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# The Use of Panel Data Regression to Identify Students' Reading Interest in the Library

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**Abstract**

Library visit is an indicator of college academic literacy. The current problem was a decrease on the students' visit and read at the library of STMIK Amik Riau. Based on the visit data in the library, there was a reduction of the students' visit for each year, as well as books lent by the students has decreased significantly. The purpose of this study was to identify the correlation between the library facilities and the library services on the students' reading interest at the library of STMIK Amik Riau by using Panel Data. This study used qualitative and quantitative approach. The population of this study were the visitors at STMIK Amik Riau Library that chosen by using simple random sampling. The data were collected through observation, interviews, questionnaires and documentation. The method used to identify the interest on the students' to read in the library was Panel Data regression. The procedures of this method were to determine the Panel Data Regression Model Estimation, the selection of Panel Data Regression Model (Estimated Technique) which includes the F Statistical Test (Chow Test), Hausman Test, and Lagrange Multiplier Test. Furthermore, conducted testing the Classical Assumptions (Multicollinearity and Heteroscedasticity) which includes the Multicollinearity test and heteroscedasticity test, followed by a feasibility test (Goodness of Fit) with the F-test hypothesis and Partial t-test. The result of this study showed that there was a correlation between the library facilities and the library services on the students' reading interest at library of STMIK Amik Riau.

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## 1. Introduction

Library is defined as a place in which there are activities for collecting, managing and disseminating all kinds of information, both printed and recorded in various media such as books, magazines, newspapers, films, cassettes, tape recorders, videos, computers, and others. Libraries are traditionally seen as collections of information and services that always play a significant role. They are enabling people to engage with all kinds of information and knowledge sources [1]. According to Law No. 43 of 2007 about libraries of Indonesia, chapter 1 points out that the library is an institute for managing collections, written works, printed works, and recorded works in a professional manner with a standard system in order to meet the needs of education, research, preservation, information, and recreation for the users [2]. Library is an inseparable part of formal, informal and non-formal education. The role of the academic library as the heart of the university and it serves the academic community of its parent institution [3]. It means that academic libraries have crucial role in to support and to enhance information and knowledge of the community of the universities especially for the students.

Based on the researchers' observation there were problems found at the library of STMIK Amik Riau namely a decrease of the students' visit to library. The reduction occurred in literacy aspects namely reading from books, references, journals, textbooks for lectures, and in other fields of science. Moreover, according to the visit data in the library, the reduction of the visit was about 10% every year. In addition, the number of books lent by the students has decreased significantly and it was about 20% per year. In other words, the students' interests in reading were low. However, reading is the common source to develop the students' knowledge and skills and their competency in accessing the world information [4]. These problems occurred due to several factors, namely the students' interest in reading, the facilities and the services in the library.

By considering the problems above, the researchers were encouraged to investigate the influence of the library facilities and the library services on the students' interest to visit and to read in the library of STMIK Amik Riau. The researchers used Panel Data of long perspective to observe the changes, so that the speed of adjustment of college development could be predicted. Panel data is able to identify and measure impacts that are not detected in time series and cross-sectional data. In this study, Panel Data Regression with the Pooled Least Square approach could be applied to process the data, so it could identify the decrease of the students' interest in visiting the library accurately. This study was an implementation of the Panel Data Regression method to identify the interest of the students' visit to the library with the following stages: planning, implementation, observation and reflection stages. To determine the estimation model, testing was carried out by using the Chow Test and Hausman Test. The Lagrange Multiplier test was not carried out, because the purpose of the test is to select an estimation model, whether it is the Common Effect Model or the Random Effect Model, this process has been carried out by the Chow Test and Hausman Test. The Chow Test aimed to determine the selection of the Common estimation model. This analysis was to find out to what extent the influence of the variables of library facilities and the library services on the students' reading interest.

## 2. Research Methods

This study used mixed method design in collecting the data which is qualitative and quantitative data. Using this approaches are particularly powerful in investigating someone's study and the results are more valid because they have been corroborated through multiple data collection methods [5]. The quantitative data were collected through

the questionnaire and the qualitative data were collected through observation and interview. The first data collection was conducted through observation. This activity was done observing directly to the use of the library by the visitors. The observations here were related to the quality of library services perceived by users, services from the librarian, as well as the physical condition of the library. Furthermore, the data collection through the questionnaire was conducted by distributing a set of questions or written questions to the respondent to be answered. In addition, in the interview process the researchers asked directly to Mr. Doni Hamdani, SP as a librarian.

### A. Population and Sampling

In this study, the population is the library users who are the general public, consisting of various professions and different educational backgrounds. The population was based on the active students in the 2019-2020 academic year, which amounted to 798, rounded up to 800 students. The participants of this study were chosen by using simple random sampling, there were 312 students involved in this study. To determine the amount of sample data is using the Slovin Formula.

$$n = N (1 + N e^2) \quad (1)$$

n = Number of samples
N = Total population
E = Error tolerance

The questionnaire consisted of 40 questions taken from each indicator from the dimensions of the Libqual method, namely affect of service, information control, and library as place. The type of instrument in this study is using a Likert scale, with the answer scale consisting of 5 levels. Likert scale is used to measure a person's response to social objects [6]. The alternative answers could be given a positive score with a value scale of 0 to 4 as follows: 4 = Very Satisfied, 3 = Satisfied, 2 = Quite Satisfied, 1 = Dissatisfied, 0 = Very Dissatisfied.

### B. Percentage Descriptive Analysis Method

This analysis was to find out to what extent the influence of the variables of the library facilities and the library services on the students' reading interest. Descriptive statistics are statistics that used to analyze by describing the data that has been collected as it is, without intending to make conclusions as stereotype or generalizations [7].

### C. Multiple Regression Analysis

Multiple regression analysis is a tool to measure the strength and the relationship direction of two or more independent variables to one dependent variable. Regression analysis is used to determine is there any influence of library facilities, library services on students' reading interest. For the multiple regressions analysis stage is to find multiple regression equations [8].

### D. Documentation Stage

This was the last stage of this research methodology. At this stage, documentation was done by collecting all data and information into one file and was compiled into a final project report or bookkeeping of the study that was conducted.

## 3. Results and Discussion

The results of this study described the data findings through a questionnaire that has been filled out by the respondents. Furthermore, statistical analysis was carried out using the Eviews application to test the data using the panel data regression stage.

Table 3.1 Distribution of Respondents' Answers on Library Facilities Variables

| No | Indicator | Result | Ideal | % | Criteria |
|---|---|---|---|---|---|

| | | Score | Score | | |
|---|---|---|---|---|---|
| 1 | Library room | 54 | 64 | 85 | Good |
| 2 | Equipment and Instrument | 54 | 64 | 84 | Good |
| 3 | Book Collection | 51 | 64 | 80 | Good Enough |

Source: Research results description

Description of Library Room Indicator based on the results of descriptive research, the percentage for the library room indicator obtained an average percentage of 85% which lies in the interval between 81.25% - 87.25%. Based on descriptive analysis the percentage is in the high category.

Table 3.2 Distribution of Respondents' Answers for The Library Room

| No | Respondents' Answer | Total |
|---|---|---|
| 1 | Strongly agree | 154 |
| 2 | Agree | 152 |
| 3 | Disagree | 33 |
| 4 | Do not agree | 0 |
| | Total | 312 |

Source: Research and Processing Results

Based on the table above, it shows that from three indicator items of the library room, the highest average distribution of respondents' answers agree is 40%, then 49% of the students strongly agree with the statement, while 11% of the students disagree, and then not agree category is 0%.

Tabel 3.3 Distribution of Respondents' Answers on Motivation Indicators for Reading Materials

| No | Respondents' Answer | Total | % |
|---|---|---|---|
| 1 | Strongly agree | 150 | 48 |
| 2 | Agree | 97 | 31 |
| 3 | Disagree | 35 | 11 |
| 4 | Do not agree | 30 | 9,6 |
| | Jumlah | 312 | 100 |

Source: Research Processing Results

Based on the table above shows that of the two motivational indicator items for reading material, the highest average distribution of respondents' answers agree is 31%, then strongly agree is 48%, while disagree at 11%, and the category is not agree is 9,6%. This shows that the motivation indicator for reading materials at the STMIK Amik Riau Library is in the high category.

## A. Panel Data Regression Model Selection Test

Statistical data analysis is needed to understand the character of the data, so the most appropriate model can be selected.

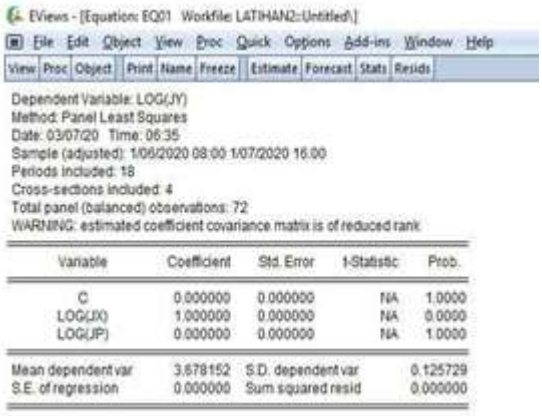



Figure 3.1. Common effect model or pooled least square

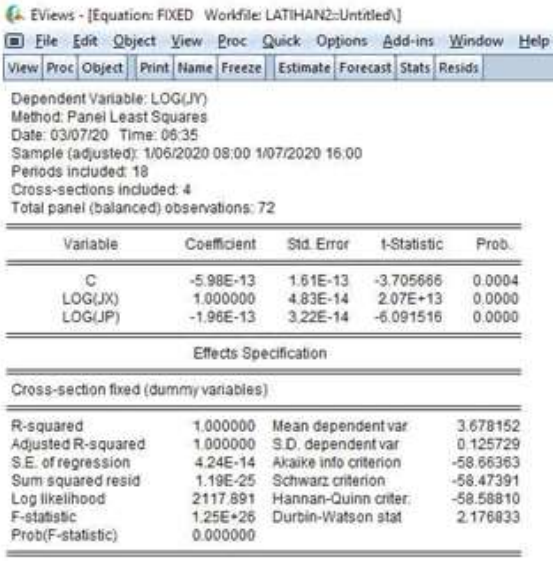



Figure 3.2. Fixed effect model results

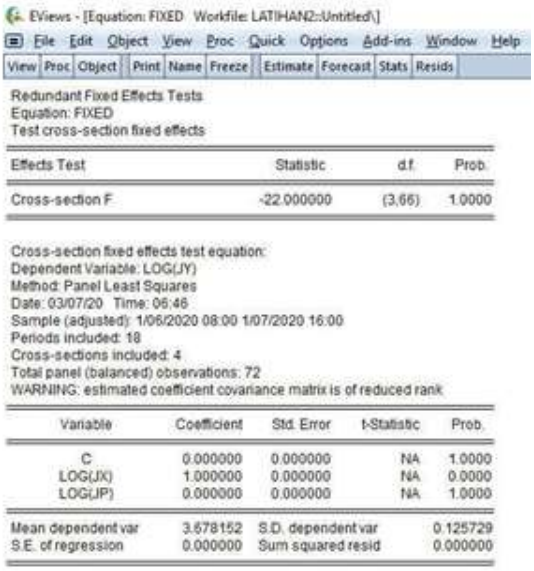
To determine the model, Chow test and Hausman test are used, can be added with Lagrange Multiplier test if needed.

**a. Chow Test**

Chow test is a test to determine the most appropriate Common Effect (OLS) or Fixed Effect model used in estimating panel data. The decision-making criteria are:

If F count > F table then the better model is Fixed effect

If F count < F table then the better model is Common effect



EViews - [Equation: FIXED Workfile: LATIHAN2::Untitled\]

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Redundant Fixed Effects Tests
Equation: FIXED
Test cross-section fixed effects

| Effects Test | Statistic | d.f. | Prob. |
|---|---|---|---|
| Cross-section F | -22.000000 | (3,66) | 1.0000 |

Cross-section fixed effects test equation:
Dependent Variable: LOG(JY)
Method: Panel Least Squares
Date: 03/07/20 Time: 06:46
Sample (adjusted): 1/06/2020 08:00 1/07/2020 16:00
Periods included: 18
Cross-sections included: 4
Total panel (balanced) observations: 72
WARNING: estimated coefficient covariance matrix is of reduced rank

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.000000 | 0.000000 | NA | 1.0000 |
| LOG(JX) | 1.000000 | 0.000000 | NA | 0.0000 |
| LOG(JP) | 0.000000 | 0.000000 | NA | 1.0000 |

| | | | |
|---|---|---|---|
| Mean dependent var | 3.678152 | S.D. dependent var | 0.125729 |
| S.E. of regression | 0.000000 | Sum squared resid | 0.000000 |

Figure 3.3. Chow test calculation results

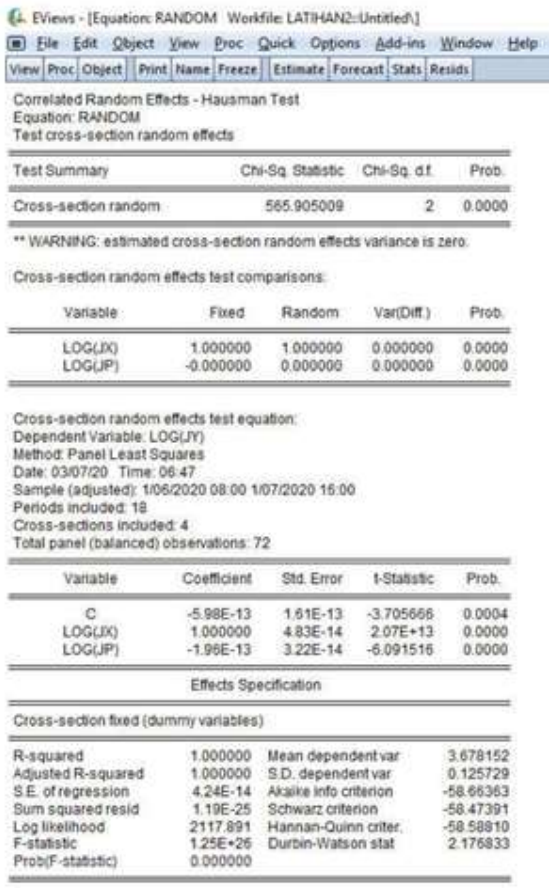
Conclusion: Since F count > F table then the better model is Fixed effect

**b. Hausman test**

Hausman test is a statistical test to choose whether the Fixed Effect or Random Effect model is the most appropriate to use. The decision-making criteria are:

a. If Chi square count > Chi square table then the better model is Fixed effect

b. If Chi square count < Chi square table then the better model is Random effect



EViews - [Equation: RANDOM Workfile: LATIHAN2::Untitled\]

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Correlated Random Effects - Hausman Test
Equation: RANDOM
Test cross-section random effects

| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
|---|---|---|---|
| Cross-section random | 565.905009 | 2 | 0.0000 |

** WARNING: estimated cross-section random effects variance is zero.

Cross-section random effects test comparisons:

| Variable | Fixed | Random | Var(Diff.) | Prob. |
|---|---|---|---|---|
| LOG(JX) | 1.000000 | 1.000000 | 0.000000 | 0.0000 |
| LOG(JP) | -0.000000 | 0.000000 | 0.000000 | 0.0000 |

Cross-section random effects test equation:
Dependent Variable: LOG(JY)
Method: Panel Least Squares
Date: 03/07/20 Time: 06:47
Sample (adjusted): 1/06/2020 08:00 1/07/2020 16:00
Periods included: 18
Cross-sections included: 4
Total panel (balanced) observations: 72

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -5.98E-13 | 1.61E-13 | -3.705666 | 0.0004 |
| LOG(JX) | 1.000000 | 4.83E-14 | 2.07E+13 | 0.0000 |
| LOG(JP) | -1.96E-13 | 3.22E-14 | -6.091516 | 0.0000 |

Effects Specification

Cross-section fixed (dummy variables)

| | | | |
|---|---|---|---|
| R-squared | 1.000000 | Mean dependent var | 3.678152 |
| Adjusted R-squared | 1.000000 | S.D. dependent var | 0.125729 |
| S.E. of regression | 4.24E-14 | Akaike info criterion | -58.66363 |
| Sum squared resid | 1.19E-25 | Schwarz criterion | -58.47391 |
| Log likelihood | 2117.891 | Hannan-Quinn criter. | -58.58810 |
| F-statistic | 1.25E+26 | Durbin-Watson stat | 2.176833 |
| Prob(F-statistic) | 0.000000 | | |

Figure 3.4. Hausman test calculation results

Chi square count = 565

Chi square table = 2. Because Chi square count > Chi square table, then the better model is Fixed Effect Model. With this, the model used is the Fixed Effect Model

**B. Multiple Regression Analysis**

Multiple analysis model was used to determine the influence of the service competence and the library facilities on service quality at the STMIK Amik Riau Library partially and simultaneously. Based on the Eviews calculation results is obtained regression as follows:

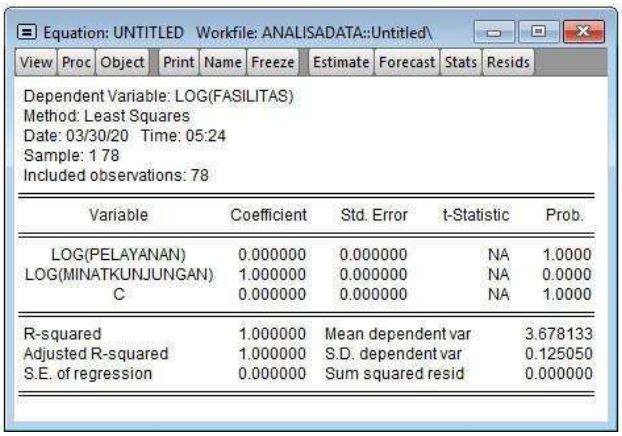


Figure 3.5. Regression analysis

a. Dependent Variable: sell service

The results of data processing, based on table 4.19, the regression coefficient for the facility variable is 0.000, the library facilities variable is 0.12 and the constant is 3.678. From the results of the analysis so that the multiple regression equation is obtained, as follow:

Y = 3,678 + 0,125X1 + 0,0001X2 (2)

The regression equation has the following meaning:
1. Constant = 6.073, If the variable of library facilities is 0, then the quality of service will be 6.073.
2. Coefficient X1 = 0.441, if the library facilities variable is considered constant, it will cause an increase in service quality of 0.441.

b. Coefficient X2 = 0,631
If the library facilities variable has increased by one point, it will cause an increase in service quality of 0.631

## 4. Discussion

### A. The Influence of Library Facilities

(X1) on Service Quality (Y) in the Library of STMIK Amik Riau. The Library Work Unit at STMIK Amik Riau is one of the supporting tools for the learning process that plays a very important role. Library as The Influence of Library Facilities (X1) on Service Quality (Y) in the Library of STMIK Amik Riau The Library Work Unit at STMIK Amik Riau is one of the supporting tools for the learning process that plays a very important role. Libraries as educational institutions and information institutions must be able to follow the development of information in order to function properly. Utilization of resources must be carried out effectively and efficiently in order to achieve maximum goals, one of which is the utilization of available facilities. To meet the needs of users, the library should always strive to provide services with the best facilities

Library facilities in this case mean a comfortable room, complete equipment, and the collection of reading books that always keep up with times. Many factors can determine the good or bad quality of service in the library. Facilities are one of the most important factors in a library. With these facilities are expected that activities in the library can run smoothly and functioning in accordance with the expected goals, such as being a source of information for the public. Based on the results of the descriptive calculation of the percentage on the variable library facilities with indicators of library space, library equipment, and collections of reading books at the STMIK Amik Riau Library in the complete category with an average of 75.89%. This was indicated by the STMIK Amik Riau library room which is spacious and comfortable for reading, complete equipment, and a collection of reading books that always keep up with times, by an average percentage of 78.59%, 78.95%, and 70.11%. Based on data analysis, it showed that there was a significant influence on library facilities to the service quality at the STMIK Amik Riau Library. From the partial test results obtained the regression coefficient of 0.631 which was tested for significance with the t test, it was obtained tcount = 7.459d with the significance of 0.000 <0.05. This

could be interpreted that the more complete library facilities would affect the quality of service achieved by the STMIK Amik Riau library, and conversely the more incomplete library facilities would affect the low satisfaction of service quality at the STMIK Amik Riau library. The magnitude influence of library facilities on the quality of service at the STMIK Amik Riau Library could be seen from the value of the partial determination coefficient (r2). Based on table 4.21 shows that the Partial Correlation coefficient is 0.574. So that the r2 magnitude of library facilities on service quality is (0.574)2 x 100% = 32.94%. The results of this study were in line with the research conducted by Mukhadiono and Widyo Subagy shows that service facilities have a significant influence on service quality [9]. The product moment correlation analysis results show that the correlation coefficient between service facilities and service quality is 0.623. The correlation between service facilities and service quality is strong because the correlation coefficient shows a value of 0.623 which belongs to the interval between 0.60-7.99 where the coefficient range is a strong correlation. Which means that the better the service facilities, the better the service quality. This study explains that service facilities are very important in order to realize quality public services. Complete and adequate service facilities are conditions that must be realized so the services that is provided are able to achieve high quality. On the other hand, with limited-service facilities, it will be difficult to do optimally so that it is also difficult to expect high quality of service to be realized.

**B. The Influence of Library Facilities (X2) on Service Quality (Y) in the STMIK Amik Riau Library**

Service is the key to success in a business or activity. The role of service will be greater if service activities in the community can be carried out. Therefore, service issues receive great attention from the community and the management, both particularly or relate to activities in the library. Libraries as institutions engaged in information services have a very important role in building the nation's intelligence. The information provided by the library will greatly assist the users to meet their needs. To meet their need, the librarian should always try to provide the best service. A quality library is a library that is able to answer every user's information needs. Therefore, the completeness of library facilities is a dominant factor in assisting users in meeting their needs for more precise information. In order to realize excellent service in the library, the librarian should have competence, such as having adequate knowledge and understanding of libraries, skills, and good attitudes in providing services. A service is said to be successful if the library has many visitors and users who take advantage of the provided facilities and resources. Facilities are very important in order to realize excellent quality service. Complete and adequate facilities are conditions that must be realized, so that the services provided are able to achieve high quality. On the other hand, with the limited facilities provided, the service will be difficult to perform optimally so that it will also be difficult to expect the realization of high service quality. Based on the results of descriptive calculations, the percentage of service quality variables in the library is in the high category with an average percentage of 72.33%. This is showed by indicators of physical form, reliability, responsiveness, assurance, and empathy with the respective percentages of 76.51%, 72.63%, 70.19%, 76.15%, and 62.28%. Based on data analysis, it shows that there is a significant influence between library facilities on service quality at the STMIK Amik Riau Library. From the results of the simultaneous test obtained Fcount of 77.759 with a p value of 0.000. Karena p value 0,000 < 0,05. The library facilities contribute to service quality at the STMIK Amik Riau Library was known from the simultaneous determination coefficient

price obtained by R2 of 0.572. Thus, it showed that the library facilities influence on service quality at the STMIK Amik Riau Library is 57.2% and the remaining 42.8% was influenced by other variables which were not discussed in this study.

## 5. Conclusion

Based on the results of the analysis and discussion in this study, the following conclusions can be drawn:

1. The condition of library facilities and library services on students' interest in reading at the STMIK Amik Riau library was good with a descriptive percentage of the average score of library facilities of 2.93 and library services of 3.08.
2. There was a correlation or influence between the library facilities and the library services on student interest in reading at the STMIK Amik Riau Library by 55.1%. So that the increase in library facilities and library services affected the increase on the students' reading interest at the STMIK Amik Riau library.
3. There was a correlation or influence of the library facilities on the students' reading interest in the library of STMIK Amik Riau with a partial contribution value of 21.2%. So the better the library facilities, the student's interest in reading also increases.
4. There was a correlation or influence of library services on the students' reading interest in the library of STMIK Amik Riau with a partial contribution value of 28.73%. So, the increasing of library services, also increase the students' reading interest.

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