# DECISION SUPPORT SYSTEM FOR SELECTING BOARDING HOUSES IN SETIABUDI AREA JAKARTA USING SAW METHOD

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***Abstract –*** *This study aims to build a decision support system for selecting a boarding house that helps the general public, especially students of the Perbanas Institute, determine a boarding house that fits the desired criteria in the area of Setiabudi Jakarta. The method used in this study is Simple Additive Weighting (SAW), with the criteria used being cost, distance, facilities, and room size. The study results indicate that the system has proven effective in helping to select a boarding house based on predetermined criteria and suitability with the desires of prospective buyers. The SAW method has proven robust and effective in developing a Decision Support System (DSS) for selecting a boarding house. The method's ability to handle multiple criteria, incorporate user preferences, and provide comparative analysis makes it valuable in helping individuals make boarding house choices.*

*Keywords: decision support system, DSS, simple additive weighting, SAW, rent house,*

## I. INTRODUCTION

The increasing population in an area will, in turn, lead to a growing need for housing. Jakarta, as a large city with a diverse population, strives to ensure a sufficient supply of housing, both in terms of the number of units available and the price. This includes the Setiabudi District in South Jakarta. One form of housing that addresses this challenge is boarding houses, better known as kos-kosan. (Januari et al., 2024).

In interviews, Perbanas Institute students stated that the majority live with their parents, but their accommodation is quite far from campus. The interviewed students complained about the need for boarding houses due to a lack of information regarding suitable boarding locations. As students studying at a campus quite far away, their daily life is greatly influenced by mobility factors. The choice to live in a boarding house was made to minimize travel time and be closer to the academic environment. The challenge faced by students is the difficulty in obtaining information about boarding locations near campus. As a new student or someone unfamiliar with the environment, this can make it difficult to find a strategic boarding location. Often, there are hidden places that provide strategic boarding houses that suit students' needs. Currently, there is no system that can assist students in finding strategic boarding houses. The lack of information about the surrounding area often results in students finding less convenient prices or locations.

A boarding house is a service that offers a room or other accommodation for a set fee for a specific period. The word "kos" is actually derived from the Dutch phrase "In de kos," but now the Indonesian public shortens it to simply "kos." This service isn't free; it requires a set fee for each period, usually calculated monthly.

A computer-based decision support system aims to assist decision-makers in selecting boarding houses with accurate calculations. Several methods that can be used to complete the boarding house selection decision support process include: TOPSIS (Imran et al., 2024; Pramudita et al., 2024), Fuzzy

Mamdani (Hasanah et al., 2022), WASPAS (Masangin & Djahi, 2021), AHP-WP (Ibrahim & Soebroto, 2023), SAW (Dhiki, 2022; Ramadhani et al., 2022). In this study, the Simple Additive Weighting (SAW) method was chosen to complete the research due to its advantages in ease of implementation and interpretation, as well as its ability to efficiently address calculation complexity. The final decision is entirely left to the user.

The criteria focused on in this study involve factors considered crucial in selecting a boarding house. Criteria frequently considered in boarding house selection include price/rental costs (Hasanah et al., 2022; Ibrahim & Soebroto, 2023; Imran et al., 2024; Masangin & Djahi, 2021; Pramudita et al., 2024; Ramadhani et al., 2022), Location/Distance (Hasanah et al., 2022; Ibrahim & Soebroto, 2023; Imran et al., 2024; Masangin & Djahi, 2021; Pramudita et al., 2024; Ramadhani et al., 2022), Facility (Dhiki, 2022; Hasanah et al., 2022; Ibrahim & Soebroto, 2023; Imran et al., 2024; Masangin & Djahi, 2021; Pramudita et al., 2024; Ramadhani et al., 2022), Size/Area (Hasanah et al., 2022; Masangin & Djahi, 2021; Pramudita et al., 2024), Security (Dhiki, 2022; Hasanah et al., 2022; Imran et al., 2024; Masangin & Djahi, 2021; Pramudita et al., 2024; Ramadhani et al., 2022), Cleanliness (Dhiki, 2022; Imran et al., 2024; Masangin & Djahi, 2021), and the Environment Around the Boarding House (Ibrahim & Soebroto, 2023; Ramadhani et al., 2022).

The Simple Additive Weighting (SAW) method assigns a weight value to each attribute, which then selects the best alternative from a number of others. This method produces more precise and accurate results because it uses predetermined criteria, resulting in more precise results for boarding houses that meet the desired criteria. (Satryawati et al., 2023). This study aims to build a decision support system for selecting boarding houses in the Setiabudia area of Jakarta that can help the community, especially Perbanas Institute students, in choosing boarding houses that meet the established criteria.

## II. METHODS

This research uses a quantitative descriptive research method (Sudipa et al., 2023), this is an analysis of data from boarding houses within the Perbanas Institute, South Jakarta. The data collection method consists of statements about criteria related to boarding houses. The observation stage is the process of collecting data through direct observation or research of the objects being studied in the field and selecting appropriate data to serve as research sources. The boarding house analysis data will be processed using the Simple Additive Weighting method (Nurlaela & Usanto, 2021). *Simple Additive Weighting* is expected to produce results based on criteria that align with the user's final decision.

This study uses the SAW method (Bachtiar & Fendy, 2023; Kusumaningtyas et al., 2020; Manalu et al., 2022). An example of the SAW method calculation formula is:

$$r_{ij} = \begin{cases} \dfrac{x_{ij}}{max\ x_{ij}} & ,If\ j\ is\ atribute\ (benefit) \\ \dfrac{min\ x_{ij}}{x_{ij}} & ,If\ j\ is\ atribute\ (cost) \end{cases}$$

Note:
• Benefit = the greater the value, the better
• Cost = the smaller the value the better
• Max xij= maximum/very large value in row i column j
• Min xij= minimum/very small value in row i column j
• Rij = Normalized performance rating
• xij= Value in row i and column

$$V_j = \sum_{j}^{i} = 1\, w_j r_{ij}$$

Note:
• Vi = Total preference value per alternative
• Wj = Author-defined weighted score
• Rij = Normalized performance rating score
The highest Vi score will be selected as the best alternative.

The SAW method is also clearer or more transparent in its implementation, which is beneficial in research, allowing users to understand how the DSS works and rationalize the final results. The SAW method is also less demanding on computer resources and is an effective method when alternatives have multiple criteria. Furthermore, the SAW method is dynamic or flexible, making it a versatile method (Satryawati et al., 2023).

## III. RESULTS AND DISCUSSION

In this research method, there are weights and criteria needed to determine the desired boarding house. The criteria are:

Table 1 Criteria

| Code | Criteria |
|---|---|
| C1 | Cost |
| C2 | Distance |
| C3 | Facility |
| C4 | Room Size |

From these criteria, a level of importance is determined based on the weight values assigned to fuzzy numbers. The suitability rating for each alternative for each criterion is as follows:

Table 2 Criteria Weight

| Weight | Value |
|---|---|
| Very Low | 1 |
| Low | 2 |
| Average | 3 |
| High | 4 |
| Very High | 5 |

Decision makers assign weights, based on the level of importance of each required criterion.

Table 3 Weight Vector

| Criteria | Weight |
|---|---|
| C1 | 5 |
| C2 | 2 |
| C3 | 3 |
| C4 | 3 |

W = (5,2,3,3)

The following are alternatives that have scores on each established criterion. This helps in assessing and comparing these alternatives to determine the most optimal one.

Table 4 Criteria Alternative

| Alternative | Criteria | | | |
|---|---|---|---|---|
| | C1 | C2 | C3 | C4 |
| Rent 1 | 4 | 3 | 3 | 2 |
| Rent 2 | 3 | 3 | 2 | 4 |
| Rent 3 | 5 | 4 | 4 | 2 |

$$X_{Kos} = \begin{pmatrix} 4 & 3 & 3 & 2 \\ 3 & 3 & 2 & 4 \\ 5 & 4 & 4 & 2 \end{pmatrix}$$

The process of calculating the normalization matrix continues. The results of this calculation are entered into a table, this time called the normalized factor table.

Table 5 Normalization Calculation

| Alternatif | Kriteria | | | |
|---|---|---|---|---|
| | C1 | C2 | C3 | C4 |
| Rent 1 | 0.75 | 1 | 0.75 | 0.5 |
| Rent 2 | 1 | 1 | 0.5 | 1 |
| Rent 3 | 0.6 | 0.75 | 1 | 0.5 |

$$R_{Kos} = \begin{bmatrix} 0{,}75 & 1 & 0{,}75 & 0{,}5 \\ 1 & 1 & 0{,}5 & 1 \\ 0{,}6 & 0{,}75 & 1 & 0{,}5 \end{bmatrix}$$

$$w = (5,2,3,3)$$

Once we have a table like this, we multiply each column in the table by the criteria weight we determined earlier. The formula is as follows:

VRent1 = (5*0,75)+(2*1)+(3*0,75)+(3*0.5) = 9,5
VRent2 = (5*1)+(2*1)+(3*0,5 )+(3*1) = 11,5
VRent3 = (5*0,6)+(2*0,75)+(3*1)+(3*0,5) = 9

The final step is the ranking process based on the largest V value. The ranking results are as follows:

Table 6 Ranking

| Alternative | Preference Value Vi | Ranking |
|---|---|---|
| Rent 1 | 9.5 | 2 |
| Rent 2 | 11.5 | 1 |
| Rent 3 | 9 | 3 |

Table 6 shows the ranking of alternatives. The higher the final score, the greater the chance of being recommended as a boarding house. The table presents data showing that boarding house alternative 2 ranks first, with a superior score compared to the previous two alternatives. The calculation results indicate that boarding house alternative 2 meets the expected criteria and meets the voter's wishes.

Figure 1. Depicts a use case diagram of the SAW application, consisting of two users: the voter and the admin. The voter's role is to provide data and view calculation results. The data provided by the voter is processed by the admin. The admin also has the task of managing data such as alternative data, criteria data, and managing user data.

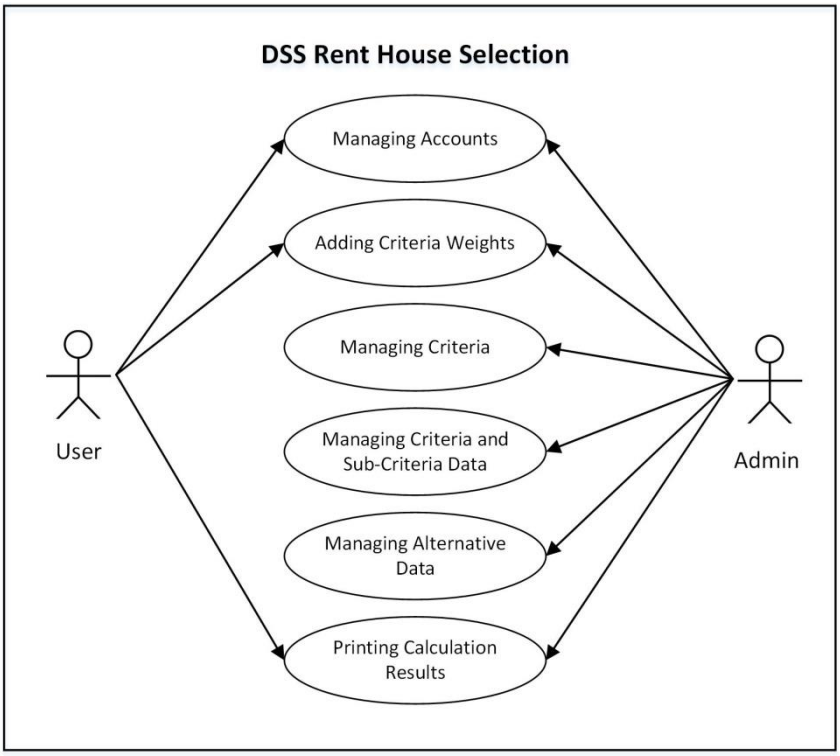


Fig 1. Usecase Diagram of SPK for Rent House Selection

The following illustrates the process of selecting a boarding house using the SAW method, implemented in an application. In this application, users can utilize the SAW method to search for boarding houses according to their needs and criteria.

After logging in, they will be directed to a page where the admin user can manage criteria data. The admin user can add, edit, and delete criteria data.

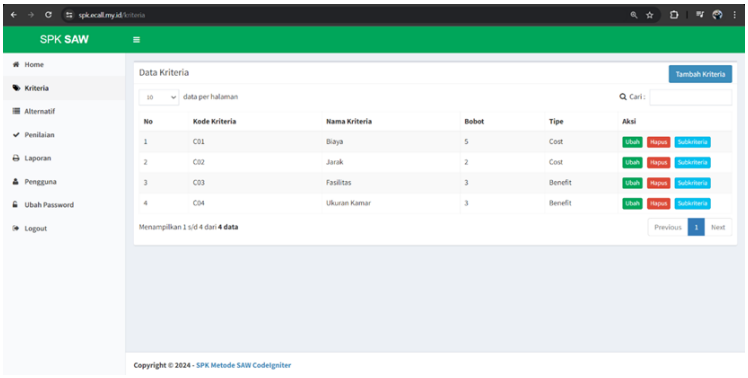


Fig 2. Selection Criteria Page

The following display is a display for the user which displays the criteria and the user process for determining the criteria weight.

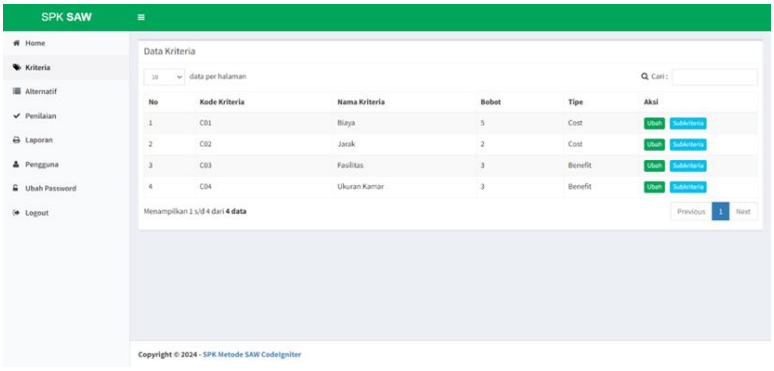


Fig 3. Criteria Weight Page

Admin users can also manage alternative data, which will be used as material after adding and managing alternative data.

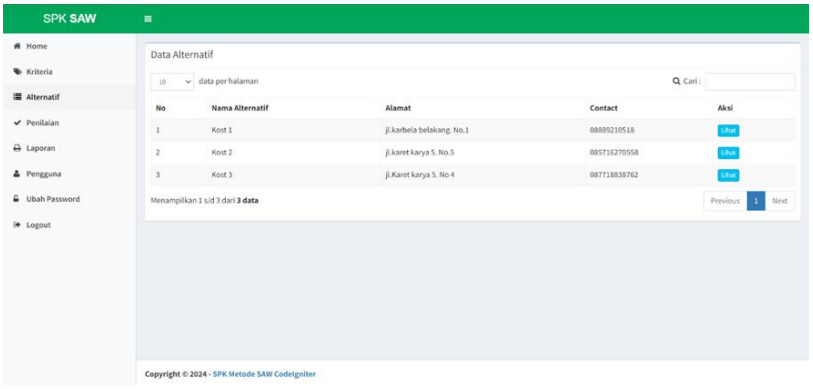


Fig 4. Alternative Rent House Page

The following display is a display of the calculation with a detailed explanation, where the calculation process is displayed comprehensively and in stages, where a voter can see the calculation process and stages.

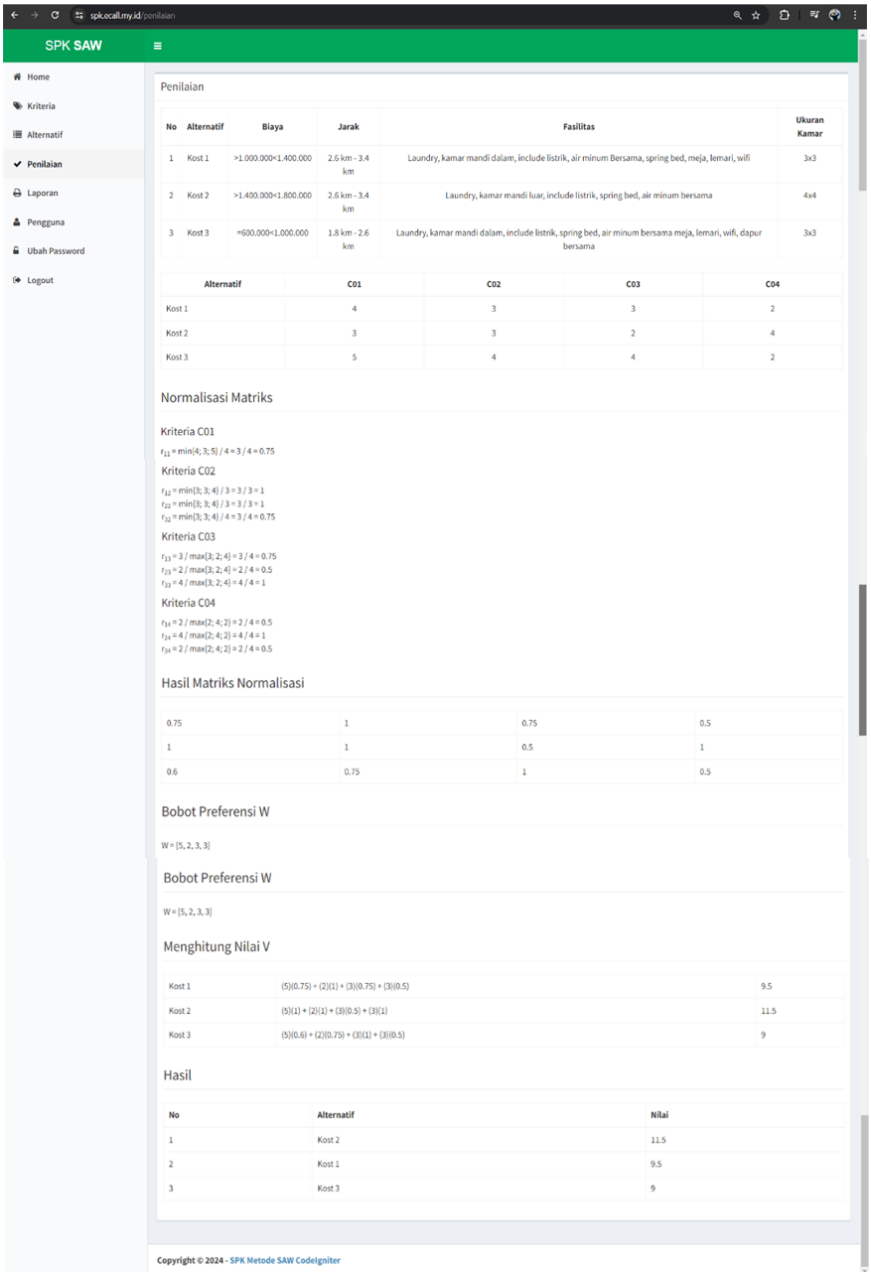


Fig 5. SAW Calculation Page

Based on the calculation results in Figure 5, the alternative ranked first is Kos 2. The specifications for Kos 2 are as follows: C1 = 3, C2 = 3, C3 = 2, and C4 = 4. This statement indicates that Kos 2 has a rental fee that is considered adequate, neither expensive nor cheap. The distance from the lecture location is neither too far nor too close, and the room size is adequate. However, the downside of Kos 2 is its relatively limited facilities. Based on the needs of the purchaser, Kos 2 meets their needs.

Price was the preferred criterion in this study. Distance was the second priority criterion after price. Interviews indicated that price and distance were prioritized because, according to several Perbanas Institute students, choosing a boarding house is not only about affordability but also proximity. Affordability and proximity reduce expenses. This is also influenced by economic and time factors, which can add up to significant costs, such as expensive rent and transportation. Therefore, this

research hopes that prospective boarding house buyers will find relief from the challenges they face, such as cost and distance.

## IV. CONCLUSION

The SAW method has proven to be an effective approach for developing a Decision Support System (DSS) for boarding house selection. Its ability to handle multiple criteria, incorporate user preferences, and provide comparative analysis makes it a valuable tool for assisting individuals in making informed and personalized boarding house choices. As research continues to explore the application of SAW in DSS for boarding house selection, further refinements and improvements are expected to further enhance its effectiveness and user experience.

After designing, implementing, and testing, it was found that using the Simple Additive Weighting (SAW) Decision Support System (DSS) for selecting boarding houses facilitates the search process and helps users determine their desired boarding house based on the criteria. The developed system can minimize errors in boarding house selection.

Price was the primary criterion in this study. Distance was the second priority criterion after price. Interviews indicated that price and distance were prioritized because, according to several Perbanas Institute students, the desire to choose boarding houses is not only affordable but also convenient.

In this study, the option that best meets the preferences of potential voters is Kos 2, which ranks first. Based on its specifications, Kos 2 has a value of C1 = 3, C2 = 3, C3 = 2, and C4 = 4. This indicates that Kos 2's rental price is quite affordable, it is not too far from the lecture hall, and the rooms are quite spacious. However, its facilities are relatively low. Overall, Kos 2 meets the voters' needs, despite its shortcomings in facilities.

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