

FUZZY LOGIC FOR DETERMINING THE SUITABILITY OF BOARDING HOUSES BASED ON DESIRED CRITERIA USING THE SAW METHOD


Nurul Rachmawati ^{1*}, Maulida Lutfiyanti ², Zulfa Aulia Fadilla ³,
Mohamad Tafrikan ⁴

¹²³Undergraduate Department of Mathematics, Faculty of Science and Technology, Universitas Islam Negeri Walisongo Semarang

Jl. Prof. Dr. Hamka No. 3, Ngaliyan District, Semarang 50185, Indonesia

⁴Department of Mathematics, Faculty of Science and Technology, Universitas Islam Negeri Walisongo Semarang
Jl. Prof. Dr. Hamka No. 3, Ngaliyan District, Semarang 50185, Indonesia

Corresponding author's e-mail: [*nurul_rachmawati_2008046038@walisongo.ac.id](mailto:nurul_rachmawati_2008046038@walisongo.ac.id)

Article Info	ABSTRACT
<p>Article History: Received: 2026-03-009 Revised: 2026-04-18 Accepted: 2026-04-226 Available online: 2026-04-28</p> <p>Keywords: Fuzzy; Boarding house; Simple Additive Weighting (SAW)</p>	<p>Determining a boarding house that matches students' preferences requires defining criteria and weights as references in the decision support system for selecting the appropriate boarding house. Questionnaire results on boarding houses around Universitas Islam Negeri Walisongo are used by the majority of boarding house seekers to choose a place to stay. One method used is Simple Additive Weighting (SAW), which is a decision support method based on the weighted sum of alternatives. The SAW method was chosen because it is capable of providing ranked recommendations based on the desired criteria, so that the expected results are sufficiently accurate. A previous study by Amirillah et al., with the same theme of determining boarding house suitability, found that the application of fuzzy logic using the Mamdani method was effectively applied in determining boarding house suitability.</p>
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1. INTRODUCTION

Human resources are the most important resources for an organization. This is because human resources affect efficiency and effectiveness. Questionnaire results on boarding houses around Universitas Islam Negeri Walisongo are used by the majority of boarding house seekers to choose a place to stay. These criteria include price, distance, facilities, and type of boarding house. Meanwhile, boarding house owners can only distribute brochures typically displayed at the boarding house gate. In terms of time and cost, the search method and boarding house owners are considered less effective [1].

Determining a boarding house that matches students' preferences requires defining criteria and weights as references in the decision support system for selecting the appropriate boarding house [2]. One of the methods used is Simple Additive Weighting (SAW), which is a decision-making approach based on the weighted summation of alternatives. The application of this method influences the data processing stage and enables the generation of more reliable evaluation results. SAW is chosen because it is capable of providing ranking recommendations based on the specified criteria, resulting in relatively accurate outcomes [3]. Fuzzy logic has been widely applied in various fields, including prediction and decision-making [4][5][6], as well as in the context of criteria-based housing selection [7][8].

According to Sri Kusumadewi [9] and Muslihudin and A. Wulan Arumita [10], the steps involved in the Simple Additive Weighting method, which are also applied in studies related to boarding house selection systems [7][8], are described as follows:

1. Determining the criteria that will serve as references in decision making, namely C_i .
2. Determining the compatibility rating of each alternative for each criterion.
3. Creating a decision matrix based on the criteria (C_i), then normalizing the matrix based on equations adjusted to the attribute type (benefit attribute or cost attribute) to obtain the normalized matrix R .
4. The final result is obtained from the ranking process, which is the sum of the multiplication of the normalized matrix R with the weight vector, resulting in the largest value selected as the best alternative (A_i) as the solution.

2. RESEARCH METHODS

2.1 Research Steps

To conduct the research, steps are required as can be seen in Figure 1 below.

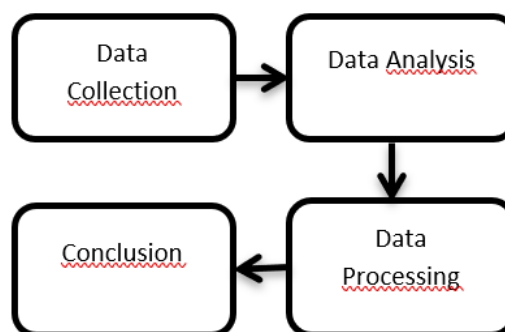


Figure 1. Research Steps

2.2 Data Collection Method

Sugiyono stated that "An interview is a meeting between two people to exchange ideas and information through questions and answers, so that meaning can be concentrated on a particular topic. The main characteristic of an interview is direct contact through face-to-face interaction between the information seeker (interviewer) and the information source (interviewee)." [3][11]

Interview is one of the most commonly used data collection methods in social research. Mita Rosaliza stated that “Interviews are used to obtain information for primary data purposes, including facts, feelings, beliefs, desires, and whatever is needed to fulfill the research objectives.” [10] To obtain objective and accurate information, each interviewer must be able to establish a good rapport with the interviewee. In this interview, the researcher conducted direct question-and-answer sessions with students residing in boarding houses in the Ngaliyan area of Semarang.

3. RESULTS AND DISCUSSION

3.1 Research Results

There are 10 locations that will serve as alternatives, namely:

- A₁ = Bu Kenuk Boarding House
- A₂ = Bu Riyanti Green Boarding House
- A₃ = Sukono Boarding House
- A₄ = BPM Sri Kustinah Boarding House
- A₅ = Kimi Boarding House
- A₆ = Bpk Paidjo Boarding House
- A₇ = Que Boarding House
- A₈ = Bariklana Boarding House
- A₉ = Biru Putri Boarding House
- A₁₀ = Pak Mustajah Boarding House

There are 5 criteria used as references in decision making, namely:

- C₁ = Monthly boarding house price
- C₂ = Distance from boarding house to campus
- C₃ = Travel time from boarding house to campus
- C₄ = Room size
- C₅ = Distance from the nearest food stall

Based on the interview results with students residing in boarding houses in the Ngaliyan area of Semarang, the data can be seen in Table 1.

Table 1. Compatibility Rating of Each Alternative for Each Criterion

A	C ₁ (thousand)	C ₂ (km)	C ₃ (minutes)	C ₄ (m ²)	C ₅ (m)
A ₁	400	1,6	6	12,25	5
A ₂	350	2	7	7,5	400
A ₃	300	1	1	9	50
A ₄	350	1	4	9	300
A ₅	450	2	7	9	5
A ₆	800	1,4	5	9	1
A ₇	500	1	4	12	500
A ₈	550	1,2	2	21	300
A ₉	330	1	7	12	1
A ₁₀	600	1	5	16	300

The decision making provides preference weights as can be seen in Table 2.

Table 2. Weight Values for Each Criterion

Criterion	Weight Value	Level of Importance
C ₁	5	Very important
C ₂	5	Very important
C ₃	4	Important
C ₄	3	Moderately important
C ₅	4	Important

3.2 Discussion

The decision matrix is formed from Table 1, as follows:

$$X = \begin{bmatrix} 400 & 1,6 & 6 & 12,25 & 5 \\ 350 & 2 & 7 & 7,5 & 400 \\ 300 & 1 & 1 & 9 & 50 \\ 350 & 1 & 4 & 9 & 300 \\ 450 & 2 & 7 & 9 & 5 \\ 800 & 1,4 & 5 & 9 & 1 \\ 500 & 1 & 4 & 12 & 500 \\ 550 & 1,2 & 2 & 12 & 300 \\ 330 & 1 & 7 & 12 & 1 \\ 600 & 1 & 5 & 16 & 300 \end{bmatrix}$$

Figure 2. Decision Matrix

First, we determine the type of criteria, as shown in Table 3.

Table 3. Criterion Type

Criterion	Criterion Type
C ₁	Cost
C ₂	Cost
C ₃	Cost
C ₄	Benefit
C ₅	Cost

Thus, the normalized matrix R is obtained as follows:

$$R = \begin{bmatrix} 0,7500 & 0,6250 & 0,1667 & 0,7656 & 0,2000 \\ 0,8571 & 0,5000 & 0,1429 & 0,4688 & 0,0025 \\ 1,0000 & 1,0000 & 1,0000 & 0,5625 & 0,0200 \\ 0,8571 & 1,0000 & 0,2500 & 0,5625 & 0,0033 \\ 0,6667 & 0,5000 & 0,1429 & 0,5625 & 0,2000 \\ 0,3750 & 0,7142 & 0,2000 & 0,5625 & 1,0000 \\ 0,6000 & 1,0000 & 0,2500 & 0,7500 & 0,0020 \\ 0,5454 & 0,8333 & 0,5000 & 0,7500 & 0,0033 \\ 0,9090 & 1,0000 & 0,1429 & 0,7500 & 1,0000 \\ 0,5000 & 1,0000 & 0,2000 & 1,0000 & 0,0033 \end{bmatrix}$$

Figure 3. Normalized Matrix R

The preference value for each alternative (V_i) is given as:

$$V_i = \sum_{j=1}^n w_j r_{ij} \quad (1)$$

The results of equation (1) can be seen in Table 4 below:

Table 4. Ranking

Alternative	Result	Ranking
A ₁	10,6385	8
A ₂	8,7734	10
A ₃	15,6955	2
A ₄	11,9865	3
A ₅	8,8923	9
A ₆	11,9339	4
A ₇	11,2580	6
A ₈	11,1573	7
A ₉	16,3669	1
A ₁₀	11,3133	5

4. CONCLUSION

Rank 1 belongs to A₉, rank 2 belongs to A₃, and rank 3 belongs to A₄, so alternatives A₉, A₃, and A₄ are selected as the top three best alternatives. In other words, Biru Putri Boarding House, Sukono Boarding House, and BPM Sri Kustinah Boarding House are selected as the most suitable boarding house locations based on the desired criteria.

Future research can be conducted by adding other criteria and weight values desired by boarding house seekers. This research can also be further developed using other methods as a comparison to determine which method performs better [13][14][15].

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