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USE OF STRUCTURAL EQUATION MODELING METHOD FOR ANALYSIS OF FACTORS AFFECTING THE QUALITY OF LIBRARY SERVICES OF BHAYANGKARA UNIVERSITY

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ABSTRACT

One of the common problems often faced by companies or organizations in the service sector is the problem of service user dissatisfaction with the quality of service provided. One of the service units in Ubhara is the Bhayangkara University Library. The quality of library services can be influenced by several factors, such as library collections, employee competence and library facilities. The data collection technique used a Likert scale questionnaire, which consists of 3 exogenous latent variables and 1 endogenous latent variable with a total of 14 indicators. The method used is data analysis using the Structural Equation Modeling (SEM) approach assisted by the LISREL 8.80 program. The problem in this study is to determine the effect and significance of the library collection variables (X1), employee competence (X2) and library facilities (X3) on service quality (Y). The hypothesis in this study is that there is a positive influence between employee competence and library facilities on service quality. The number of samples in this study were 100 students who visited the Ubhara Library. Based on the results of the study, the variable X1 estimate is 0.09 and the T-value is 0.67, the variable X2 estimate is 0.44 and the T-value is 2.97 and the variable X3 estimate is 0.46 and the T-value is 3.02. So the latent variables of employee competence and library facilities have a positive effect on the quality of library services. Meanwhile, the library collection variable has no positive effect on service quality.

Keywords: *Structural Equation Modeling, LISREL 8.80, Kuesioner.*

1. INTRODUCTION

Structural Equation Modeling (SEM) is a statistical analysis technique used to build and test statistical models in the form of a causal model (Prastuti, 2011: 14). SEM analysis combines regression, factor, and path analysis so that it simultaneously calculates the relationship that occurs between latent variables, measures the loading value of the latent variable indicators, and calculates the path model of these latent variables. Basically, SEM is a multivariate technique that will show how to represent a series or series of causal relationships in a path diagram.

There are several programs offered for SEM, such as LISREL, AMOS, EQS, ROMANO, SEPATH, LISCOMP. LISREL is a program that is most widely used in research compared to other programs. LISREL is the most sophisticated SEM program and can estimate SEM problems that are almost impossible for other SEM programs (Latan, 2013: 6). Currently, many students and researchers have used the LISREL program to analyze research using structural equation modeling. Service is an activity carried out for the benefit of others and is not merely intended to serve but is an effort to build a long-term cooperation with the principle of mutual benefit.

Good service is being able to understand customer desires and always provide added value in the eyes of customers (Amanullah, 2012). One of the service units in universities such as Bhayangkara University Surabaya (Ubhara) is library services. Ubhara Central Library is a service unit that provides services in the library sector. The need for library users, especially students for science and other educational media, is something that is difficult to separate. Therefore, the library is one of the academic support facilities needed by library users such as students.

The Ubhara Central Library has several library services such as circulation services for book borrowing and book return services, services for finding books that are only a few in number, reference services for students who want to find final project references such as theses and final project books. Most visitors come to make assignments, read books and borrow or return books. Not only that, visitors also came to work on the thesis to get inspiration. The method used in this research is Structural Equation Modeling (SEM). SEM is a multivariate analysis technique developed to cover the limitations of previous analytical models that have been widely used in statistical research. The models in question include regression analysis (regression analysis), path analysis (path analysis), and confirmatory factor analysis (confirmatory factor analysis) (Hox & Bechger, 1998). Based on the description above, the researchers took the title of the final project "The Use of Structural Equation Modeling Methods for Analysis of Factors Affecting the Quality of Library Services".

2. SYSTEM ANALYSIS AND DESIGN

2.1 Research Hypothesis

Based on what is described, the hypothesis used in this study consists of three hypotheses, namely :

1. Library collections have a positive effect on service quality with SEM analysis using the LISREL program
2. Employee competence has a positive effect on service quality with SEM analysis using the LISREL program.
3. Library facilities have a positive effect on service quality with SEM analysis using the LISREL program.

2.2 Initial Research Model

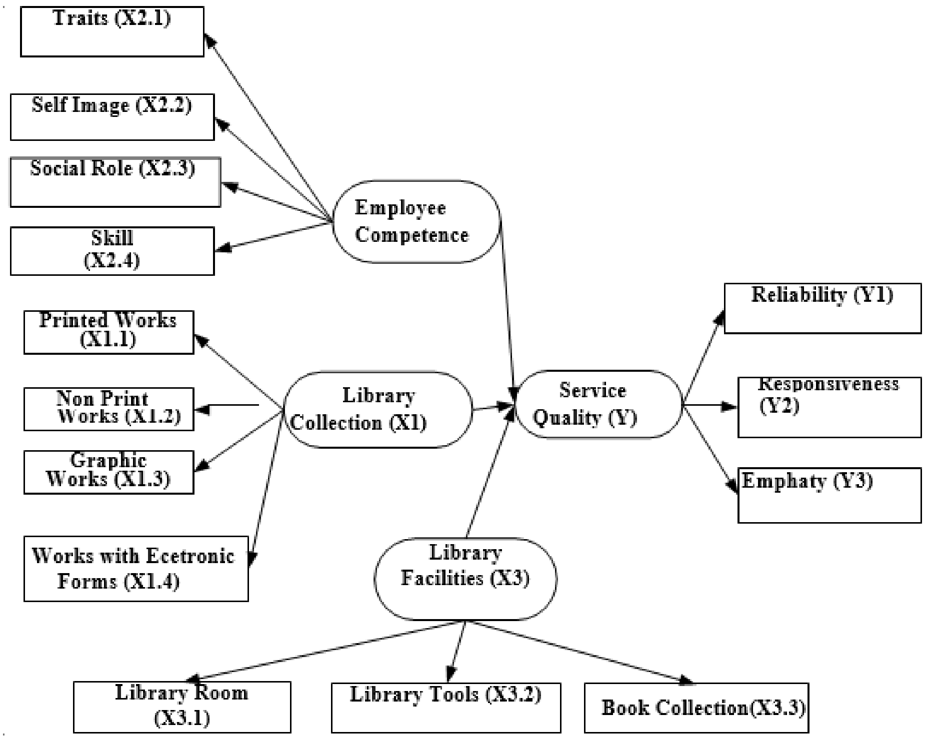

Figure 1. Initial Research Model

The researcher built a research model by adopting the variables in both models and simplifying them into a research model that was tested for the relationship. The linkage model between variable relationships can be seen in Figure 1 above.

2.3. Questionnaire Quality Test

This study used a questionnaire to obtain data. The questionnaire is analyzed first before use to ensure its feasibility and quality. The questionnaire analysis conducted was a validity test and a reliability test. Researchers have conducted a questionnaire trial test for students visiting the Bhayangkara University Library and obtained 100 students in January 2020. The test questions consisted of fourteen description questions.

2.3.1 Validity and Reliability Test

Validity concerns the level of accuracy achieved by an indicator in assessing something or the accuracy of measuring what should be measured. Meanwhile, reliability is a measure of the internal consistency of the indicators of a construct which shows the degree to which each indicator indicates a general construct. Because the indicator is multidimensional, the validity test of each latent variable / construct will be tested by looking at the loading factor of the relationship between each observed variable and the latent variable. Meanwhile, reliability was tested with construct reliability and variance extracted. From the results of data processing, the results are as presented in the following.

Table 1. *validity test results*

Variabel	Indicator Code	*Loading Factor*	*Cut Off Value*	Information
Library Collection	X1.1	0.80	0.5	Valid
	X1.2	0.83	0.5	Valid
	X1.3	0.84	0.5	Valid
	X1.4	0.74	0.5	Valid
Employee Competence	X2.1	0.85	0.5	Valid
	X2.2	0.79	0.5	Valid
	X2.3	0.81	0.5	Valid
	X2.4	0.81	0.5	Valid
Library Facilities	X3.1	0.78	0.5	Valid
	X3.2	0.84	0.5	Valid
	X3.3	0.82	0.5	Valid
Quality of Library Services	Y.1	0.83	0.5	Valid
	Y.2	0.82	0.5	Valid
	Y.3	0.8	0.5	Valid

Source: primary data, processed.

Based on Table 1, it can be seen that all indicators are declared valid. This is indicated by the loading factor value obtained by each indicator is more than 0.5. According to Igbaria et.al (1997) as quoted by Wijanto (2008: 65), regarding the relative importance and significance of the factor loading of each item, it states that the load factor loading is ≥ 0.50.

After knowing the construct validity, the next step is to know the reliability of the construct. This reliability test uses construct reliability or variance extracted with the following formula :

$$Construct\ Reliability = \frac{(\sum Std.Loading)^2}{(\sum Std.Loading)^2 + \sum \varepsilon_j} \text{.........(Formula 1)}$$

$$Variance\ Extracted = \frac{\sum[\text{Standardiz e Loading}^2]}{\sum[\text{Standardiz e Loading}^2] + \sum \varepsilon_j} \text{......... (Formula 2)}$$

In general, the limit value used to assess an acceptable level of reliability is if the value of the construct reliability is greater than 0.7 or the extracted variance value is greater than 0.5. The following are the results of the reliability test.

 ISSN: 2528-0260
p.835-844

Table 2. *Reliability Test Results*

Variabel	Indicator	*Standardized Factor Loading*	SFL Kuadrat (Persepsi)	Error [εj]	Construct Reliability	Variance Extrated
Library Collection	X1.1	0.83	0.689	0.311	0.881	0.64955
	X1.2	0.81	0.656	0.344		
	X1.3	0.84	0.706	0.294		
	X1.4	0.74	0.548	0.452		
Total		**3.220**	**2.598**	**1.402**		
Employee Competence	X2.1	0.85	0.723	0.278	0.886	0.66078
	X2.2	0.78	0.608	0.392		
	X2.3	0.81	0.656	0.344		
	X2.4	0.81	0.656	0.344		
Total		**3.250**	**2.643**	**1.357**		
Library facilities	X3.1	0.78	0.608	0.392		
	X3.2	0.84	0.706	0.294	0.855	0.662
	X3.3	0.82	0.672	0.328		
Total		**2.440**	**1.986**	**1.014**		
Quality of Library Service	Y.1	0.83	0.689	0.311	0.857	0.667
	Y.2	0.82	0.672	0.328		
	Y.3	0.8	0.640	0.360		
Total		**2.450**	**2.001**	**0.999**		
Acceptable Limit					**≥ 0,7**	**≥ 0,5**

Source: primary data, processed.

The results of instrument reliability testing with construct reliability show that the instrument is reliable, which is indicated by the value of construct reliability that meets acceptable limits. Thus, all indicators on all variables are reliable.

3. RESULTS AND DISCUSSION

3.1 Normality

In analyzing data using Structural Equation Modeling, the distribution of data used must meet the assumptions required for normality, meaning that the data used in the analysis are not analyzed. One of the requirements for data that can be processed by this method is that it is normally distributed multivariate, so the level of validity of the processing results is not good.

According to Ghozali & Fuad (2008: 37), normality is divided into two, namely :

1. Univariate normality.
2. Multivariate normality.

The assumption for normality can be tested with the z statistical value for skewness and kurtosis. If the z value, both $zkurtosis$ and or $zskewness$ is significant (less than 0.05 at the 5% level) it can be said that the data distribution is not normal. Conversely, if the z value, both $zkurtosis$ and or $zskewness$ are not significant (greater than 0.05 at level 5 %) it can be said that the data distribution is normal. So that It is concluded that the normality test is expected to have significant results (Ghozali & Fuad, 2008: 37). Univariate normality and multivariate normality of the data used in this analysis can be tested for normality, as presented in Figure 2 and Figure 3 below.

Test of Univariate Normality for Continuous Variables

	Skewness		Kurtosis		Skewness and Kurtosis	
Variable	Z-Score	P-Value	Z-Score	P-Value	Chi-Square	P-Value
X1.1	-3.033	0.002	0.303	0.762	9.291	0.010
X1.2	-1.853	0.064	-0.674	0.500	3.887	0.143
X1.3	-3.728	0.000	1.580	0.114	16.393	0.000
X1.4	-1.490	0.136	-2.061	0.039	6.465	0.039
X2.1	-3.361	0.001	1.038	0.299	12.377	0.002
X2.2	-1.526	0.127	-0.972	0.331	3.273	0.195
X2.3	-1.836	0.066	-0.322	0.747	3.475	0.176
X2.4	-2.860	0.004	1.147	0.251	9.498	0.009
X3.1	-3.700	0.000	1.413	0.158	15.690	0.000
X3.2	-3.335	0.001	1.322	0.186	12.868	0.002
X3.3	-1.338	0.181	-2.363	0.018	7.375	0.025
Y.1	-3.050	0.002	0.830	0.406	9.993	0.007
Y.2	-2.821	0.005	1.782	0.075	11.135	0.004
Y.3	-1.928	0.054	0.197	0.844	3.755	0.153

Figure 2. *Univariate Normality Test*

In the normality test above, the data can be said to be normally distributed if the P-Value of Skewness and Kurtosis> 0.05. Univariate normality shows the results of normality testing for each variable. Based on the output results above, it can be seen that the variables that meet normality are X1.2, X2.2, X2.3, and Y.3 because the P-Value of Skewness and Kurtosis> 0.05. But the variables that have problems with normality are X1.1, X1.3, X1.4, X2.1, X2.4, X3.1, X3.2, X3.3, Y.1, and Y.2.

Test of Multivariate Normality for Continuous Variables

Skewness			Kurtosis			Skewness and Kurtosis	
Value	Z-Score	P-Value	Value	Z-Score	P-Value	Chi-Square	P-Value
50.283	7.240	0.000	251.317	5.166	0.000	79.103	0.000

Figure 3. *Multivariate Normality Test*

Based on the output results above, it can be seen that multivariate normality is not normally distributed because the P-value for skewness and kurtosis is 0.000 <0.05. To overcome this abnormality, the researchers used the Normal Scores feature in the LISREL program to transform the data into normal.

Test of Univariate Normality for Continuous Variables

	Skewness		Kurtosis		Skewness and Kurtosis	
Variable	Z-Score	P-Value	Z-Score	P-Value	Chi-Square	P-Value
X1.1	-2.125	0.034	-1.550	0.121	6.917	0.031
X1.2	-1.376	0.169	-1.297	0.195	3.574	0.167
X1.3	-2.036	0.042	-1.465	0.143	6.292	0.043
X1.4	-1.300	0.193	-2.476	0.013	7.821	0.020
X2.1	-1.553	0.120	-1.568	0.117	4.871	0.088
X2.2	-1.160	0.246	-1.254	0.210	2.919	0.232
X2.3	-1.312	0.190	-1.046	0.296	2.813	0.245
X2.4	-1.634	0.102	-0.910	0.363	3.498	0.174
X3.1	-2.496	0.013	-1.248	0.212	7.786	0.020
X3.2	-2.078	0.038	-1.184	0.236	5.720	0.057
X3.3	-1.142	0.253	-2.749	0.006	8.862	0.012
Y.1	-1.958	0.050	-1.275	0.202	5.460	0.065
Y.2	-1.064	0.287	-0.086	0.932	1.139	0.566
Y.3	-1.298	0.194	-0.764	0.445	2.267	0.322

Figure 4. *The Transformed Univariate Normality Test*

After the transformation is carried out, for univariate normality it can be said to be normal where the P-Value for skewness and kurtosis While for multivariate normality can be seen in Figure 5 as follows.

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Relative Multivariate Kurtosis = 1.075

Test of Multivariate Normality for Continuous Variables

            Skewness                    Kurtosis           Skewness and Kurtosis

    Value  Z-Score P-Value     Value  Z-Score P-Value      Chi-Square P-Value
   ------  ------- -------   -------  ------- -------      ---------- -------
   43.728    4.628   0.000   240.786    3.870   0.000          36.395   0.000
```

Figure 5. *Transformed Multivariate Normality Test*

Likewise, multivariate normality, the data can be said to remain abnormal where the P-Value for skewness and kurtosis <0.05. According to Ghozali & Fuad (2008: 250), there are two assumptions regarding data abnormalities. The researcher uses the second assumption, namely estimating the model using the ML method, but correcting for standard errors and some goodness of fit indices due to abnormal data distribution.

3.2 Model Estimation

Research models that have met the specification and model identification stages can then be modeled estimates. In this study the data did not follow the multivariate normal distribution, so based on the assumption of data abnormalities, the model was estimated using the ML method, but corrected for standard errors and some goodness of fit indices due to data distribution abnormalities. Based on this research, the estimation results can be shown in Figure 6 as below

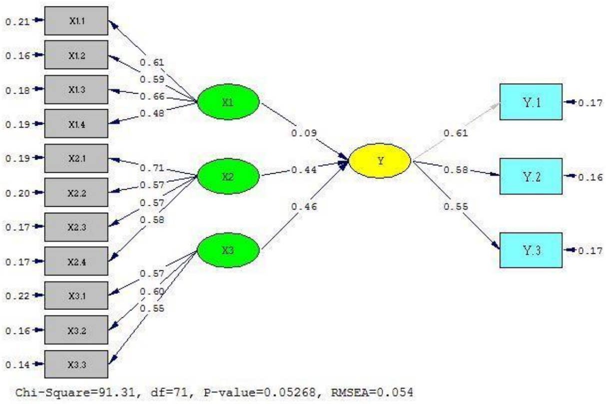

Figure 6. *Diagram of Model Estimation Results*

3.3 Overall Model Fit Test (Structural Model)

In the SEM model, the measurement model and the structural model parameters are estimated together and must meet the demands of the fit model, therefore the model must be based on a strong theory. The estimation results and fit of the one step approach to SEM model using the Lisrel application program can be seen in the table below:

Table 3 Goodnes Of Fit Results

Criteria	Result *Goodness of Fit*	*Cut-off Value*	Model Evaluation
X^2 - *Chi Square*	127,92	≤ 122,11	*Unwell*
Probability	0,023	≥ 0,05	*Unwell*
CMIN/DF	1,305	≤ 2,00	*Good Fit*
RMSEA	0.049	≤ 0.08	*Good Fit*
GFI	0,86	≥ 0,90	*Marginal Fit*
AGFI	0,80	≤ 0,90	*Marginal Fit*
IFI	0,99	≥ 0,90	*Good Fit*
CFI	0,99	≥ 0,90	*Good Fit*
NFI	0,97	≥ 0,90	*Good Fit*

Table 3 shows that there are 5 goodness of fit criteria that have met the cut off value, meaning that the evaluation results show that the model is good. This explains that the model used in this study produces the expected level of predictions. Thus this model is a good and feasible model to explain the relationship between variables in the model

3.4 Measurement Model Fit Test

After the fit of the model and the data as a whole is good, the next step is to test the fit of the measurement model. This evaluation will be carried out between a latent variable with several indicator. Figure 7 is a path diagram of a standardized solution and Figure 8 is a path diagram of the t-value.

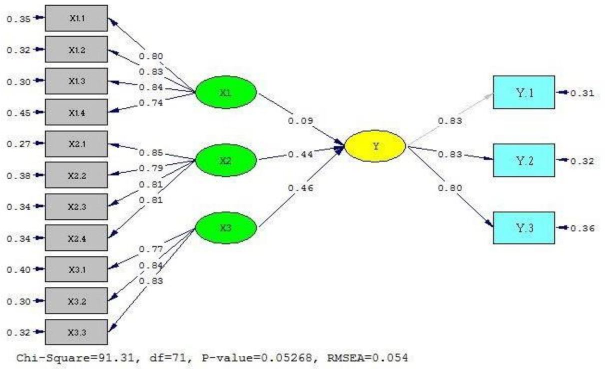

Figure 7. *Path Diagram of Standardized Solution*

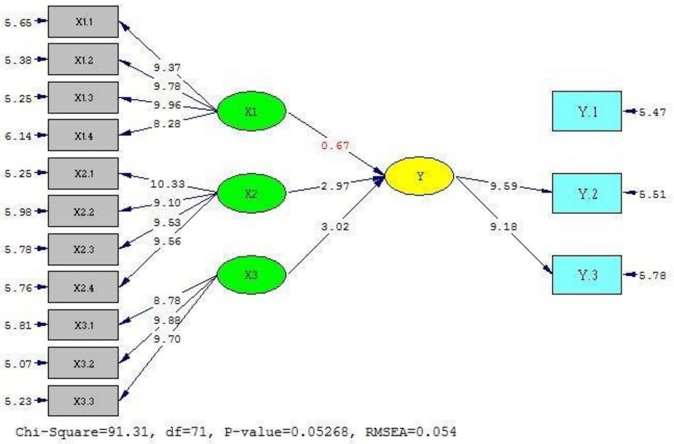

Figure 8. *The T-Value Flowchart*

In the t-value estimation results, there is a variable that has no path, namely the Y to Y1 relationship. This is because the variable has been set as the reference variance, which means that the manifest variable is significantly related to the latent variable. With Figure 7 and Figure 8, an evaluation of the suitability of the measurement model is obtained, namely through evaluation of the validity and evaluation of reliability, the following will explain the results of the evaluation. A variable is said to have good validity towards the construct or its latent variable if the t value is the factor load (loading factors) is greater than the critical value (or ≥ 1.96 or practically ≥ 2) and the standardized loading factor ≥ 0.50. And it is said to be reliable if CR ≥ 0.70 and VE ≥ 0.50. Table 6.1 shows the results of the evaluation of the validity and reliability of each latent variable or indicator.

Based on table 4 it is found that there are 10 indicators with 3 latent variables and each indicator has passed the validity (and value) test and all latent variables and it can be said that the respondent's answer to the questions used to measure each construct or indicator is consistent and construct reliable / reliable.

Table 4. *Evaluation Results of Validity and Reliability*

Variable	Indicator Code	*Standardized Factor Loading*	T-Value	Construct Reliability	Variance Extrated
Library Collection	X1.1	0,8	9,37	0,881	0,64955
	X1.2	0,83	9,78		
	X1.3	0,84	9,96		
	X1.4	0,74	8,82		
Employee Competence	X2.1	0,85	10,33	0,886	0,66078
	X2.2	0,79	9,10		
	X2.3	0,81	9,53		
	X2.4	0,81	9,56		
Library Facilities	X3.1	0,77	8,78	0,855	0,662
	X3.2	0,84	9,88		
	X3.3	0,81	9,70		
Quality of Library Service	Y.1	0,83		0,857	0,667
	Y.2	0,83	9,59		
	Y.3	0,8	9,18		

Evaluation or analysis of the structural model includes examining the significance of the estimated coefficients. Based on the output of data analysis, the results of structural equation analysis are obtained in Table 5 as follows.

Table 5. Structural Model Fit Test

Variabel laten eksogen	*Standardized Coefficient*	t-value	Information	R^2
X1	0,94	0,67	Not Significant	0,87
X2	0,44	2,97	Significan	
X3	0,46	3,02	Significan	

According to Dr. Edi Riadi (2016) states that evaluation or analysis of structural models includes examining the estimated coefficients. With a "level of accuracy (α) of 5% and a level of confidence of 95% so that the value of Z = 1.96, the value of e (level of significance / error) of 5% is obtained. The coefficient of determination (R2) on the structural equation indicates the number of variants in the endogenous latent variable that can be explained simultaneously by the independent latent variables. The higher the R2 value, the greater the independent variables can explain the endogenous variables so that the structural equation will be better.

From the research results obtained structural equations regarding structural equations, it can be seen the value of R^2 (coefficient of determination) for each relationship equation. The value of R^2 is used to show how far each independent variable is able to explain the dependent variable. So it can be concluded that 88% of the variation of the service quality variable (Y) can be influenced by the library collection (X1), employee competence (X2) and library facilities (X2).

The value of R^2 serves to show how far each independent variable is able to explain the dependent variable. So it can. It can be concluded that 88% of the variation of the service quality variable (Y) can be influenced by employee competence (X1) and library facilities (X2).

From the structural equation and Table 6.3, it can be explained that the employee competency variable as X1 with a parameter value ($\gamma 1$) is 0.09 and a t-value of 0.67 indicates that the library collection variable does not have a positive effect on the quality of library services. Competency variable employees as X2 with the parameter value ($\gamma 2$) is 0.44 and the t-value is 2.97 indicating that the library facilities variable has a positive effect on the quality of library services. This means that if the employee competency variable is increased by 1, the level of service quality

The library is expected to increase by 2.97. The library facilities variable as X3 with the parameter value ($\gamma 3$) is 0.46 and the t-value 3.02 shows that the library facilities variable has a positive effect on the quality of library services. This means that if the library facilities variable is increased by 1, the level of library service quality is expected to increase by 3.02.

4. CONCLUSION AND SUGGESTION

4.1 Conclusion

The conclusions obtained in this study are:

[1]. Library Collection (X1) has a positive but not significant effect on the quality of library services. This is because the estimated value shown is positive, namely 0.94 with a T-value of 0.67. Where the T-value is smaller than the T-table 1.96. So it can be concluded that hypothesis 1 is not fulfilled.

[2]. Employee Competence (X2) has a positive and significant effect on the quality of library services. This is because the estimated value shown is positive, namely 0.44 with a T-value of 2.97. Where the T-value is greater than the T-table 1.96. The positive value estimate indicates that the better the employee competency, the more likely it is to increase the quality of library services. So it can be concluded that hypothesis 2 is fulfilled.

[3]. Library facilities (X3) have a positive and significant effect on the quality of library services. This is because the estimated value shown is positive, namely 0.46 with a T-value of 2.30. Where the T-value is greater than the T-table 1.96. Estimated value which is positive indicates that the better the library facilities tend to increase the quality of library services. So it can be concluded that hypothesis 3 is fulfilled.

4.2 Suggestion

Based on the conclusion, the suggestions that can be submitted are as follows:

[1]. In estimating the model using the Maximum Likelihood method or also known as ML, if the data normality assumption is not met, it corrects the standard error and some goodness of fit indices.

[2]. Data processing using ordinal data which is treated as continuous data with maximum likelihood can be done by correcting some biases that may arise.

[3]. Further researchers can use factors that affect the quality of library services that are more complex.

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