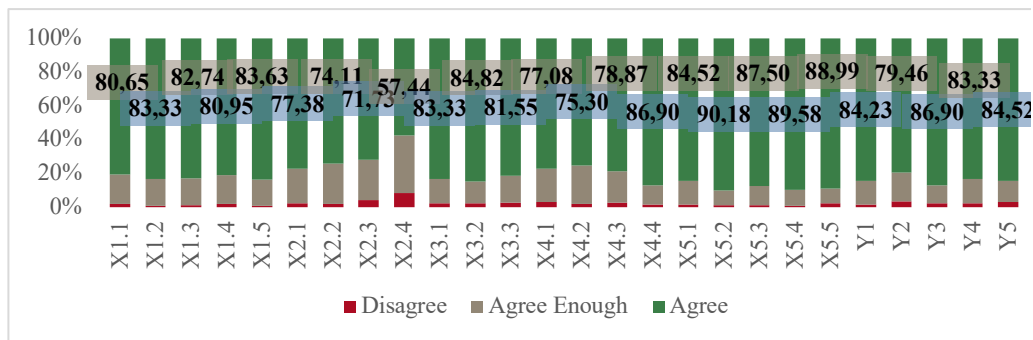


Figure 3. Recapitulation of respondent's answers for each indicator

good such as responsive, fast, and responsive, the services provided by the work unit at the FMIPA USK provide security and comfort guarantees, the attitude of the service providers offered at the FMIPA USK is satisfactory, and the facilities and facilities provided by the FMIPA USK are adequate. The following describes student service satisfaction based on the study program. For ease of interpretation, a merger of categories is carried out. Namely, the category of strongly disagree (STS) and disagree (TS) will be merged into the category of disagree (TS), and the category agrees (S) and strongly agree (SS) will be integrated into the category of agree (S). Interpretation criteria interpret the percentage obtained as a qualitative understanding [20].

The category column in Table 6 is obtained based on the percentage of student answers that agree and strongly agree with the statement, labeling the category according to Table 5. Based on Table 6, it can be seen that the services provided by FMIPA USK have been satisfactory in all study programs in FMIPA. USK. Nine study programs are included in the very satisfied category. That can be interpreted that students from the study program are delighted with the services provided by FMIPA USK. In contrast, the assessments of students from the Undergraduate Informatics Management study program, Bachelor of Physics, and Bachelor of Mathematics are included in the satisfied category. That means that students from the study program are satisfied with the services provided by FMIPA USK.

Based on Table 6, where TS disagrees, CS entirely agrees, and S agrees. F is the frequency of respondents who choose that category. It is known that there are still students from various study programs who disagree with the statement given. That means there are still students who are unsatisfied with the services provided. USK.

Figure 2 shows that the indicator in the service quality variable with the highest frequency of disagreeing answers is the responsive indicator. There are 12 students from 8 study programs at FMIPA USK, of which four students are undergraduate Mathematics students, who feel disagree with the statement that the response of the service provider provided by the work unit at FMIPA USK is good, such as responsive, fast, and responsive. That means 3.57% of students feel that the response of service providers provided by the work unit at FMIPA USK is not good, such as not being responsive, fast, and responsive. In addition, the tangible (physical evidence) indicator also has a high frequency of disagreeing answers. There are ten students, Biology, Physics, and Informatics undergraduate students and a Bachelor of Statistics, each of which consists of 2 students who disagree with a statement that the facilities and facilities provided by FMIPA USK are adequate. That means 2.98% of students feel that the facilities and facilities supplied by FMIPA USK are inadequate.

Figure 3 shows that most or more than 50% of students agree with the statements in the questionnaire. That means the services provided by FMIPA are good, and most students are satisfied with the services offered. The indicator that has the highest percentage value of agreeing is the indicator X_{52} which is 90.18% of students who feel agree with the employee's statement about using neat and professional clothes, while the indicator that has the lowest percentage value of agreeing is the indicator X_{24} namely, as many as 57.44% of students agree with the statement about the availability of anti-corruption media and information. In addition, based on Figure 3, it can be seen that among the available indicators, the availability of anti-corruption press and information is the highest indicator for the percentage value of the disagree category, which is 8.33%. Based on the descriptions above, it can be seen that the overall student

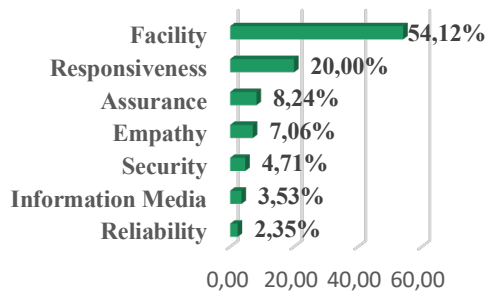


Figure 4. Summary of criticism and suggestions by category

assessment of FMIPA USK services is good. Only some aspects may still need to be improved. Ratings are detailed in open-ended questions regarding criticism and suggestions. Based on the answers to open questions given by students, FMIPA USK students hope that FMIPA USK services will continue to be improved by maintaining what is already good and improving some things that are still lacking. The following is a summary of the results obtained from open-ended questions based on several categories:

Figure 4 shows that the majority of students, or 54.12% of students, criticize or provide suggestions for improving the facilities or facilities of FMIPA USK, such as increasing the number of lecturers and projectors that have problems or are not connected, improving laboratory facilities, or replacing materials that are no longer feasible, AC that is not cold enough, Wi-Fi is slow, and so on. In addition, some students suggested the availability of room signs or the FMIPA USK map application. As many as 20% of students criticize or provide suggestions regarding the responsiveness of service providers, which in this case are FMIPA USK. Students advise so that the services offered by FMIPA USK are more responsive.

Generalized Structured Component Analysis (GSCA) Method

Inferential analysis in this study uses the Generalized Structured Component Analysis (GSCA) method. Evaluation of the GSCA model is carried out in three stages, namely the evaluation of the measurement model (outer model), structural model (inner model), and the overall model (overall goodness of fit).

1. Evaluation of the measurement model (outer model)

The measurement model was evaluated using three tests: convergent validity, discriminant validity, and composite reliability. The requirements that must be met in each test follow what has been explained in Table 4. The test results show that all indicators in the study have an estimated value of loadings greater than 0.7, so the convergent validity test is fulfilled, and it can be said that the indicators used as a measure are good. In addition, it is known that the reliability variable (ξ_1) The most influential indicator is X_{13} , namely, the service provided according to applicable procedures with a loading value of 0.871 on the responsiveness variable (ξ_2) The most influential indicator is X_{22} namely, FMIPA USK helps solve your problem/work unit quickly and responsively with a loading value of 0.873 on the guarantee variable (ξ_3) The most influential indicator is X_{31} , FMIPA USK employees have good competence, can be trusted, and are polite, with a loading value of 0.922. On the empathy variable (4), the most influential indicator is X_{42} namely, the employee understands your needs/your work unit with a loading value of 0.883 on the tangibles variable (ξ_5) The most influential indicator is X_{53} namely, the room at FMIPA USK looks clean, neatly arranged, and attractive with a loading value of 0.885, and the

Table 7. Correlation value and $\sqrt{AVE}$ measurement model

	ξ_1	ξ_2	ξ_3	ξ_4	ξ_5	η
ξ_1	0.857*					
ξ_2	0.679	0.803*				
ξ_3	0.651	0.639	0.912*			
ξ_4	0.690	0.658	0.688	0.846*		
ξ_5	0.614	0.516	0.662	0.645	0.834*	
η	0.700	0.635	0.708	0.738	0.767	0.881*

Note: * = value of $\sqrt{AVE}$

Table 8. Composite reliability value in the measurement model

Variable Laten	ρ_c
ξ_1	0.9325
ξ_2	0.8782
ξ_3	0.9368
ξ_4	0.9097
ξ_5	0.9195
η	0.9453

service satisfaction variable (η) is the most influential indicator is Y_3 which is a service provided by the work unit at FMIPA USK which guarantees security and comfort with a loading value of 0.911. Discriminant validity testing was carried out to test the validity of the latent variables used in the study. The following is the value of $\sqrt{AVE}$ and the resulting correlation of each latent variable:

Table 7 shows that the latent variables in the study have a positive relationship with the variables. In addition, it can be seen that the value of $\sqrt{AVE}$ each latent variable has a greater value than the correlation value of other latent variables, so the discriminant validity test has been fulfilled. Composite reliability testing is used to measure the reliability of each indicator of a latent variable. Composite reliability is done by looking at the resulting ρ_c value. If the ρ_c value of a latent variable meets the minimum value, which is greater than or equal to 0.7, then composite reliability is met. The following is the result of ρ_c on each latent variable.

Table 8 shows that each latent variable has a composite reliability value greater than 0.7, so the composite reliability test is fulfilled, and it can be said that each indicator is reliable. Therefore, based on the evaluation of the measurement model carried out, it can be seen that each indicator measuring the latent variable is valid and reliable so that the indicator can be trusted and correctly measures each latent variable.

2. Evaluation of the structural model (inner model)

The structural model is evaluated by testing the estimated parameter coefficients and looking at the R-Square value of the model. Evaluation of the structural model aims to know the relationship between latent variables. The hypotheses used in this study are:

Table 9. Parameter estimation on the structural model after elimination

Parameter	Estimate	SE	CR
$\eta \sim \xi_1$	0.1862	0.0602	3.093
$\eta \sim \xi_3$	0.1578	0.0645	2.447
$\eta \sim \xi_4$	0.2532	0.0577	4.388
$\eta \sim \xi_5$	0.3847	0.0755	5.095

$H_0 : \beta_i = 0$ (parameter coefficient γ_i not significant)

$H_1 : \beta_i \neq 0$ (parameter coefficient γ_i significant)

Where β is the estimated parameter value, γ is a parameter to describe the direct relationship between exogenous variables to endogenous variables, and i is the latent variable in the study ($i = 1, 2, 3, \dots, n$) with n is the number of latent variables.

One variable that is not significant in the test is the responsiveness variable, which has a value of less than 1.96, which is 1.856. Therefore, it is necessary to retest by eliminating variables that are not significant in the test. The following is the estimated value of the parameter coefficient, standard error (SE), and the CR value generated after eliminating the responsiveness variable.

Table 9 shows that all existing variable relationships have CR values greater than 1.96. That means there are four mutually influential relationships: reliability, assurance, empathy, and tangibles of service satisfaction. The influence of the relationship of exogenous latent variables on endogenous latent variables based on Table 9 is that reliability, assurance, empathy, and tangibles have a positive effect on service satisfaction, meaning that they are more reliable, timely, and according to promises in service delivery, guaranteed security, and comfort provided by service providers. The better the service provider's attitude to the service recipient, the better the service satisfaction, and the better the facilities that support the service, such as the cleanliness of the place, clear signs, and so on, the greater the perceived service satisfaction. The R-Square value is used to measure the variability of the endogenous latent variable, which the

Table 10. Estimates on the overall model

Measure	Value	Criteria
FIT	0.634	Close to 1
AFIT	0.632	Close to 1
GFI	0.962	Close to 1
SRMR	0.365	Close to 0

variability of the exogenous latent variable can explain. The resulting R-Square value is 0.724. That means the service satisfaction variable can be explained by the latent variables of reliability, assurance, empathy, and tangibles of 72.4%.

In comparison, 27.6% is influenced by other variables not presented in the model. Based on the analysis results, it is known that the responsiveness variable has no effect on service satisfaction at FMIPA USK. That means the service satisfaction students feel does not depend on the responsiveness of services at FMIPA USK.

3. Evaluation of the overall model (overall goodness of fit)

The overall model (overall goodness of fit) is evaluated by looking at FIT, AFIT, GFI, and SRMR values. The resulting FIT, AFIT, Based on Table 10, which is the estimation result in the overall model, it is known that the resulting FIT value is 0.634. That means the model of 63.4% can explain the diversity of data from all variables. In addition, the AFIT value obtained is 0.632, meaning that the model and the rest can explain 63.2% of the variance can be explained by other factors. A GFI value close to 1 and an SRMR close to 0 indicate a good match. Therefore, with the resulting GFI and SRMR values of 0.962 and 0.365. The resulting SRMR value is too large compared to the cutoff value 0.08. However, the FIT and AFIT values obtained were more significant than 0.5, and the GFI values obtained were greater than 0.9. Therefore, it can be concluded that the model used is good enough.

The results of previous research are those of research that has been tested for truth, which in this study are used as comparisons by researchers. The results of previous research used by researchers are research conducted by Sri Bulkia [21]. This research aims to determine how much service quality influences student satisfaction. Service quality has five dimensions: reliability, responsiveness, assurance, empathy, and tangibles. The study results show that service quality significantly

and positively affects student satisfaction. Theoretically, the effect of service quality on student satisfaction is unidirectional. The similarity of this research is that they have the same aim, namely wanting to know the factors or service quality on student satisfaction. In addition, the service satisfaction used in this study also consists of the five dimensions that existed in previous studies. The results of this study and previous studies also have similarities, namely, the relationship between service quality and student satisfaction is positive, which means that if the perception of service quality on student satisfaction is excellent and positive, then student satisfaction will be higher and positive. The difference with previous research is that previous research used multiple linear regression analysis where the indicators from the questions on the questionnaire were grouped into the five dimensions of service quality previously mentioned. Then if there are several indicators in one dimension, the average value will be used for that dimension. In this study, the method used was SEM GSCA, where the questionnaire indicators reflect the dimensions so that the error in the measurement model is also considered.

Other previous research on the same topic as this research is conducted by Mochammad Yusa et al. [22]. This study aims to determine student satisfaction with the quality of academic services at the Faculty of Engineering, University of Bengkulu, and the quality of academic services at the Faculty of Engineering, University of Bengkulu. The difference between the research conducted by Mochammad Yusa et al. and this research is that Mochammad Yusa et al.'s research only used a quantitative descriptive method. In addition, this study uses six dimensions to measure service satisfaction. The five dimensions used are the same as this research: tangibles, reliability, responsiveness, assurance, and empathy. However, the research of Mochammad Yusa et al. added an information system dimension to be a reference in measuring the level of satisfaction. The sampling technique used is also different. This study used stratified random sampling to determine the research sample, while previous studies used simple random sampling. The results of this study and previous research have in common. Previous research shows that of the six characteristics, the tangibles aspect is the dimension with the lowest value. The tangibles aspect includes spatial planning and tangible facilities within the Faculty of Engineering. Similar to the results of this study, based on the summary results obtained from open questions

based on several categories, it shows that most, or 54.12% of students, criticize or provide suggestions for improving FMIPA USK facilities. That indicates students are very critical of the facilities provided by the university or faculty. Hence, the university or faculty must pay more attention to the available facilities and means.

CONCLUSION

The conclusions obtained based on the results of the analysis and discussion in this study are the measurement model and structural model formed using the GSCA method are included in the good category. The resulting FIT, GFI, and SRMR values were 63.4%, respectively; 0.962; and 0.365, evaluation of the measurement model shows that each indicator measuring the latent variable has met all the minimum test values so that all indicators are valid and reliable. Evaluation of the structural model indicates that four variables significantly affect service satisfaction. These variables are the variables of reliability, assurance, empathy, and tangibles, where the path coefficient value of each variable is 0.1862; 0.1578; 0.2532; and 0.3847. Because the coefficient values of all exogenous latent variables are positive, it can be concluded that if the reliability, assurance, empathy, and tangibles increase, the service satisfaction felt by students will also increase. The service satisfaction variable can be explained by the latent variables of reliability, assurance, empathy, and tangibles of 72.4%, while 27.6% is influenced by other variables not presented in the model.

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