

IMPLEMENTATION OF SIMPLE ADDITIVE WEIGHTING METHOD AS A DECISION SUPPORT FOR NEW STUDENT ADMISSION IN MADRASAH ALIYAH

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Abstract

The selection or acceptance of new students is something that needs to be determined quickly. In terms of the determination of prospective new students, several considerations are needed which are quite numerous and complicated, namely, the standard of grades, school entry requirements, and policies of the government and educational institutions that often change each year. In terms of the admission of new students, students are required to come directly. During this time the process of admission test for new students is still using the manual method by filling out the answer sheet provided by the committee. The method used in determining students to be accepted is Simple Additive Weight. Determining the admission of new students using the Simple Additive Weight method, where this method provides certain criteria which have a weight value of each so that the results of the sum of the weights will get the final decision and rank the students accepted at Madrasah Aliyah named Amira and Afrilina.

Keywords: Simple Additive Weighting, Decision Support, Admission of New Students

Abstrak

Seleksi atau penerimaan siswa baru adalah sesuatu yang perlu ditentukan dengan cepat. Dalam hal penentuan calon siswa baru, beberapa pertimbangan diperlukan yang cukup banyak dan rumit, yaitu, standar nilai, persyaratan masuk sekolah, dan kebijakan pemerintah dan lembaga pendidikan yang sering berubah setiap tahun. Dalam hal penerimaan siswa baru, siswa diwajibkan untuk datang langsung. Selama ini proses penerimaan siswa baru masih menggunakan metode manual dengan mengisi lembar jawaban yang disediakan oleh panitia. Metode yang digunakan dalam menentukan siswa yang akan diterima adalah Simple Additive Weight. Dari penentuan penerimaan siswa baru menggunakan metode Simple Additive Weight, dimana metode ini memberikan kriteria tertentu yang memiliki nilai bobot masing-masing sehingga hasil penjumlahan dari bobot tersebut akan mendapatkan keputusan akhir dan peringkat siswa yang diterima di Madrasah Aliyah bernama Amira dan Afrilina.

Kata kunci: Simple Additive Weighting, Pendukung Keputusan, Penerimaan Siswa Baru

INTRODUCTION

The limited number of students who can be accommodated in this school causes the school to carry out the selection process of prospective students who have registered (Dzulhaq et al., 2017). Registration still uses the form, and can only be obtained by coming to school (Irfiani & Encep, 2017). And felt less concise, because there are 2 times the work in the system. And felt less concise, because there are 2 times the work in the system. Then if the registration (3 days) is in the middle of the quota registration period, the registration is closed (Pratama & Yustanti, 2016). Prospective

students who register each year are increasing and always exceeding the available quota, sometimes the admissions committee has difficulty in selecting and selecting prospective students to be accepted (Sopyan et al., 2016). Admission of new students only uses written tests so along with the changing times to improve the quality of good students a written test is needed to determine the non-academic achievements of prospective new students (Aulia & Oktafianto, 2014). The SAW method for the calculation process can solve the selection problem, the calculation process from several choices, and the benchmarks that become the determination. The load process for each

benchmark outlines the benefit factor for the algorithm SAW(Sunarti, 2020). During this time the process of admitting new students is still using the manual method by filling in the answer sheet provided by the committee. Some of the criteria are seen from passing the standard values determined by Madrasah Aliyah Darunnajah, passing the Imla written test, report cards, reading oral Al-Qur'an test, and also non-academic achievement, which is the last interview or interview conducted. At Madrasah Aliyah Darunnajah, the student admission process is still not deemed appropriate enough. This caused the new student admission committee to not be able to manage everything properly and felt inconvenienced because too many registered. So it is felt to be less than optimal and requires considerable time, both in preparing reports and deciding prospective new students to be accepted even though ideally the selection of prospective students must be determined as soon as possible to support the others.

Because of the need for decision support that can help to determine students who will be accepted at Madrasah Aliyah Darunnajah. The results given by this decision support can provide alternative problem-solving (Friedyadie, 2017) so that decisions are made for the better. The method used in determining students to be accepted is Simple Additive Weighting (SAW)(Widiati & Putri, 2018). This method is a weighted numbering method or a method that provides certain criteria that have a weight value of each so that the sum of the weights will get the results that become the final decision. The aim is to produce fast, permanent, and accurate information about students who will be accepted by Madrasah Aliyah Darunnajah.

RESEARCH METHODS

Types of research

This research study will be about the decision support that can help to determine students who will be accepted.

Time and Place of Research

The study was conducted during the process of student admission to Madrasah Aliyah in Darunnajah.

Research subject

In this study, researchers used non-probability sampling techniques by taking samples using purposive sampling. The population accepted at Madrasah Aliyah Darunnajah was 400 students, and the sample taken was 7 students. The Simple

Additive Weight (SAW) method is a multi-criteria decision-making method. By calculating quantitatively with Simple Additive Weight (SAW). This study is an alternative to student acceptance at Madrasah Aliyah namely

K1 = Andini, K2 = Azis, K3 = Dessy, K4 = Diamond, K5 = Amira, K6 = Daffa, K7 = Afrilina.

Data, Instrument, and Data Collection Techniques

The author uses a suitable list technique (checklist) is a list that contains the subject and aspects to be observed. A checklist can guarantee that the researcher records every event that is considered important. Aspects noted in this case the decisive criteria for student acceptance at Madrasah Aliyah are (Imla written test, report card grades, oral reading al-Qur'an, non-academic achievement, and interviews

All prospective students in and outside the Jakarta area are required to come directly to take the test to Madrasah Aliyah Darunnajah, the new admissions committee cannot manage everything properly and feels inconvenienced because too many students register using the Simple Additive Weighting (SAW) method in determining the prospective Madrasah Aliyah students accepted at Darunnajah. It can help the committee in the process of accepting new students. Conduct research on each criterion for the acceptance of new students. Using the Simple Additive Weighting (SAW) method in determining the admission of new students.

RESEARCH RESULTS AND DISCUSSION

In the hierarchy of new student admission decisions, there is a relationship between goals, criteria, and alternatives. The relationship can be described as follows:

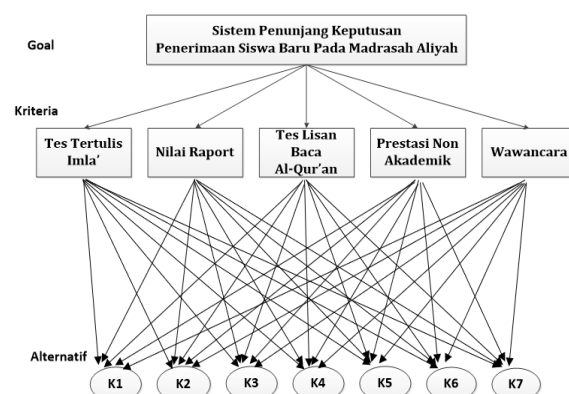


Figure 1. Alternative Hierarchical Structure Determination of New Student Acceptance

Determination of Criteria for the Simple Additive Weight (SAW) Method

Determination of the criteria in the Simple Additive Weight (SAW) method there are criteria needed to determine the admission of new students, namely:

Table 1. Criteria for admission of new students

No	Code	Description
1	C1	Imla Written Test
2	C2	Report Card Value
3	C3	Oral Reading Test Al-Qur'an
4	C4	Non-Academic Achievement
5	C5	Interview

From Table 1 these criteria, a level of importance is made based on the specified weight and scale values and compared to the weighting table as follows:

a. Imla Written Test

In the Imla Written Test criteria 'the more obvious and correct Arabic writing, the better the value obtained. Here is table 2:

Table 2. Imla Written Test Assessment

Criteria	Range	Scale	Weight
Very low	0-40	1	0.2
Low	50-55	2	0.4
Enough	60-70	3	0.6
High	75-80	4	0.8
Very high	85-100	5	1

b. Report Card Value Report Card Value is a requirement needed to make decisions the better the report card value, the greater the value obtained. Here is the table 3:

Table 3. Table report cards report cards

Criteria	Range	Scale	Weight
Very low	0-40	1	0.2
Low	50-55	2	0.4
Enough	60-70	3	0.6
High	75-80	4	0.8
Very high	85-100	5	1

c. Oral Reading Test Al-Qur'an

The oral test of reading the Qur'an is a requirement that is needed to make a decision, the smoother the reading of the Qur'an is and the clearer the letter makhraj, the higher the value obtained. Here is the table 4:

Table 4. Oral Reading Test Al-Qur'an

Criteria	Range	Scale	Weight
Very low	0-40	1	0.2
Low	50-55	2	0.4
Enough	60-70	3	0.6
High	75-80	4	0.8
Very high	85-100	5	1

d. Non-Academic Achievement

Non-academic achievement is a supporting achievement and includes the requirements needed to make decisions. Here is the table:

Table 5. Non-Academic Achievement

Criteria	Range	Scale	Weight
Very low	0-40	1	0.2
Low	50-55	2	0.4
Enough	60-70	3	0.6
High	75-80	4	0.8
Very high	85-100	5	1

e. Interview

In the interview criteria, where the better the interview, the greater the value obtained. Here is the table 6:

Table 6. Interview Test

Criteria	Range	Scale	Weight
Very low	0-40	1	0.2
Low	50-55	2	0.4
Enough	60-70	3	0.6
High	75-80	4	0.8
Very high	85-100	5	1

Determined based on the main requirements or criteria above, the preference weights (W) are as follows:

1. $W_1 = \text{Imla Test Written} (30\%) = 0.3$
2. $W_2 = \text{Report Card Value} (20\%) = 0.2$
3. $W_3 = \text{Oral Reading Test Qur'an} (20\%) = 0.2$
4. $W_4 = \text{Non Academic Achievement} (15\%) = 0.15$
5. $W_5 = \text{Interview} (15\%) = 0.15$

In determining the acceptance of new students by the Simple Additive Weight (SAW) method based on the above criteria, Table 7 the following data are obtained, as seen in Table 7:

Table 7. Value of each criterion

		Criteria				
		Report				
No	Name	Imla'	Card	TBQ	PN	Interview
1	Andini	85	75	80	80	85
2	Azis	75	85	70	70	80
3	Dessy	60	65	50	80	80
4	Intan	50	70	40	60	70
5	Amira	90	95	85	80	90
6	Daffa	60	70	55	65	60
7	Afrilina	95	90	80	70	90

Make a Decision Matrix Based on Criteria (Ci)

The values from the results of the match table are then made into a matrix as follows:

$$X = \begin{pmatrix} 1 & 0.8 & 0.8 & 0.8 & 1 \\ 0.8 & 1 & 0.6 & 0.6 & 0.8 \\ 0.6 & 0.6 & 0.4 & 0.8 & 0.8 \\ 0.4 & 0.6 & 0.2 & 0.6 & 0.6 \\ 1 & 1 & 1 & 0.8 & 1 \\ 0.6 & 0.6 & 0.4 & 0.6 & 0.6 \\ 1 & 1 & 0.8 & 0.6 & 1 \end{pmatrix}$$

Matrix Normalization

Make a Normalized Matrix based on an equation that is adjusted to the type of attribute (profit attribute or ordinary attribute) so that the normalized matrix R. See Table 8 below.

Table 8. Determination of Benefit or Cost		
Criteria	Benefit	Cost
Imla Written Test '	✓	
Report Card Value	✓	
Oral Reading Test Al-Qur'an	✓	
Non-Academic Achievement		✓
Interview		✓

Determine R using the following formula:

$$rij = \begin{cases} \frac{xij}{\max xij} & \text{If } j \text{ is the profit attribute (benefit)} \\ \frac{\min xij}{xij} & \text{If } j \text{ is the profit attribute (cost)} \end{cases} \dots\dots (1)$$

Information :

Max xij = The biggest value of each criterion i.

Min xij = The smallest value of each criterion i.

Xij = attribute value owned by each criterion

1. For Imla Written Test Criteria '

R11, R51, dan R71=1

R21=0.8

R31, R61= 0.6

R41=0.4

So for R11, R51, and R71 has a value of 1 R21 has a value of 0.8 then for R31, R61 has a value of 0.6 and R41 has a value of 0.4.2.

2. For Report Card Value Criteria

R12=0.8

R22, R52, dan R72=1

R32, R42, dan R62=0.6

So R12 has a value of 0.8 for R22, R52, and R72 has a value of 1 then for R32, R42, and R62 has a value of 0.6.

3. For Oral Reading Test Al-Qur'an Criteria

R13, dan R73= 0.8

R23=0.6

R33 dan R63 =0.4

R43=0.2

R53 =1

Then for R13, and R73, has a value of 0.8 for R23 has a value of 0.6 then for R33, and R63 has a value of 0.4 and for R43 have a value of 0.2 and for R53 = 1

4. For Non-Academic Achievement Criteria

R14, R34 dan R54 =0.75

R24, R44, R64 dan R74=1

So R14, R34 and R54 have a value of 0.75 and R24, R44, R64, and R74 have a value of 1.

5. For Interview Criteria

R15, R55, dan R75=0.6

R25, dan R35=0.75

R45, dan R65 =1

Then for R15, R55, and R75, they have a value of 0.6 and for R25, and R35 have a value of 0.75 and for R45, and R65 have a value of 1.

From the above calculation, the R matrix is obtained as follows:

$$R = \begin{pmatrix} 1 & 0.8 & 0.8 & 0,75 & 0,6 \\ 0.8 & 1 & 0.6 & 1 & 0.75 \\ 0.6 & 0.6 & 0.4 & 0,75 & 0.75 \\ 0.4 & 0.6 & 0.2 & 1 & 1 \\ 1 & 1 & 1 & 0,75 & 0.6 \\ 0.6 & 0.6 & 0.4 & 1 & 1 \\ 1 & 1 & 0.8 & 1 & 0.6 \end{pmatrix}$$

Determination of the Match Rating of Each Alternative With Every Criteria

In determining the suitability rating each criterion is entered into a match rating table that has been adjusted to the value of the criteria table. The match rating in Table 9 can be seen as follows:

Table 9. Match Ratings

No	Name	Criteria				
		Imla'	Report Card	TBQ	PN	Interview
1	Andini	1	0.8	0.8	0.8	1
2	Azis	0.8	1	0.6	0.6	0.8
3	Dessy	0.6	0.6	0.4	0.8	0.8
4	Intan	0.4	0.6	0.2	0.6	0.6
5	Amira	1	1	1	0.8	1
6	Daffa	0.6	0.6	0.4	0.6	0.6
7	Afrilina	1	1	0.8	0.6	1

Define Ranking

To find the value of each student revealed passing the new student admission test, determine rank by using the following formula:

$$Vi = \sum_{j=1}^n w_j \cdot rij \quad (2)$$

information :

Vi = ranking for each alternative

Wj = the weight value of each criterion

rij = normalized performance rating value

Determining the value of V1 up to V7 is as follows:

$$V1 = 0,82$$

$$V2 = 0,82$$

$$V3 = 0,60$$

$$V4 = 0,44$$

$$V5 = 0,91$$

$$V6 = 0,54$$

$$V7 = 0,90$$

From the results of the calculation of Vi of each student who will be accepted the ranking determination table 10 can be made as follows:

Table 10 Final Values

No	Name	Criteria					Result	Percentage (%)
		Imla'	Report Card	TBQ	PN	Interview		
		30%	20%	20%	15%	15%		
1	Amira	0,3	0,2	0,2	0,11	0,09	0,91	91
2	Afrilina	0,3	0,2	0,16	0,15	0,09	0,90	90
3	Andini	0,3	0,16	0,16	0,11	0,09	0,82	82
4	Azis	0,24	0,2	0,12	0,15	0,11	0,82	82
5	Daffa	0,18	0,12	0,08	0,15	0,15	0,68	68
6	Dessy	0,18	0,12	0,08	0,11	0,11	0,54	54
7	Intan	0,12	0,12	0,04	0,15	0,15	0,44	44

From the determination of the acceptance of new students using the Simple Additive Weight (SAW) method, the highest value for students accepted at Madrasah Aliyah Darunnajah is Amira with a percentage of 91% and Afrilina with a percentage of 90%. Next below is Figure 2 Graphic Final Value Determination of New Student Acceptance.

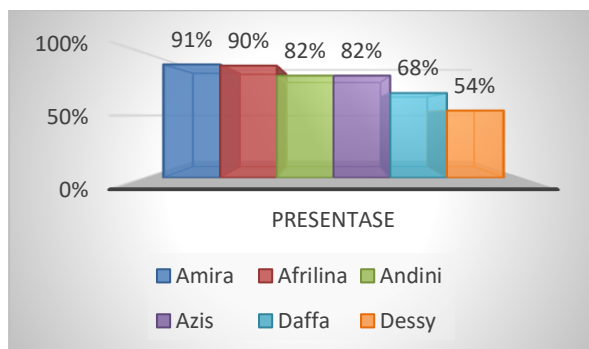


Figure 2. Graphic Final Value Determination of New Student Acceptance

CONCLUSIONS AND SUGGESTIONS

Conclusion

From the determination of admission of new students using the Simple Additive Weight (SAW) method, then based on ranking, the highest value can be obtained with the percentage for students who are accepted at the Aliyah Darunnajah Madrasah named Amira with a percentage of 91% and Afrilina with a percentage of 90%.

Suggestion

It is expected that the next research will add criteria for determining student acceptance by adding criteria and alternatives and using other methods such as profile matching, AHP, weighted product, and electric.

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