DETERMINATION OF PRIORITIES OF ELEMENTARY SCHOOL REHABILITATION AT ASAHAN USING SIMPLE ADDICTIVE WEIGHT

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Abstract
In the budgeting process for school building rehabilitation activities in Asahan Regency, there are still inaccuracies in selecting prioritized primary schools for rehabilitation. This study aimed to apply the Simple Additive Weighting (SAW) method to determine five primary schools that were prioritized for repair. This research method uses quantitative methods. The data source comes from the East Kisaran and West Kisaran Elementary Schools. The data were analyzed using the SAW method based on the criteria weight depending on the matrix value and normalization. The results showed the 5 largest criteria weights, namely UPTD SDN 010097 Selawan (0.940), UPTD SDN 014689 Lestari (0.884), UPTD SDN 010039 Sentang (0.880), SD Taman Kasih Karunia (0.847), and UPTD SDN 018453 Siumbut-Umbut (0.820). This study concluded that the double exponential smoothing method could make it easier to determine which primary school decisions are prioritized for rehabilitation.

Keywords: decision support; elementary school; priority; rehabilitation; simple additive weighting

INTRODUCTION
School facilities and infrastructure are components of education, which is also the main problem faced by schools (Wardani, 2021). It is due to the limitations of school facilities and the lack of good management from the manager, such as damaged school buildings, inadequate learning media, and lack of classrooms so that there is one study group placed in a multimedia room that is not by the standard of classroom size. (Sahid & Rachlan, 2019). Lack of planning in the procurement of facilities so that procurement activities often occur that do not match the specifications needed by users, uneven distribution of facilities, and lack of care and maintenance of existing infrastructure facilities (Sahid & Rachlan, 2019). Damaged school buildings can affect the quality of education for students because children are psychologically not comfortable studying in buildings that are almost collapsed (Bustari, 2016).

In budgeting for school building rehabilitation activities in Asahan Regency, there are often inaccuracies in selecting schools that need to be rehabilitated, considering that currently, the rehabilitation of primary schools is only based on

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the level of the worst damage. The factors that cause inaccuracy in budgeting are the absence of an accurate database of school conditions and a comprehensive system for determining the priority scale for handling school building maintenance. So far, the determination of the priority scale for handling school building maintenance only focuses on the criteria for the level of damage.

Schools that should be more deserving of maintenance but do not receive care. In other cases, the status of the land is not clear, but it is receiving rehabilitation. As a result, there is often an inaccuracy in determining the priority of handling the maintenance of school buildings that really must be rehabilitated, considering that currently, the rehabilitation of primary schools is only based on the level of the worst damage (Mulyadi, 2019).

The decision support system can be used as a tool to make a decision on which primary school is the priority for rehabilitation (Prasetya, 2019), so it is hoped that it can help the Asahan District Education Office in making policy decisions, to obtain valid, objective and reliable information about elementary schools that are priority rehabilitation.

The simple additive weighting (SAW) method is a decision support system that can select the best alternative from several other options because of the ranking process after determining the weight for each attribute. The simple additive weight (SAW) method is often also known as the weighted addition method. The basic concept of the simple additive weighting (SAW) method is to find the weighted sum of the performance ratings for each alternative on all attributes. The simple additive weighting (SAW) method is recommended to solve the selection problem in a multi-process decision-making system. The simple additive weighting (SAW) method is a method that is widely used in decision-making that has many attributes (Friyadie, 2016) (Lubis & Fadil, 2020). This study aims to apply the SAW method to objectively determine priority primary schools for rehabilitation in Asahan.

RESEARCH METHODS

Type of Research
This type of research is quantitative research.

Time and Place of Research
This research was conducted from February 2022 to June 2022. The study was conducted at the Department of Education in the Head of Profile. JL Ahmad Yani, Kisaran Naga.

1. Problem Identification
Problem identification is the first step in applying simple additive weighting. Problem identification aims to determine the appropriate data to be analyzed using the simple additive weighting method.

2. Method, Source, and Data Collecting
This research method is qualitative. The data used in this study is the data of the East Kisaran and West Kisaran Regional Elementary Schools. The techniques used for data collection include the following:

a) Field Research
In field research, researchers directly visit the research site and take the data needed for research. The field research was conducted using direct interviews with the Principals of Kisaran Timur and Kisaran Barat Elementary Schools.

b) Literature Research
Literature research is carried out by collecting references from journals or academic books related to the problems discussed and used as support for comparisons in thesis completion.

3. Data Collecting
At this stage, the data obtained is processed into new information that is easier to understand.

4. Data Analysis
After the data is processed, the system is analyzed using the SAW method based on the matrix value, normalization, and the number of weights as parameters in making decisions.

RESULT AND DISCUSSION

The decision support system is interactive, helping decision-making through data and decision models to solve semi-structured and unstructured problems. The basic concept of the simple additive weighting method is to find the weighted sum of the performance ratings for each alternative on all attributes (Resti, 2017).

The problems identified were the problems faced by the Asahan District Education Office. Namely, the assessment team's selection of primary schools prioritized for rehabilitation was still carried out manually, so it was inefficient to use the budget because every performance assessment always carried out procurement and doubling instruments. In addition, there is much interest in providing an evaluation of the selection of primary schools as a priority for rehabilitation so that the assessment is not carried out transparently. A decision support system, namely SAW, is needed to
overcome these obstacles. The data analyzed in this study are referred to as criteria data which can be seen in Table 1.

### Table 1. Criteria

| No. | Alternative | Criteria      |
|-----|-------------|---------------|
| 1.  | C1          | Building Age  |
| 2.  | C2          | Number of Students |
| 3.  | C3          | Operational Permit |
| 4.  | C4          | Rate of damage |
| 5.  | C5          | Facilities     |

After the criteria data was determined, the criteria conversion was carried out. Conversion of standards is the value of the existing criteria for the calculation process. Values in the conversion criteria consist of 1 to 5. Conversion criteria can be seen in Tables 2, 3, and 4.

### Table 2. Conversion of Building Age Criteria

| Building Age (Years) | Value |
|----------------------|-------|
| >6                   | 5     |
| 5-6                  | 4     |
| 4-5                  | 3     |
| 3-4                  | 2     |
| 1-2                  | 1     |

### Table 3. Conversion of Student Criteria

| Number of Students | Value |
|--------------------|-------|
| >200               | 5     |
| 151-200            | 4     |
| 101-150            | 3     |
| 51-100             | 2     |
| 10-50              | 1     |

### Table 4. Conversion of Criteria for Operational Permits

| Operational Permits (Month) | Value |
|-----------------------------|-------|
| 49-60                       | 5     |
| 37-48                       | 4     |
| 25-36                       | 3     |
| 13-24                       | 2     |
| 0-12                        | 1     |

### Table 5. Conversion of Damage Level Criteria

| Rate of Damage | Value |
|----------------|-------|
| Worst (>50%)   | 5     |
| Poor (41%-50%) | 4     |
| Pretty Good   | 3     |
| Good (21% - 30%) | 2 |
| Very Good (10 % - 20%) | 1 |

After the conversion of criteria is carried out, the standard weights are determined. See tables 5 and 6, which are useful for describing the criteria' importance. The importance of the requirements can be seen in Table 7.

### Table 7. Criteria Weight

| Alternative | Criteria      | Weight | Attribute |
|-------------|---------------|--------|-----------|
| C1          | Building Age  | 5      | Benefit   |
| C2          | Number of Students | 2  | Benefit   |
| C3          | Operational Permit | 4 | Benefit   |
| C4          | Rate of damage | 3     | Benefit   |
| C5          | Facilities     | 1     | Benefit   |

Furthermore, the name of the education unit is determined as the data to be decided by the SAW method. The decision by the SAW method is based on the value of the decision matrix. The value of the decision matrix is the value of each alternative against each criterion. The value is based on the value of the previously converted criteria. Decision makers provide alternative values based on the level of importance of each criterion needed (Setiawan, 2017). The SAW method requires normalizing the decision matrix to a scale that can be compared with all available alternative ratings. The decision matrix can be seen in Table 8.

### Table 8. Decision Matrix Value

| Code   | Alternative | C1 | C2 | C3 | C4 | C5 |
|--------|-------------|----|----|----|----|----|
| A1     | SDs Ir Ar-Reja | 3 | 4 | 4 | 4 | 4 |
| A2     | SD Taman Kasih Karunia | 5 | 4 | 4 | 4 | 4 |
| A3     | UPTD SDN 010039 Sentang | 4 | 5 | 4 | 5 | 2 |
| A4     | UPTD SDN 010086 Selawon | 5 | 3 | 3 | 5 | 3 |
| A5     | UPTD SDN 010087 Selawon | 3 | 3 | 4 | 4 | 2 |
| A6     | UPTD SDN 010088 Selawon | 4 | 4 | 5 | 4 | 4 |
| A7     | UPTD SDN 010093 Selawon | 5 | 3 | 4 | 3 | 3 |
| A8     | UPTD SDN 010096 Karang Anjer | 2 | 3 | 4 | 4 | 4 |
| A9     | UPTD SDN 010097 Selawon | 5 | 4 | 5 | 5 | 4 |
The SAW method requires the process of normalizing the decision matrix (X) to a scale that can be compared with all available alternative ratings (Susilowati et al., 2019) (Pratama et al., 2017) (Buraehar, 2020). The calculation of the normalization matrix starts from the values that have been collected from each alternative and its criteria. Normalization of this matrix is used to find the value of the performance rating on each criterion (Wiyono, 2017). Previous studies used the decision and normalization matrix to determine the ranking (Muilty, 2016). Normalization matrix values can be seen in Table 9. After obtaining the normalized matrix value, the number of weights is calculated by adding the product of the normalized matrix with the weight value. The normalized matrix values can be seen in Table 10.

| Code | Alternative | C1  | C2  | C3  | C4  | C5  |
|------|-------------|-----|-----|-----|-----|-----|
| A10  | UPTD SDN 013849 | 3   | 3   | 3   | 5   | 4   |
| A11  | UPTD SDN 013853 | 4   | 4   | 4   | 5   | 4   |
| A12  | UPTD SDN 013854 | 3   | 3   | 4   | 4   | 4   |
| A13  | UPTD SDN 013855 | 2   | 4   | 4   | 4   | 4   |
| A14  | UPTD SDN 013856 | 5   | 5   | 3   | 3   | 4   |
| A15  | UPTD SDN 014671 Sentang | 3   | 5   | 4   | 4   | 3   |
| A16  | UPTD SDN 014685 | 4   | 5   | 3   | 4   | 3   |
| A17  | UPTD SDN 014689 | 3   | 3   | 4   | 3   | 3   |
| A18  | UPTD SDN 015921 | 1   | 4   | 4   | 3   | 3   |
| A19  | UPTD SDN 017108 Sentang | 4   | 3   | 5   | 4   | 3   |
| A20  | UPTD SDN 018065 | 3   | 4   | 2   | 5   | 3   |
| A21  | UPTD SDN 018453 | 5   | 3   | 4   | 4   | 4   |
| A22  | SD Harapan Bunut | 2   | 4   | 2   | 3   | 3   |
| A23  | SD Islam Manaul Hidayah | 3   | 3   | 3   | 5   | 5   |
| A24  | SD Swasta Al Washiyah 74 | 1   | 1   | 1   | 6   | 5   |
| A25  | SD Tamam Siswa Sidodadi | 4   | 2   | 5   | 3   | 3   |
| A26  | SD Tpi Kisaran | 3   | 3   | 3   | 3   | 4   |

| Elementary School | C1  | C2  | C3  | C4  | C5  |
|-------------------|-----|-----|-----|-----|-----|
| UPTD SDN 013853  | 0.8 | 0.8 | 0.8 | 1   | 0.5 |
| UPTD SDN 013854  | 0.6 | 0.6 | 0.6 | 0.8 | 0.5 |
| UPTD SDN 013855  | 0.4 | 0.8 | 0.8 | 0.8 | 0.5 |
| UPTD SDN 013856  | 1   | 1   | 0.6 | 0.6 | 0.667|
| UPTD SDN 014671  | 0.6 | 1   | 0.8 | 0.6 | 0.567|
| UPTD SDN 014685  | 0.8 | 1   | 0.6 | 0.8 | 0.667|
| UPTD SDN 014689  | 1   | 1   | 0.8 | 0.6 | 0.667|
| UPTD SDN 015921  | 0.6 | 0.8 | 0.8 | 0.6 | 0.667|
| UPTD SDN 017108  | 0.8 | 0.6 | 1   | 0.8 | 0.667|
| UPTD SDN 018065  | 0.6 | 0.8 | 0.4 | 1   | 0.667|
| UPTD SDN 018453  | 1   | 0.6 | 0.8 | 0.8 | 1   |
| SD Harapan Bunut | 0.4 | 0.8 | 0.4 | 0.6 | 0.667|
| SD Islam Manaul Hidayah | 0.6 | 0.6 | 0.6 | 1 | 0.667|
| SD Swasta Al Washiyah 74 | 0.2 | 0.8 | 0.8 | 1 | 0.5 |
| SD Tpi Kisaran | 0.8 | 0.4 | 1 | 0.6 | 0.667|
| SD Tpi Kisaran | 0.6 | 0.6 | 0.6 | 0.6 | 0.5 |

Table 10. Total Weight
adjusted to the type of attribute so that it can obtain a normalized matrix, \( R \), and ranking as the final result, by adding the normalized matrix multiplication \( R \) with the weight vector, the largest value was selected as the best alternative (Ermin, Sunardi, & Fadil, 2020).

### CONCLUSIONS AND SUGGESTIONS

#### Conclusion

The SAW method as a decision support system can determine the priority of primary school rehabilitation at the Asahan District Education Office based on the number of weights. The SAW method states that 5 elementary schools are entitled to rehabilitation based on the largest number of weights, namely UPTD SDN 010097 Selawan (0.940), UPTD SDN 014689 Lestari (0.884), UPTD SDN 010039 Sentang (0.880), SD Taman Kasih Karunia (0.847), and UPTD SDN 018453 Siumbut-Umbut (0.820).

#### Suggestion

The SAW method should also be compared with other methods to strengthen the decision support system’s results.

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| Code | Name                      | Weigh t | Ranki ng |
|------|---------------------------|---------|----------|
| A11  | UPTD SDN 013853 Selawan   | 0.820   | 7        |
| A12  | UPTD SDN 013854 Selawan   | 0.633   | 22       |
| A13  | UPTD SDN 013855 Selawan   | 0.647   | 21       |
| A14  | UPTD SDN 013856 Selawan   | 0.780   | 10       |
| A15  | UPTD SDN 014671 Sentang   | 0.700   | 15       |
| A16  | UPTD SDN 014685 Siumbut-Umbut | 0.764 | 12       |
| A17  | UPTD SDN 014689 Lestari   | 0.884   | 16       |
| A18  | UPTD SDN 015921 Kedai Ledang | 0.684 | 9        |
| A19  | UPTD SDN 017108 Sentang   | 0.818   | 20       |
| A20  | UPTD SDN 018065 Teladan   | 0.658   | 20       |
| A21  | UPTD SDN 018453 Siumbut-Umbut | 0.820 | 5        |
| A22  | SD Harapan Bunut          | 0.511   | 26       |
| A23  | SD Islam Manbal Hidayah   | 0.684   | 18       |
| A24  | SD Swasta Al Washliyah 74 | 0.620   | 23       |
| A25  | SD Taman Siswa Sido dadi  | 0.751   | 13       |
| A26  | SD Tpi Kisaran            | 0.593   | 25       |

Based on Table 10, 5 elementary schools that deserve rehabilitation are 5 elementary schools with the 5 largest weight values, namely UPTD SDN 010097 Selawan (0.940), UPTD SDN 014689 Lestari (0.884), UPTD SDN 010039 Sentang (0.880), SD Taman Kasih Karunia (0.847), and UPTD SDN 018453 Siumbut-Umbut (0.820). The greater the number of weights, the greater the opportunity to receive the largest value was selected as the best alternative (Setiadi et al., 2018; Topadang et al., 2020). Analysis with the SAW method uses predetermined criteria to reference the ranking (Syam & Rabidin, 2019)(Helilintar, Winarno, & Fatta, 2016). The ranking process is the sum of the normalized matrix multiplication \( R \) with the preference weight vector so that the largest value is chosen as the best alternative(Subagio et al., 2017). The research stage in the application of the SAW method consists of determining the criteria that will be used as a reference in decision making, determining the suitability of each alternative for each criterion, making a decision matrix based on the criteria \( C_j \) then normalizing the matrix based on the equation

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