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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

Abstrak

Proses penganggaran kegiatan rehabilitasi gedung sekolah di Kabupaten Asahan masih terdapat ketidak tepatan dalam pemilihan sekolah dasar yang diprioritaskan untuk direhabilitasi. Tujuan penelitian ini adalah menerapkan metode Simple Additive Weighting (SAW) untuk menentukan 5 sekolah dasar yang diprioritaskan untuk direhabilitasi. Metode penelitian ini menggunakan metode kuantitatif. Sumber data berasal dari data Sekolah Dasar Daerah Kisaran Timur dan Kisaran Barat. Data dianalisis menggunakan metode SAW berdasarkan bobot kriteria yang tergantung dari nilai matriks dan normalisasi. Hasil penelitian menunjukkan 5 bobot kriteria terbesar, yaitu UPTD SDN 010097 Selawan (0,940), UPTD SDN 014689 Lestari (0,884), UPTD SDN 010039 Sentang (0,880), SD Taman Kasih Karunia (0,847), dan UPTD SDN 018453 Siumbut-Umbut (0,820). Penelitian ini menyimpulkan bahwa metode double exponential smoothing dapat mempermudah menentukan keputusan sekolah dasar yang diprioritaskan untuk direhabilitasi.

Kata kunci: dukungan keputusan; sekolah dasar; prioritas; rehabilitasi; pembobotan aditif sederhana

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 (Prasetia,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(Frieyadie, 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.

Procedures

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

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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 (31% - 40%)	3
Good (21% - 30%)	2
Very Good (10 % - 20%)	1

Table 6. Facilities Criteria

Facilities (Number of Building)	Value
1-5	5
5-10	4
10-15	3
15-20	2
>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 It Ar-Roja	3	4	4	3	3
A2	SD Taman Kasih Karunia	5	4	4	4	4
A3	UPTD SDN 010039 Sentang	4	5	4	5	2
A4	UPTD SDN 010086 Selawan	5	3	3	5	3
A5	UPTD SDN 010087 Selawan	3	3	4	4	2
A6	UPTD SDN 010088 Selawan	4	4	4	5	4
A7	UPTD SDN 010093 Selawan	5	3	4	3	3
A8	UPTD SDN 010096 Karang Anyer	2	3	4	4	4
A9	UPTD SDN 010097 Selawan	5	4	5	5	4

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Code	Alternative	C1	C2	C3	C4	C5
A10	UPTD SDN 013849 Siumbut-Umbut Baru	3	3	3	5	4
A11	UPTD SDN 013853 Selawan	4	4	4	5	4
A12	UPTD SDN 013854 Selawan	3	3	3	4	4
A13	UPTD SDN 013855 Selawan	2	4	4	4	4
A14	UPTD SDN 013856 Selawan	5	5	3	3	4
A15	UPTD SDN 014671 Sentang	3	5	4	3	4
A16	UPTD SDN 014685 Siumbut Baru	4	5	3	4	3
A17	UPTD SDN 014689 Lestari	5	5	4	4	3
A18	UPTD SDN 015921 Kedai Ledang	3	4	4	3	3
A19	UPTD SDN 017108 Sentang	4	3	5	4	3
A20	UPTD SDN 018065 Teladan	3	4	2	5	3
A21	UPTD SDN 018453 Siumbut-Umbut	5	3	4	4	4
A22	SD Harapan Bunut	2	4	2	3	3
A23	SD Islam Manbaul Hidayah	3	3	3	5	3
A24	SD Swasta Al Washliyah 74 Sidomukti	1	4	4	5	4
A25	SD Taman Siswa Sidodadi	4	2	5	3	3
A26	SD Tpi Kisaran	3	3	3	3	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)(Buraerah, 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(Mulyati, 2016). Normalization matrix values can be seen in Table 9.

Table 9. Normalization Matrix Value

Elementary School	(C1)	(C2)	(C3)	(C4)	(C5)
SDs It Ar-Roja	0,6	0,8	0,8	0,6	0,667
SD Taman Kasih Karunia	1	0,8	0,8	0,8	0,5
UPTD SDN 010039 Sentang	0,8	1	0,8	1	1
UPTD SDN 010086 Selawan	1	0,6	0,6	1	0,667
UPTD SDN 010087 Selawan	0,6	0,6	0,8	0,8	1
UPTD SDN 010088 Selawan	0,8	0,8	0,8	1	0,5
UPTD SDN 010093 Selawan	1	0,6	0,8	0,6	0,667
UPTD SDN 010096 Karang Anyer	0,4	0,6	0,8	0,8	0,5
UPTD SDN 010097 Selawan	1	0,8	1	1	0,5
UPTD SDN 013849 Siumbut-Umbut Baru	0,6	0,6	0,6	1	0,5
UPTD SDN 013853 Selawan	0,8	0,8	0,8	1	0,5
UPTD SDN 013854 Selawan	0,6	0,6	0,6	0,8	0,5
UPTD SDN 013855 Selawan	0,4	0,8	0,8	0,8	0,5
UPTD SDN 013856 Selawan	1	1	0,6	0,6	0,667
UPTD SDN 014671 Sentang	0,6	1	0,8	0,6	0,5
UPTD SDN 014685 Siumbut Baru	0,8	1	0,6	0,8	0,667
UPTD SDN 014689 Lestari	1	1	0,8	0,8	0,667
UPTD SDN 015921 Kedai Ledang	0,6	0,8	0,8	0,6	0,667
UPTD SDN 017108 Sentang	0,8	0,6	1	0,8	0,667
UPTD SDN 018065 Teladan	0,6	0,8	0,4	1	0,667
UPTD SDN 018453 Siumbut-Umbut	1	0,6	0,8	0,8	1
SD Harapan Bunut	0,4	0,8	0,4	0,6	0,667
SD Islam Manbaul Hidayah	0,6	0,6	0,6	1	0,667
SD Swasta Al Washliyah 74 Sidomukti	0,2	0,8	0,8	1	0,5
SD Taman Siswa Sidodadi	0,8	0,4	1	0,6	0,667
SD Tpi Kisaran	0,6	0,6	0,6	0,6	0,5

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.

Table 10. Total Weight

Code	Name	Weight	Ranking
A01	SDs It Ar-Roja	0,684	17
A02	**SD Taman Kasih Karunia**	**0,847**	**4**
A03	**UPTD SDN 010039 Sentang**	**0,880**	**3**
A04	UPTD SDN 010086 Selawan	0,818	8
A05	UPTD SDN 010087 Selawan	0,720	14
A06	UPTD SDN 010088 Selawan	0,820	6
A07	UPTD SDN 010093 Selawan	0,791	11
A08	UPTD SDN 010096 Karang Anyer	0,620	24
A09	**UPTD SDN 010097 Selawan**	**0,940**	**1**
A10	UPTD SDN 013849 Siumbut-Umbut Baru	0,673	19

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Code	Name	Weight	Ranking
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 Baru	0,764	12
A17	**UPTD SDN 014689 Lestari**	**0,884**	**2**
A18	UPTD SDN 015921 Kedai Ledang	0,684	16
A19	UPTD SDN 017108 Sentang	0,818	9
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 Manbaul Hidayah	0,684	18
A24	SD Swasta Al Washliyah 74 Sidomukti	0,620	23
A25	SD Taman Siswa Sidodadi	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 (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 (Cj) then normalizing the matrix based on the equation 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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