

# Application of the Simple Additive Weighing Method in the selection of housing in the city of Tasikmalaya

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**Abstract.** Application of information technology has been able to enter all aspects of life, including the property sector. The development of housing today is very rapid, so consumers often feel hesitant when they have to decide directly which house to buy. The house is a place to live with the family and is occupied forever and for investment. This study aims to facilitate consumers in making decisions when determining the right type of housing and in accordance with the desired conditions. Therefore, as the development of information technology, the Decision Support System for housing type selection needs to be built using the SAW (Simple Additive Weighting) method. The basic concept of the SAW Method is to find a weighted sum of the performance ratings for each alternative on all criteria. There are six criteria that are taken into consideration: distance to the shopping center, distance to the location of education, distance to the location of health, water availability, price and land area .. The method used in designing this application uses the Business System Planning method often referred to as a structured approach or methodology.

## 1. Introduction

This research is to create a support system in the selection of housing in accordance with the desired keriteria, where the house is a primary need that serves as a place for people to live and carry out their lives. Once the importance of homes and housing environments, people want a conducive housing environment.

As it is known that the high demand of consumers in owning a house or residence, especially in the city of Tasikmalaya, makes consumers have to be careful in choosing a home that matches the desired criteria. Realizing that all lately many developers offer a variety of alternative housing from the price, location, design, and method of payment. Developments in the field show that consumers in choosing housing have at least six aspects taken into consideration: distance to shopping centers, distance to education locations, distance to health locations, water availability, prices and land area. To help the process of finding suitable alternative homes, a decision support system is needed.

The decision support system built to assist people in making choices in this case is to help people to choose the desired housing from various housing options based on the six aspects. The method to be used in a home selection decision support system is the Simple Additive Weighting (SAW) method is one method for solving multi-attribute decision making problems. The SAW method is often also known as the weighted sum method [1]. The basic concept of the SAW method is to find a weighted sum with the performance rating of each alternative on all attributes [2]. The assumption underlying



the SAW method is that each attribute is independent, so it will not affect each other. Scoring with this method is obtained by adding contributions from each attribute [2].

## 2. Method

### 2.1. Simple Additive Weighting (SAW)

Simple Additive Weighting Method (SAW) Is a weighted sum method[3]. 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 criteria [4]. The criteria used in this study are: distance to shopping centers, distance to the location of education, jarak to the location of health, water availability, price and land area. The SAW method requires the decision matrix normalization process (X) to a scale that can be compared with all available alternative ratings. The SAW method recognizes 2 (two) attributes, namely the benefit criteria and cost criteria. The fundamental difference between the two criteria is in the selection of criteria when making decisions[5].

The completion steps for using it are:

1. Determine alternatives.
2. Determine the criteria that will be used as a reference in making decisions, namely  $C_j$ .
3. Give a rating match the value of each alternative on each criterion.
4. Determine the weight of preference or level of importance (V) of each criterion.

$$V = [V_1, V_2, V_3, \dots, V_J]$$

(1)

5. Make a match rating table of each alternative on each criterion.
6. Make a decision matrix (X) formed from the match rating table of each alternative to each criterion. The X value of each alternative ( $A_i$ ) for each criterion ( $C_j$ ) that has been determined, where,  $i = 1, 2, \dots, m$  and  $j = 1, 2, \dots, n$ .

$$X = \begin{pmatrix} X_{11} & X_{12} & X_{1j} \\ \dots & \dots & \dots \\ \dots & \dots & \dots \\ X_{i1} & X_{i2} & X_{ij} \end{pmatrix}$$

(2)

7. Normalize the decision matrix by calculating the value of the nominal performance rating ( $R_{ij}$ ) from alternative  $A_i$  on the  $C_j$  criterion.

$$R = \begin{pmatrix} \frac{X_{ij}}{\text{Max}_i(X_{ij})} \\ \frac{\text{Min}_i(X_{ij})}{X_{ij}} \end{pmatrix}$$

(3)

$$R = \begin{pmatrix} R_{11} & R_{12} & R_{1j} \\ \dots & \dots & \dots \\ \dots & \dots & \dots \\ R_{i1} & R_{i2} & R_{ij} \end{pmatrix}$$

(4)

8. The final result of the preference value ( $V_i$ ) is obtained from the sum of the multiplications of normalized matrix row elements ( $R_i$ ) with preference weights ( $W$ ) corresponding to the matrix column elements ( $W$ ).

$$V_i = \sum_{j=1}^n W_j R_{ij} \tag{5}$$

The calculation result of the greater  $V_i$  value indicates that the  $A_i$  alternative is the best alternative.

2.2 Business System Planning (BSP)

According to Surendro [7] Business System Planning is often referred to as a structured approach or methodology. Business System Methodology Planning was developed by the IBM company in the 1980s. This methodology relating to the efforts of how information systems should be structured, integrated and implemented by the organization in the long run. The basic concept of Business System Planning is information system planning made top-down with bottom-up implementation. This concept can stated in diagram form as shown in the figure below.

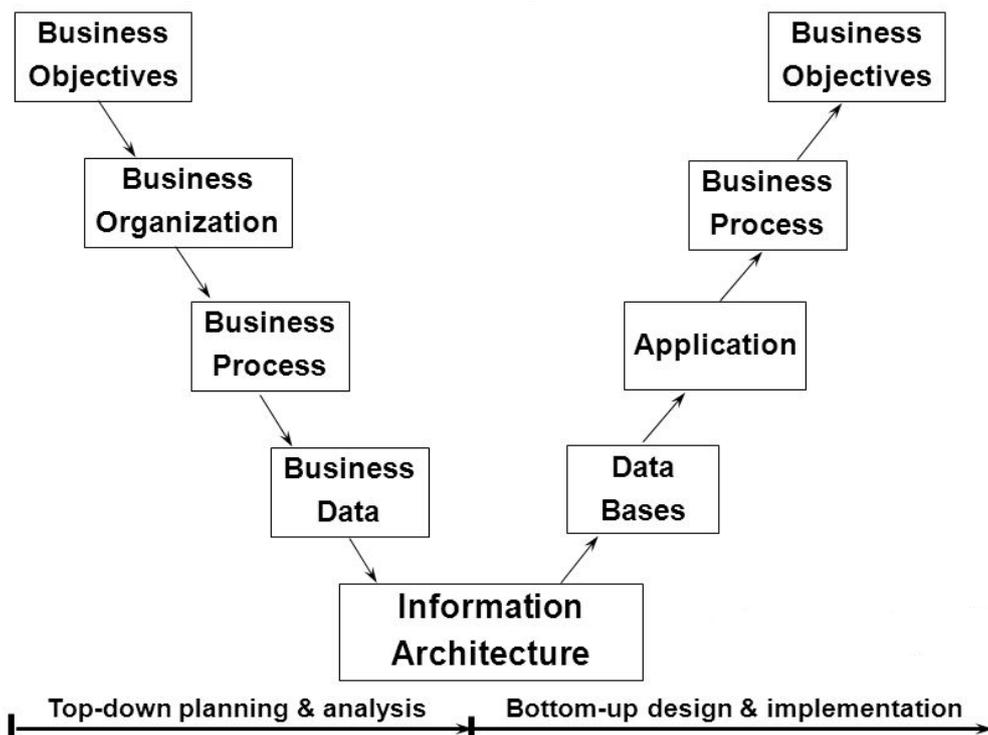


Figure 1. Concept of business system planning

3. Results and Discussion

3.1. analysis of the method of saw

Simple Additive Weighting (SAW) is a weighted sum method [3]. The basic concept of Simple Additive Weighting (SAW) is to find the weighted sum of the performance ratings for each alternative on a criterion. The Simple Additive Weighting (SAW) method requires the process of normalizing the decision matrix ( $X$ ) to a scale that can be compared with all existing alternative branches [5].

The calculation steps for the SAW method are as follows:

1. Determine the alternative, namely  $A_i$

2. Determine the criteria that will be used as a reference in  $C_i$  decision making
3. Determine the weight of preference or level of importance ( $W$ ) for each criterion.  $W = [W_1 W_2 W_3 \dots W_4]$
4. Make a match rating table for each alternative on each criterion.
5. Making the decision  $X$  matrix formed from the match rating table of each alternative ( $A_i$ ) for each predetermined criterion ( $C_j$ ) where,  $i = 1, 2, \dots, m$  and  $j = 1, 2, \dots, n$ .
6. Normalize the decision  $X$  matrix by calculating the normalized performance rating ( $r_{ij}$ ) value of alternative ( $A_i$ ) on performance ( $C_j$ ).
7. The results of the normalized performance rating ( $R_{ij}$ ) form a normalized matrix ( $R$ ).

**Table 1.** Criteria weight

wigth	adjective	distance to			water condition	price	surface area
		shopping center	educational location	health center			
1	Very bad	>10KM >7,5-	>10KM	>10KM >7,5-	Very bad	>1000jt >750jt-	0-50m2 >50m2-
2	Bad	10KM >5-	>7,5-10KM	10KM >5-	Bad	1000jt >500jt-	100m2 >100m2-
3	Enough	7,5KM >2,5-	>5-7,5KM	7,5KM >2,5-	Enough	750jt >250jt-	150m2 >150m2-
4	Well	5KM	>2,5-5KM	5KM	Well	500jt	200m2
5	Very good	0-2,5KM	0-2,5KM	0-2,5KM	Very good	0-250Jt	>200m2

$W=6,5,4,3,2,1$

**Table 2.** Alternative matches for each criterion

Alternatif	Criteria					
	price	educational location	surface area	water condition	health center	shopping center
Karisma Siliwangi Residence	4	5	3	4	4	3
Perum Garuda Mas	5	3	2	3	3	3
Perum Wastu kencana Garden	4	2	3	4	2	2
Perum Pelangi Residence	3	3	3	2	2	2
Perum Andalusia	1	3	4	4	3	2

Normalized Matrix R

	0.8000	1.0000	0.7500	1.0000	1.0000	1.0000
	1.0000	0.6000	0.5000	0.7500	0.7500	1.0000
R=	0.8000	0.4000	0.7500	1.0000	0.5000	0.6667
	0.6000	0.6000	0.7500	0.5000	0.5000	0.6667
	0.2000	0.6000	1.0000	1.0000	0.7500	0.6667

Next is the ranking process

$$V1 = ( 6 \times 0.8000 ) + ( 5 \times 1.0000 ) + ( 4 \times 0.7500 ) + ( 3 \times 1.0000 ) + ( 2 \times 1.0000 ) + ( 1 \times 1.0000 ) = 18.80000$$

$$V2 = ( 6 \times 1.0000 ) + ( 5 \times 0.6000 ) + ( 4 \times 0.5000 ) + ( 3 \times 0.7500 ) + ( 2 \times 0.7500 ) + ( 1 \times 1.0000 ) = 15.75000$$

$$V3 = ( 6 \times 0.8000 ) + ( 5 \times 0.4000 ) + ( 4 \times 0.7500 ) + ( 3 \times 1.0000 ) + ( 2 \times 0.5000 ) + ( 1 \times 0.6667 ) = 14.46667$$

$$V4 = ( 6 \times 0.6000 ) + ( 5 \times 0.6000 ) + ( 4 \times 0.7500 ) + ( 3 \times 0.5000 ) + ( 2 \times 0.5000 ) + ( 1 \times 0.6667 ) = 12.76667$$

$$V5 = ( 6 \times 0.2000 ) + ( 5 \times 0.6000 ) + ( 4 \times 1.0000 ) + ( 3 \times 1.0000 ) + ( 2 \times 0.7500 ) + ( 1 \times 0.6667 ) = 13.36667$$

The results of the SAW method ranking

<b>V1=</b>	18.8000	<b>1</b>
<b>V2=</b>	15.7500	<b>2</b>
<b>V3=</b>	14.4667	<b>3</b>
<b>V4=</b>	12.7667	<b>5</b>
<b>V5=</b>	13.3667	<b>4</b>

### 3.2 system design analysis

Research methodology used in software development This uses the Business System Planning model which is a method relating to the efforts of how information systems should be structured, integrated, and implemented by the organization in the long run. The following stages:

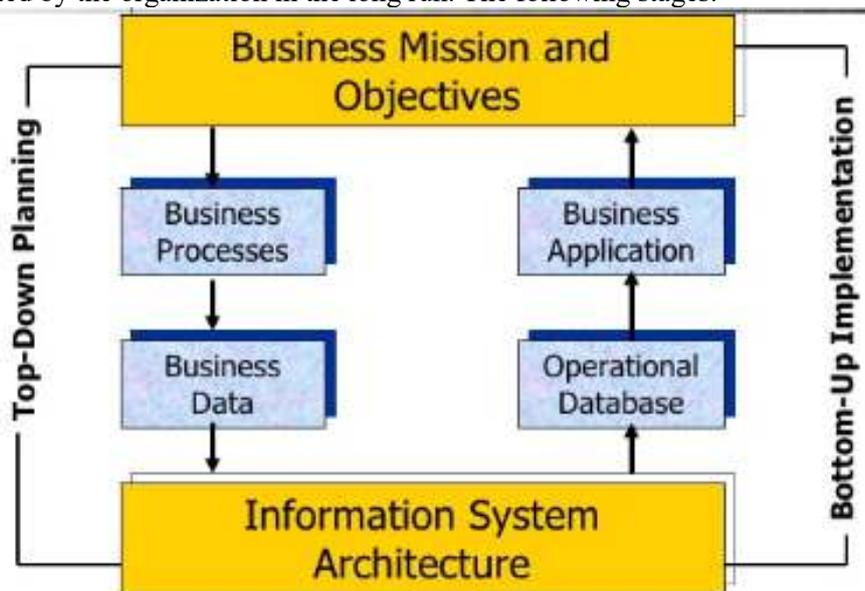


Figure 2. Business System Planning Method [6]

### 4. Conclusion

Based on the analysis and design of the system in the housing selection decision support system using the Simple additive weighting method, it was concluded that the application of the SAW method is able to provide the best alternative in determining housing and the housing selection decision support system can help provide recommendations to prospective home buyers based on a system that matches the data entered by admin.

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