

# improving user

*By o l sari*



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## Improving User Comfort Classroom at the Kalimantan Institute of Technology with Maintenance Factors

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### ABSTRACT

In building construction, the implementation of maintenance activities plays an important role in the quality of the building. By carrying out these activities regularly, it's hoped to minimize and prevent damage to buildings and make users feel comfortable. Kalimantan Institute of Technology must have comfortable study spaces. This study aims to determine the effect of the class maintenance factor on the user's comfort level. The analysis brought by determining what factors are influencing, these factors influence, and the most dominant factors affecting the most. Primary data was obtained by distributing questionnaires to respondents, secondary data inactive students, and lecturers at the Kalimantan Institute of Technology, and supporting research data in ministerial regulations, books, research journals, and others. The data analysis process uses IBM SPSS as an auxiliary program with multiple linear regression analysis methods. Based on the research and data processing conducted, it's concluded that 8 factors influence the maintenance, namely the maintenance of user comfort by 80.8% and the variable maintenance of the room walls. The room wall maintenance variable is the most dominant factor influencing the comfort of classroom users. Knowing these factors can implement optimal implementation to support the comfort of class users at the Kalimantan Institute of Technologists.

### 1. Introduction

Maintenance is an activity to repair and replace parts of components, buildings, infrastructure, and building materials so that the building remains functional and curative after a problem or damage occurs [1]. Proper and appropriate maintenance activities can save time and costs, provide long-term benefits, and support better performance. Buildings can achieve a service life if they are cared for and maintained as planned [2][3].

Maintenance of a building can be interpreted as an activity carried out to maintain the building and preventive maintenance. A building is a physical form of the result of a construction work that integrated with the place of its domicile, functions as a place for humans to carry out an activity, whether for a place to live or occupy, business activities, religious activities, culture, special activities or social activities [4].

Comfort can be defined as a condition of fulfilling basic human needs, namely the need for relief (needs have been met), transcendence (a state associated with something that exceeds problems and pain), and tranquility. (a sense of satisfaction that can improve daily appearance) [5].

In previous studies that became the author's reference, each of these studies discussed two things, namely the level of comfort and the influence factor of maintenance. In previous research that discusses the level of comfort, as sustainable construction tends to focus on environmental sustainability, it is likely that this focus will also lead to a sustainable workplace in terms of health, satisfaction, and well-being [6][7][8]. Some discuss related factors that affect building maintenance. Starting from case studies of offices, residential, housing, government residential [9][10][11]. Regarding affecting factors, there are discussions related to building maintenance in government residential and similar discussions with case studies in tertiary institutions [12][13]. Another case study is related to the factors that affect the maintenance of public buildings oriented to environmental or climate problems, humidity, design errors, unavailability of skilled labor, and comfort of office workers [14][15][16].

The Kalimantan Institute of Technology, as a large campus, must have a comfortable lecture room for its users because comfortable room conditions affect the course of lecture activities. As the building ages, it is necessary to maintain and care for the building to keep it proper and comfortable. In the classrooms of buildings A and B on the ITK campus, it's still found that some components of the classroom were damaged, which affected the user's comfort.

Class maintenance activities need to be implemented to support educational activities, which addressed knowing what maintenance factors affect the comfort level of classroom users in buildings A and B. Determine the factor of classroom maintenance in buildings A and B which has the most dominant influence on user comfort.

## 2. Research Method

### 2.1. Research Sites

The research location is in building A and B of the Kalimantan Institute of Technology

campus. The campus is an engineering campus located on Jl. Soekarno Hatta, KM. 15, Karang Joang, North Balikpapan, Balikpapan, East Kalimantan. The research location can be seen in **Figure 1** below:



Source : Maps of Kalimantan Institute of Technology  
(Google Earth, 2020)

**Figure 1.** Research Sites Location on Kalimantan Institut of Technology

## 2.2. Preliminary Survey

A minimum number of experts can be used as much as possible and ask for opinions 3 people [17]. In this study, to ascertain the variables, the authors carried out activities such as consultation, verification, interviews, and filling out questionnaires to 5 experts with data that can be seen in **Table 1** as follows:

**Table 1.** Expert Respondent Data.

| No. | Position           | Education       | Work Experience | Project Involvement |
|-----|--------------------|-----------------|-----------------|---------------------|
| 1   | Project Manager    | Bachelor Degree | > 20 Year       | > 10 Project        |
| 2   | Lecturer           | Post Graduate   | > 20 Year       | 8 – 10 Project      |
| 3   | Inspector/Surveyor | Vocational      | 10 – 20 Year    | 5 – 7 Project       |
| 4   | Section Chief      | Bachelor Degree | 5 – 10 Year     | > 10 Project        |
| 5   | Supervisor         | Bachelor Degree | 10 – 20 Year    | > 10 Project        |

Source : Processed Researchers (2021)

## 2.3. Population and Samples

In the research carried out, there were populations, respondents, and samples in which the population in this study were students and lecturers of the Kalimantan Institute of Technology, totaling 2728 people. This study obtained a sample of 348 students and lecturers at the Kalimantan Institute of Technology.

## 2.4. Sampling Techniques

In the research carried out, the technique used in sampling is the random sampling technique (random sampling). Slovin's formula use to determine the number of samples in the study [18], the solving formula, which can see in below:

$$n = \frac{N}{1 + Ne^2}$$

Where:

n = Number of Samples.  
N = Number of Populations.  
e = Error Tolerance Limits.

## 2.5. Research Variable

The independent variables in this study are the building maintenance factors for the lecture buildings used in the questionnaire, which can be seen in **Table 2** below:

**Table 2.** Independent Variable.

| No.            | Variable                               | Indicator  | Information   | Reference |
|----------------|--|--|---|-----------|
| X <sub>1</sub> | Maintenance of the Lighting System     | Neat placement of electrical installation cables (X <sub>1,1</sub> ) | The placement of the power cables is neat and unobtrusive             | [4]       |
|                |  | Lighting in the room (X <sub>1,2</sub> )                             | The lighting in the room is bright and not dark                       |           |
| X <sub>2</sub> | Maintenance of Ceiling                 | Ceiling condition (X <sub>2,1</sub> )                                | The ceiling is well maintained and does not experience cracks/breaks  | [4]       |
|                |  | Ceiling cleanliness (X <sub>2,2</sub> )                              | The ceiling is not stained, and the color does not fade               |           |
| X <sub>3</sub> | Maintenance of Air Conditioning System | Availability of fan/AC (X <sub>3,1</sub> )                           | Fan/AC available  | [4]       |
|                |  | Fan/AC works (X <sub>3,2</sub> )                                     | The fan/AC is usable and works fine                                   |           |
| X <sub>4</sub> | Maintenance of Classroom Cleanliness   | Floor cleanliness (X <sub>4,1</sub> )                                | Floor not dirty and dusty   | [4]       |
|                |  | Availability of trash cans (X <sub>4,2</sub> )                       | Clear enough  |           |
|                |  | Arrangement of tables, chalkboard, and chairs (X <sub>4,3</sub> )    | Tables, blackboards, and chairs neatly arranged                       |           |
| X <sub>5</sub> | Maintenance of Frames                  | Frames condition (X <sub>5,1</sub> )                                 | The frame is well maintained  | [4]       |
|                |  | Lock, Hinge, and Latch Conditions (X <sub>5,2</sub> )                | Locks, hinges, and latch do not rust and work well                    |           |
| X <sub>6</sub> | Maintenance of Electronic System       | The condition of the socket and switch (X <sub>6,1</sub> )           | Sockets and switches can function properly                            | [4]       |
|                |  | Internet network quality (X <sub>6,2</sub> )                         | The quality of the internet has sufficient speed                      |           |
|                |  | Condition of LCD Projector / Screen Media (X <sub>6,3</sub> )        | Produces images with quality that are not blurry and suitable for use |           |
| X <sub>7</sub> | Maintenance of Room Wall               | Paint color on the walls (X <sub>7,1</sub> )                         | The paint color does not fade and fade                                | [4]       |
|                |  | Cleanliness of the walls (X <sub>7,2</sub> )                         | Walls have no stains or streaks                                       |           |
|                |  | Walls condition (X <sub>7,3</sub> )                                  | Walls are not cracked or chipped                                      |           |

| No.            | Variable                 | Indicator  | Information  | Reference |
|----------------|--------------------------|--|--|-----------|
| X <sub>8</sub> | Maintenance of Furniture | Furniture condition (X <sub>8,1</sub> )          | Furniture is functional and well maintained            | [4]       |
|                |                          | Cleanliness of the furniture (X <sub>8,2</sub> ) | Furniture color does not fade, and there are no stains |           |

Source : Processed Researchers (2021)

The below is the dependent variable in the research carried out, attached to **Table 3**:

**Table 3.** Dependent Variable.

| No.            | Variable                               | Indicator              | Information  | Reference |
|----------------|--|------------------------|--------------|-----------|
| Y <sub>1</sub> | User Comfort Level (Y <sub>1,1</sub> ) | Classroom User Comfort | Clear Enough | -         |

Source : Processed Researchers (2021)

## 2.6. Questionnaire Survey

The step in this stage is the drafting of a questionnaire, and then the pilot survey process is carried out after the draft questionnaire is made, in which can use the pilot survey sample at least 10% of the total sample size [18]. In the research, a questionnaire used a Likert scale for measurements. The Likert scale to determine the value of each variable can be seen in **Table 3** below:

**Table 3** below:

**Table 3.** Variable Assessment Using a Likert Scale.

| Variable Assessment by Respondent | Scoring Scale |
|-----------------------------------|---------------|
| Very Irrelevant                   | 1             |
| Irrelevant                        | 2             |
| Quite Relevant                    | 3             |
| Relevant                          | 4             |
| Very Relevant                     | 5             |

Source : Processed Researchers (2021)

## 2.7. Processing and Analysis of Data

In conducting the validity and reliability tests, the SPSS software was used as an auxiliary program[20]. The following is the correlation coefficient at the r value found in **Table 4**:

**Table 4.** Correlation Coefficient at r Value.

| Correlation Coefficient at r Value | Relationship Level |
|------------------------------------|--------------------|
| 0,00-0,199                         | Very Low           |
| 0,20-0,399                         | Low                |
| 0,40-0,599                         | Strong Enough      |
| 0,60-0,799                         | Strong             |
| 0,80-1,00                          | Very Strong        |

Source : [21]



In research conducted by the authors, the reliability test has a function to ensure that the data or questionnaire used can be said to be reliable or not. Cronbach's Alpha as a method is measured on a scale from 0 to 1. An instrument in research is called reliable if the Cronbach's Alpha value is  $> 0,6$  [22][23]. Below is the attached Cronbach's Alpha value and can be seen in **Table 5**:

**Table 5.** Cronbach's Alpha Value.

| Cronbach's Alpha Value | Score           |
|------------------------|-----------------|
| 0,00 - 0,20            | Less Reliable   |
| 0,21 - 0,40            | Rather Reliable |
| 0,41 - 0,60            | Quite Reliable  |
| 0,61 - 0,80            | Reliable        |
| 0,81 - 1,00            | Very Reliable   |

Source : [22]

The data from the questionnaire obtained by the researcher were analyzed using multiple linear regression analysis, then performed multiple linear regression analysis, hypothesis testing (t test and F test), analysis of the coefficient of determination, then the dominant test.

### 3. Results and Discussions

#### 3.1. Preliminary Survey Results

The preliminary survey results carried out on the experts have obtained responses related to the level of influence of classroom maintenance indicators in buildings A and B of the Kalimantan Institute of Technology campus. If the mean value is higher, the indicator is more relevant [17]. The results of the responses are attached using the mean test shown in **Table 6**:

**Table 6.** Expert Response on Classroom Maintenance Indicators for Building A and B.

| Code             | Indicator   | 1 | 2 | 3 | 4 | 5 | Mean | Score          |
|------------------|---|---|---|---|---|---|------|----------------|
| X <sub>1,1</sub> | Tidiness of Placement of Electrical Installation Cables | 4 | 5 | 4 | 4 | 5 | 4,4  | Relevant       |
| X <sub>2,1</sub> | Ceiling Condition                                       | 5 | 4 | 5 | 4 | 4 | 4,4  | Relevant       |
| X <sub>6,3</sub> | LCD Projector Condition                                 | 4 | 4 | 3 | 5 | 5 | 4,2  | Relevant       |
| X <sub>7,3</sub> | Walls Condition   | 4 | 4 | 4 | 4 | 5 | 4,2  | Relevant       |
| X <sub>2,2</sub> | Ceiling Cleanliness                                     | 4 | 3 | 5 | 4 | 4 | 4    | Relevant       |
| X <sub>4,1</sub> | Floor Cleanliness                                       | 4 | 3 | 5 | 4 | 4 | 4    | Relevant       |
| X <sub>4,3</sub> | Table, Chalkboard, and Chair Arrangement                | 4 | 4 | 4 | 4 | 4 | 4    | Relevant       |
| X <sub>6,2</sub> | Internet Network Quality                                | 4 | 3 | 5 | 5 | 3 | 4    | Relevant       |
| X <sub>7,1</sub> | Paint Color on the Wall                                 | 4 | 3 | 4 | 5 | 4 | 4    | Relevant       |
| Y <sub>1,1</sub> | User Comfort Level                                      | 4 | 4 | 4 | 4 | 4 | 4    | Relevant       |
| X <sub>3,2</sub> | Fan/Air Conditioner Function                            | 4 | 4 | 4 | 4 | 3 | 3,8  | Quite Relevant |
| X <sub>4,2</sub> | Availability of Trash Cans                              | 3 | 4 | 5 | 3 | 4 | 3,8  | Quite Relevant |
| X <sub>5,2</sub> | Lock, Hinge, and Latch Conditions                       | 3 | 4 | 4 | 5 | 3 | 3,8  | Quite Relevant |
| X <sub>6,1</sub> | Receptacles and Switches Condition                      | 4 | 4 | 3 | 3 | 4 | 3,6  | Quite Relevant |

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| Code             | Indicator                           | 1 | 2 | 3 | 4 | 5 | Mean | Score          |
|------------------|-------------------------------------|---|---|---|---|---|------|----------------|
| X <sub>7,2</sub> | Walls Cleanliness                   | 3 | 3 | 4 | 4 | 4 | 3,6  | Quite Relevant |
| X <sub>8,2</sub> | Furniture Cleanliness               | 3 | 3 | 4 | 5 | 3 | 3,6  | Quite Relevant |
| X <sub>1,2</sub> | Indoor Lighting                     | 2 | 4 | 4 | 3 | 4 | 3,4  | Quite Relevant |
| X <sub>5,1</sub> | Frame Condition                     | 4 | 4 | 4 | 2 | 3 | 3,4  | Quite Relevant |
| X <sub>3,1</sub> | Availability of Fan/Air Conditioner | 3 | 3 | 5 | 2 | 3 | 3,2  | Quite Relevant |
| X <sub>8,1</sub> | Furniture's Condition               | 2 | 3 | 4 | 4 | 3 | 3,2  | Quite Relevant |

Source : Processed by Researchers, 2021

In each indicator, the mean score must be  $> 3,00$  so that the indicator can be used as an indicator that determines making a decision. The 20 indicators for the maintenance of classrooms in buildings A and B on the Kalimantan Institute of Technology campus can be relevant for use in the questionnaire survey.

### 3.2. Pilot Survey Results

The number of samples used in the pilot survey was 10% of the total sample size [24]. With a total of 35 samples, the result can be seen in **Table 7** below:

**Table 7.** Response to the Pilot Survey of Classroom Maintenance for Buildings A and B

| Code             | Indicator   | Mean (R1-R35) | Score          |
|------------------|---|---------------|----------------|
| X <sub>1,2</sub> | Indoor Lighting   | 4,5           | Relevant       |
| X <sub>3,1</sub> | Availability of Fan/Air Conditioner                     | 4,5           | Relevant       |
| X <sub>6,1</sub> | Receptacles and Switches Condition                      | 4,5           | Relevant       |
| X <sub>1,1</sub> | Tidiness of Placement of Electrical Installation Cables | 4,4           | Relevant       |
| X <sub>4,2</sub> | Availability of Trash Cans                              | 4,3           | Relevant       |
| X <sub>3,2</sub> | Fan/Air Conditioner Function                            | 4,3           | Relevant       |
| X <sub>6,2</sub> | Internet Network Quality                                | 4,3           | Relevant       |
| X <sub>2,1</sub> | Ceiling Condition                                       | 4,2           | Relevant       |
| X <sub>4,1</sub> | Floor Cleanliness                                       | 4,2           | Relevant       |
| X <sub>6,3</sub> | LCD Projector Condition                                 | 4,2           | Relevant       |
| X <sub>5,2</sub> | Lock, Hinge, and Latch Conditions                       | 4,2           | Relevant       |
| X <sub>7,2</sub> | Walls Cleanliness                                       | 4,1           | Relevant       |
| X <sub>8,1</sub> | Furniture's Condition                                   | 4,1           | Relevant       |
| X <sub>7,3</sub> | Walls Condition   | 4,1           | Relevant       |
| X <sub>7,1</sub> | Paint Color on the Wall                                 | 4             | Relevant       |
| X <sub>2,2</sub> | Ceiling Cleanliness                                     | 4             | Relevant       |
| X <sub>8,2</sub> | Furniture Cleanliness                                   | 4             | Relevant       |
| X <sub>4,3</sub> | Table, Chalkboard, and Chair Arrangement                | 3,9           | Quite Relevant |
| X <sub>5,1</sub> | Frame Condition   | 3,8           | Quite Relevant |
| Y <sub>1,1</sub> | User Comfort Level                                      | 3,8           | Quite Relevant |

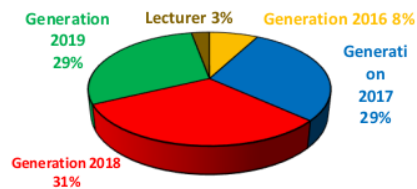
Source : Processed by Researchers, 2021

The mean pilot survey filled in by 35 samples obtained a score with relevant and quite relevant information from the pilot survey results. This indicates that respondents can understand the questionnaire, and it is feasible to distribute questionnaires to all respondents.



### 3.3. Questionnaire Survey Data Collection Result

From the questionnaire survey distributed by the author, a sample/data of 348 respondents obtained. The percentage of respondents by generation can be seen in **Figure 2** below:



Source : Processed by Researchers, 2021

**Figure 2.** Percentage Diagram of Respondents by Position

From the percentage diagram of respondents based on batches, it is known that the 2018 batch of students filled out the questionnaire the most with a percentage of 31%, followed by the 2019 and 2017 batches at 29%, the 2016 class at 8%, and 3% for lecturers.

### 3.4. Validity Test

The validity test aims to determine whether each variable/indicator of a questionnaire submitted to respondents can be said to be valid or not. The results of the validity test that have been done can be seen in **Table 8** below:

**Table 8.** Results of the Validity Test of Classroom Maintenance Variables

| Variable   | Indicator        | $r_{count}$  | $r_{table}$ | Information |
|--|------------------|--------------|-------------|-------------|
| Maintenance of the Lighting System<br>(X <sub>1</sub> )      | X <sub>1.1</sub> | <b>0,463</b> | 0,113       | Valid       |
|  | X <sub>1.2</sub> | <b>0,388</b> | 0,113       | Valid       |
| Ceiling Maintenance<br>(X <sub>2</sub> )                     | X <sub>2.1</sub> | <b>0,692</b> | 0,113       | Valid       |
|  | X <sub>2.2</sub> | <b>0,709</b> | 0,113       | Valid       |
| Air Conditioning System Maintenance<br>(X <sub>3</sub> )     | X <sub>3.1</sub> | <b>0,546</b> | 0,113       | Valid       |
|  | X <sub>3.2</sub> | <b>0,705</b> | 0,113       | Valid       |
| Room Cleanliness<br>Maintenance<br>(X <sub>4</sub> )         | X <sub>4.1</sub> | <b>0,507</b> | 0,113       | Valid       |
|  | X <sub>4.2</sub> | <b>0,454</b> | 0,113       | Valid       |
|  | X <sub>4.3</sub> | <b>0,497</b> | 0,113       | Valid       |
| Maintenance of frames<br>(X <sub>5</sub> )                   | X <sub>5.1</sub> | <b>0,637</b> | 0,113       | Valid       |
|  | X <sub>5.2</sub> | <b>0,579</b> | 0,113       | Valid       |
| Electronic System<br>Maintenance<br>(X <sub>6</sub> )        | X <sub>6.1</sub> | <b>0,649</b> | 0,113       | Valid       |
|  | X <sub>6.2</sub> | <b>0,627</b> | 0,113       | Valid       |
|  | X <sub>6.3</sub> | <b>0,671</b> | 0,113       | Valid       |
| Maintenance of the Walls<br>of the room<br>(X <sub>7</sub> ) | X <sub>7.1</sub> | <b>0,665</b> | 0,113       | Valid       |
|  | X <sub>7.2</sub> | <b>0,616</b> | 0,113       | Valid       |
|  | X <sub>7.3</sub> | <b>0,666</b> | 0,113       | Valid       |

| Variable                                     | Indicator        | r <sub>count</sub> | r <sub>table</sub> | Information |
|--|------------------|--------------------|--------------------|-------------|
| Furniture Maintenance (X <sub>8</sub> )      | X <sub>8.1</sub> | <b>0,697</b>       | 0,113              | Valid       |
|  | X <sub>8.2</sub> | <b>0,661</b>       | 0,113              | Valid       |
| Classroom User Convenience (Y <sub>1</sub> ) | Y <sub>1.1</sub> | <b>0,911</b>       | 0,113              | Valid       |

Source : IBM SPSS, 2021

Based on the table above, it can be seen that the values of r<sub>count</sub> and r<sub>table</sub> obtained from the results of the Validity Test. The value of r<sub>table</sub> obtained a value of 0.113, and for all r<sub>count</sub> values, the variables/indicators have r<sub>count</sub> > r<sub>table</sub> (0.113).

### 3.5. Reliability Test

The following is attached the Reliability Test results, which can be seen in the following

**Table 9** below:

**Table 9.** Results of Reliability Test of Classroom Maintenance Variables

| Variable   | Indicator        | Cronbach's Alpha | Information   |
|--|------------------|------------------|---------------|
| Maintenance of the Lighting System (X <sub>1</sub> )   | X <sub>1.1</sub> | <b>0,912</b>     | Very Reliable |
|  | X <sub>1.2</sub> | <b>0,913</b>     | Very Reliable |
| Ceiling Maintenance (X <sub>2</sub> )                  | X <sub>2.1</sub> | <b>0,907</b>     | Very Reliable |
|  | X <sub>2.2</sub> | <b>0,906</b>     | Very Reliable |
| Air Conditioning System Maintenance (X <sub>3</sub> )  | X <sub>3.1</sub> | <b>0,910</b>     | Very Reliable |
|  | X <sub>3.2</sub> | <b>0,906</b>     | Very Reliable |
| Room Cleanliness Maintenance (X <sub>4</sub> )         | X <sub>4.1</sub> | <b>0,911</b>     | Very Reliable |
|  | X <sub>4.2</sub> | <b>0,912</b>     | Very Reliable |
|  | X <sub>4.3</sub> | <b>0,911</b>     | Very Reliable |
| Maintenance of frames (X <sub>5</sub> )                | X <sub>5.1</sub> | <b>0,908</b>     | Very Reliable |
|  | X <sub>5.2</sub> | <b>0,909</b>     | Very Reliable |
| Electronic System Maintenance (X <sub>6</sub> )        | X <sub>6.1</sub> | <b>0,907</b>     | Very Reliable |
|  | X <sub>6.2</sub> | <b>0,909</b>     | Very Reliable |
|  | X <sub>6.3</sub> | <b>0,907</b>     | Very Reliable |
| Maintenance of the Walls of the room (X <sub>7</sub> ) | X <sub>7.1</sub> | <b>0,907</b>     | Very Reliable |
|  | X <sub>7.2</sub> | <b>0,908</b>     | Very Reliable |
|  | X <sub>7.3</sub> | <b>0,907</b>     | Very Reliable |
| Furniture Maintenance (X <sub>8</sub> )                | X <sub>8.1</sub> | <b>0,906</b>     | Very Reliable |
|  | X <sub>8.2</sub> | <b>0,907</b>     | Very Reliable |
| Classroom User Convenience (Y <sub>1</sub> )           | Y <sub>1.1</sub> | <b>0,903</b>     | Very Reliable |

Source : IBM SPSS, 2021

Based on the reliability test results attached in the table, can concluded variables/indicators of classroom maintenance of buildings A and B of the Kalimantan Institute of Technology

### 3.6. Classic Assumption Test

The below are the results of the analysis and further data testing carried out in this study.

#### a. Normality Test

The following is attached the Normality Test results which can be seen in the following

**Table 10** below:

**Table 10.** Results of the Normality Test

|         | Kolmogrov-Smirnov |     |              |
|---------|-------------------|-----|--------------|
|         | Statistic         | df  | Sig.         |
| Average | 0,051             | 348 | <b>0,265</b> |

Source : IBM SPSS, 2021

The Normality Test value can normally be distributed if the significance value is  $> 0.05$ , and it is said to not normally be distributed if the significance value is  $< 0.05$ . Based on the normality test results above, we obtained a significance value of  $0.265 > 0.05$ . can be concluded that the residual value is normally distributed.

### b. Multicollinearity Test

The following is attached the Multicollinearity Test results, which can be seen in the following **Table 11** below:

**Table 11.** Results of Multicollinearity Test

| Model            | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig.  | Collinearity Statistics |              |
|------------------|-----------------------------|------------|---------------------------|--------|-------|-------------------------|--------------|
|                  | B                           | Std. Error | Beta                      |        |       | Tolerance               | VIF          |
| 1 (Constant)     | -0,157                      | 0,123      |                           | -1,279 | 0,202 |                         |              |
| X <sub>1.1</sub> | 0,043                       | 0,022      | 0,052                     | 1,978  | 0,049 | <b>0,744</b>            | <b>1,344</b> |
| X <sub>1.2</sub> | 0,042                       | 0,022      | 0,051                     | 1,958  | 0,051 | <b>0,772</b>            | <b>1,395</b> |
| X <sub>2.1</sub> | 0,039                       | 0,021      | 0,072                     | 1,818  | 0,070 | <b>0,333</b>            | <b>3,002</b> |
| X <sub>2.2</sub> | 0,031                       | 0,025      | 0,051                     | 1,261  | 0,208 | <b>0,316</b>            | <b>3,162</b> |
| X <sub>3.1</sub> | 0,039                       | 0,018      | 0,061                     | 2,131  | 0,034 | <b>0,639</b>            | <b>1,565</b> |
| X <sub>3.2</sub> | 0,069                       | 0,020      | 0,117                     | 3,429  | 0,001 | <b>0,453</b>            | <b>2,209</b> |
| X <sub>4.1</sub> | 0,005                       | 0,023      | 0,006                     | 0,222  | 0,825 | <b>0,646</b>            | <b>1,548</b> |
| X <sub>4.2</sub> | 0,102                       | 0,022      | 0,128                     | 4,555  | 0,000 | <b>0,664</b>            | <b>1,506</b> |
| X <sub>4.3</sub> | 0,080                       | 0,023      | 0,100                     | 3,484  | 0,001 | <b>0,636</b>            | <b>1,573</b> |
| X <sub>5.1</sub> | 0,088                       | 0,025      | 0,114                     | 3,490  | 0,001 | <b>0,491</b>            | <b>2,038</b> |
| X <sub>5.2</sub> | 0,011                       | 0,026      | 0,015                     | 0,440  | 0,660 | <b>0,471</b>            | <b>2,125</b> |
| X <sub>6.1</sub> | 0,075                       | 0,020      | 0,113                     | 3,804  | 0,000 | <b>0,598</b>            | <b>1,672</b> |
| X <sub>6.2</sub> | 0,036                       | 0,017      | 0,067                     | 2,090  | 0,037 | <b>0,510</b>            | <b>1,959</b> |
| X <sub>6.3</sub> | 0,027                       | 0,021      | 0,041                     | 1,314  | 0,190 | <b>0,527</b>            | <b>1,896</b> |
| X <sub>7.1</sub> | 0,066                       | 0,024      | 0,095                     | 2,781  | 0,006 | <b>0,448</b>            | <b>2,232</b> |
| X <sub>7.2</sub> | 0,082                       | 0,023      | 0,120                     | 3,590  | 0,000 | <b>0,466</b>            | <b>2,147</b> |
| X <sub>7.3</sub> | 0,063                       | 0,024      | 0,090                     | 2,683  | 0,008 | <b>0,468</b>            | <b>2,136</b> |
| X <sub>8.1</sub> | 0,082                       | 0,026      | 0,105                     | 3,089  | 0,002 | <b>0,452</b>            | <b>2,211</b> |
| X <sub>8.2</sub> | 0,063                       | 0,028      | 0,079                     | 2,261  | 0,024 | <b>0,433</b>            | <b>2,312</b> |

a. Dependent Variable: User Comfort Level (Y)

Source : IBM SPSS, 2021

For the multicollinearity test, it can be seen in the collinearity statistics section for each independent variable having a tolerance value  $> 0.1$  and a VIF value  $< 10.00$ , can conclude that the regression model does not occur multicollinearity.

### c. Heteroscedasticity Test

Based on data processing, then the following is attached the Heteroscedasticity Test

results, which can be seen in the following **Table 12** below:

**Table 12.** Results of Heteroscedasticity Test

| Model        | Unstandardized Coefficients |            | Standardized Coefficients | T     | Sig.         |
|--------------|-----------------------------|------------|---------------------------|-------|--------------|
|              | B                           | Std. Error | Beta                      |       |              |
| 1 (Constant) | 0,172                       | 0,054      |                           | 3,198 | <b>0,202</b> |
| Maintenance  | 0,001                       | 0,001      | 0,055                     | 1,076 | 0,283        |

a. Dependent Variable: Abs\_Res

Source : IBM SPSS, 2021

For the Glejser test, the basis for decision-making is the value (Sig.) The significance between the independent variables with absolute residual  $> 0.05$  then the heteroscedasticity problem does not occur, based on the Glejser test table above the significance value is  $0.283 > 0.05$ , and it can be concluded that for the regression model, There are no problems or symptoms of heteroscedasticity.

#### d. Autocorrelation Test

Based on data processing, then the following is attached the Autocorrelation Test results which can be seen in the following **Table 13** below:

**Table 13.** Results of Autocorrelation Test

| Model  | d            | $d_l$ | $d_u$ | $4 - d_l$ | $4 - d_u$ | Decision                           |
|--------|--------------|-------|-------|-----------|-----------|------------------------------------|
| Linear | <b>1,891</b> | 1,780 | 1,864 | 2,220     | 2,136     | <b>There is no autocorrelation</b> |

Source : IBM SPSS, 2021

From the Durbin-Watson table, the value of  $d_l = 1.780$  and the value of  $d_u = 1.864$ . From the results of the Autocorrelation Test, the value of  $d = 1.891$ , this value is then compared with other values in Table 13, namely the value of  $d_l = 1.780$ , the value of  $d_u = 1.864$ , the value of  $4 - d_l = 2.220$ , and the value of  $4 - d_u = 2.136$ , from The comparison, is obtained  $1.864 (d_u) < 1.891 (d) < 2.136 (4 - d_u)$ , it is concluded that there is no autocorrelation in the regression model.

### 3.7. Multiple Linear Regression Analysis

Multiple linear regression analysis is a test used to test the effect of more than one independent variable on the dependent variable [25]. Based on data processing, then the following is attached the Multiple Linear Regression Analysis results, which can be seen in the following **Table 14** below:

**Table 14.** Results of Multiple Linear Regression Analysis (Value B)

| Model |                | Coefficients <sup>a</sup>   |            |                           |           | t     | Sig.  | Collinearity Statistics |  |
|-------|----------------|-----------------------------|------------|---------------------------|-----------|-------|-------|-------------------------|--|
|       |                | Unstandardized Coefficients |            | Standardized Coefficients | Tolerance |       |       | VIF                     |  |
|       |                | B                           | Std. Error | Beta                      |           |       |       |                         |  |
| 1     | (Constant)     | -0,210                      | 0,124      |                           | -1,687    | 0,092 |       |                         |  |
|       | X <sub>1</sub> | <b>0,098</b>                | 0,026      | 0,099                     | 3,804     | 0,000 | 0,810 | 1,234                   |  |
|       | X <sub>2</sub> | <b>0,089</b>                | 0,018      | 0,152                     | 4,933     | 0,000 | 0,579 | 1,726                   |  |
|       | X <sub>3</sub> | <b>0,110</b>                | 0,022      | 0,156                     | 5,068     | 0,000 | 0,581 | 1,722                   |  |
|       | X <sub>4</sub> | <b>0,186</b>                | 0,026      | 0,202                     | 7,251     | 0,000 | 0,713 | 1,403                   |  |
|       | X <sub>5</sub> | <b>0,083</b>                | 0,024      | 0,101                     | 3,427     | 0,001 | 0,635 | 1,574                   |  |
|       | X <sub>6</sub> | <b>0,135</b>                | 0,023      | 0,188                     | 5,906     | 0,000 | 0,548 | 1,824                   |  |

Improving User Comfort Classroom at the Kalimantan Institute of Technology with Maintenance Factors

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| Model          | Unstandardized Coefficients |            | Standardized Coefficients | t     | Sig.  | Collinearity Statistics |       |
|----------------|-----------------------------|------------|---------------------------|-------|-------|-------------------------|-------|
|                | B                           | Std. Error | Beta                      |       |       | Tolerance               | VIF   |
| X <sub>7</sub> | <b>0,208</b>                | 0,023      | 0,270                     | 8,871 | 0,000 | 0,597                   | 1,674 |
| X <sub>8</sub> | <b>0,128</b>                | 0,026      | 0,150                     | 4,876 | 0,000 | 0,586                   | 1,706 |

a. Dependent Variable: User Comfort Level (Y)

Source : IBM SPSS, 2021

From the table above, in the multiple linear regression analysis, we want to know how much influence the variable x has on the y variable if classroom maintenance activities are carried out.

### 3.8. Hypothesis Test (t Test and F Test)

Based on data processing, then the following is attached the t Test results which can be seen in the following **Table 15** below:

**Table 15.** Results of Multiple Linear Rgression Analysis (t Test)

| Model | Unstandardized Coefficients |              | Coefficients <sup>a</sup> | t     | Sig.         | Collinearity Statistics |           |
|-------|-----------------------------|--------------|---------------------------|-------|--------------|-------------------------|-----------|
|       | B                           | Std. Error   | Standardized Coefficients |       |              | Beta                    | Tolerance |
| 1     | (Constant)                  | -0,210       | 0,124                     |       | -1,687       | 0,092                   |           |
|       | X <sub>1</sub>              | <b>0,098</b> | 0,026                     | 0,099 | <b>3,804</b> | <b>0,000</b>            | 0,810     |
|       | X <sub>2</sub>              | <b>0,089</b> | 0,018                     | 0,152 | <b>4,933</b> | <b>0,000</b>            | 0,579     |
|       | X <sub>3</sub>              | <b>0,110</b> | 0,022                     | 0,156 | <b>5,068</b> | <b>0,000</b>            | 0,581     |
|       | X <sub>4</sub>              | <b>0,186</b> | 0,026                     | 0,202 | <b>7,251</b> | <b>0,000</b>            | 0,713     |
|       | X <sub>5</sub>              | <b>0,083</b> | 0,024                     | 0,101 | <b>3,427</b> | <b>0,001</b>            | 0,635     |
|       | X <sub>6</sub>              | <b>0,135</b> | 0,023                     | 0,188 | <b>5,906</b> | <b>0,000</b>            | 0,548     |
|       | X <sub>7</sub>              | <b>0,208</b> | 0,023                     | 0,270 | <b>8,871</b> | <b>0,000</b>            | 0,597     |
|       | X <sub>8</sub>              | <b>0,128</b> | 0,026                     | 0,150 | <b>4,876</b> | <b>0,000</b>            | 0,586     |

a. Dependent Variable: User Comfort Level (Y)

Source : IBM SPSS, 2021

In the t-test table, we want to know whether there is an effect of the x variable on the y variable that the classroom maintenance variable has a partial effect on user comfort. Based on data processing, then the following is attached the F-Test results, which can be seen in the following **Table 16** below:

**Table 16.** Results of Multiple Linear Rgression Analysis (F Test)

| ANOVA <sup>b</sup> |            |                |     |             |                |                    |
|--------------------|------------|----------------|-----|-------------|----------------|--------------------|
| Model              |            | Sum of Squares | df  | Mean Square | F              | Sig.               |
| 1                  | Regression | 113,142        | 8   | 14,143      | <b>183,638</b> | 0,000 <sup>a</sup> |
|                    | Residual   | 26,108         | 339 | 0,077       |                |                    |
|                    | Total      | 139,250        | 347 |             |                |                    |

a. Predictors: (Constant), Furniture Maintenance, Lighting System Maintenance, Air Conditioning System Maintenance, Room Cleanliness Maintenance, Electronic System Maintenance, Frame Maintenance, Ceiling Maintenance, Electronic System Maintenance.

b. Dependent Variable: User Comfort Level (Y)

Source : IBM SPSS, 2021

In the F test table, we want to know whether there is an effect of variable x on variable y that the classroom maintenance variable has a partial effect on user comfort.

### 3.9. Analysis of the Coefficient of Determination ( $R^2$ Test)

Based on data processing, then the following is attached the Analysis of the Coefficient of Determination ( $R^2$  Test) results which can be seen in the following **Table 17** below:

**Table 17.** Results of Multiple Linear Rgression Analysis ( $R^2$  Test)

| Model Summary |       |          |                   |                            |               |
|---------------|-------|----------|-------------------|----------------------------|---------------|
| Model         | R     | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
| 1             | 0,901 | 0,813    | 0,808             | 0,278                      | 1,912         |

- a. Predictors: (Constant), Furniture Maintenance, Lighting System Maintenance, Air Conditioning System Maintenance, Room Cleanliness Maintenance, Electronic System Maintenance, Frame Maintenance, Ceiling Maintenance, Electronic System Maintenance
- b. Dependent Variable: User Comfort Level (Y)

Source : IBM SPSS, 2021

From the Multiple Linear Regression Analysis that has it's finished, the Adjusted R Square value is 0.808. So it can be concluded that the Classroom Maintenance Variable (X) has an effect of 80.8% on the User Comfort Level (Y). The remaining percentage of 19.2% is another factor besides the variables studied in this study.

### 3.10. Dominant Test

Based on data processing, then the following is attached the Dominant Test results, which can be seen in the following **Table 18** below:

**Table 18.** The Results of Ordering Independent Variable Beta Values

| No | Variabel Bebas  | B     |
|----|---|-------|
| 1  | Maintenance of Room Walls (X <sub>7</sub> )           | 0,208 |
| 2  | Room Cleanliness Maintenance (X <sub>4</sub> )        | 0,186 |
| 3  | Electronic System Maintenance (X <sub>6</sub> )       | 0,135 |
| 4  | Furniture Maintenance (X <sub>8</sub> )               | 0,128 |
| 5  | Air Conditioning System Maintenance (X <sub>3</sub> ) | 0,110 |
| 6  | Lighting System Maintenance (X <sub>1</sub> )         | 0,098 |
| 7  | Maintenance of Ceiling (X <sub>2</sub> )              | 0,089 |
| 8  | Maintenance of Frames (X <sub>5</sub> )               | 0,083 |

Source: IBM SPSS, 2021

If the value of the Beta coefficient is getting closer to 0 then the relationship of the X variable and Y variable can be said to be getting weaker. Based on the table above, the Room Wall Maintenance Variable (X<sub>7</sub>) is the Independent Variable (X) with a Beta value of 0,208, which has the most dominant influence on Classroom User Comfort (Y).



## 4. Conclusion and Suggestion

### 4.1. Conclusion

From the research that researchers have carried out, the following conclusions were obtained:

1. Maintenance factors that affect the comfort level of classrooms A and B classroom users. Room Wall Maintenance, Room Cleanliness Maintenance, Electronic System Maintenance, Furniture Maintenance, Air Conditioning System Maintenance, Lighting System Maintenance, Ceiling Maintenance, and Maintenance Sills.
2. Classroom Maintenance Variables (X) in buildings A and B simultaneously have a significant effect on the User Comfort Level Variable (Y) with a determination coefficient of 0.808 which means that the Classroom Maintenance Variable (X) has an effect of 80.8% on the variable Classroom User Comfort (Y).
3. Room Wall Maintenance Variable (X<sub>7</sub>) is the most dominant factor affecting the Comfort Level of Classroom Users (Y) in buildings A and B. It is indicated by the room wall maintenance variable (X<sub>7</sub>) with a value of 0.208.

### 4.2. Suggestion

Based on the results obtained from the research, it's hoped that the Kalimantan Institute of Technology campus will increase its classroom maintenance activities to increase the comfort level of classroom users in buildings A and B on the Kalimantan Institute of Technology campus.

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