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Decision Support Systems Recipient Program Keluarga Harapan (PKH) In Durian Kec.Pantai Labu Kab. Deli Serdang with the Simple Additive Weighting (SAW) Method

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ABSTRACT

This research examines how to design an application and build a decision support system in order to facilitate the process of determining beneficiaries of Program Keluarga Harapan (PKH). By using the Simple Additive Weighting (SAW) method, PKH beneficiaries are more targeted. The SAW method certainly uses a more accurate assessment because it is based on a criterion value of a predetermined preference weight. This research produces a system that is able to display the recommendation of prospective beneficiaries in accordance with the ranking of the criteria that have been determined according to the needs of the system.

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1. Introduction

Poverty is a major and complex problem in every country. Poverty cannot be eliminated by any country, but with a strong determination, poverty can be reduced or minimized. In Indonesia the level of poverty is still fairly high. Although it seems to be declining slowly, the government with various special efforts in each regime has been able to reduce poverty. However, because poverty in Indonesia is a micro-visible problem, while the government is still pursuing aspects of macro development, what happens is the inaccuracy of development targets themselves [12].

The recording of Very Poor household data also plays an important role so that assistance can be received by targeted families. Incorrect recording and wrong determination of assistance results in an imbalance[12]

The SAW method is a method also known as the weighting sum method. The basic concept of the SAW method is to find a weighted sum of the performance ratings for each alternative on all attributes.. The SAW method requires the decision matrix normalization process (X) to a scale that can be compared with all available alternative ratings [1][2][3][5][7].

2. Theory

2.1 Support System

Decision Support System (DSS) as a computer-based system consisting of three interacting

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components, a language system (a mechanism to provide communication between users and other decision support system components), a knowledge system (reporsitory of knowledge dominating the problems that exist in a Decision Support System or as data or as a procedure), and problem processing systems (the relationship between two other components, consisting of or more general mass manipulation capabilities needed for decision making)[1][3].

2.2 Simple Additive Weighting (SAW) Method

The SAW (Simple Additive Weighting) method The SAW is often also known as the weighted sum method[3][5][6][8][10][13][14]. This method requires the decision maker to determine the weight for each attribute. The total score for an alternative is obtained by adding up all the multiplication results between the rating (which can be compared across attributes) and the weight of each attribute[7].

The steps of problem solving with the Simple Additive Weighting (SAW) method according to Kusumadewi in the SAW Method recognize that there are 2 attributes, namely the profit criteria and the cost criteria. The fundamental difference between the two criteria is in the selection of criteria when making decisions

1. Determine the alternative, namely Ai.
2. Determine the Criteria that will be used as a reference in Ci decision making.
3. Give a rating match the value of each alternative on each criterion
4. Determine the weight of preference or level of importance (W), W = [W1, W2W3 ... Wn]
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. ..n,
7. Normalize the decision matrix by calculating the normalized performance rating value (rij) from the Ai alternative to Cj
8. The final results obtained from the ranking process is the sum of the multiplication of normalization (R) product.
9. The reference value result (Vi) is obtained from the sum of the multiplications of normalized matrix row elements (R) with reference weights (W) corresponding to the matrix elements (W)[15].

The formula for doing Normalisi :

$$R_{ij} = \begin{cases} \dfrac{x_{ij}}{\max(x_{ij})} \\ \dfrac{\min(x_{ij})}{x_{ij}} \end{cases} \qquad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

3. Research Methods

The framework that will be carried out by researchers in an effort to find data and information that will help in establishing research is as follows.

3.1 Collecting Data Method.

Data Collecting method of this research is a quetionnaire methode with direct studies or survey. This Methode use a number of closed question or statments with a choice of answer that have been provided.

3.2 Data Analysis Phase

Analyzing data using a questionnaire conducted directly by guiding respondents who are Durian villagers, so that it is expected that the results obtained will be more accurate and describe the condition and the population as a whole.

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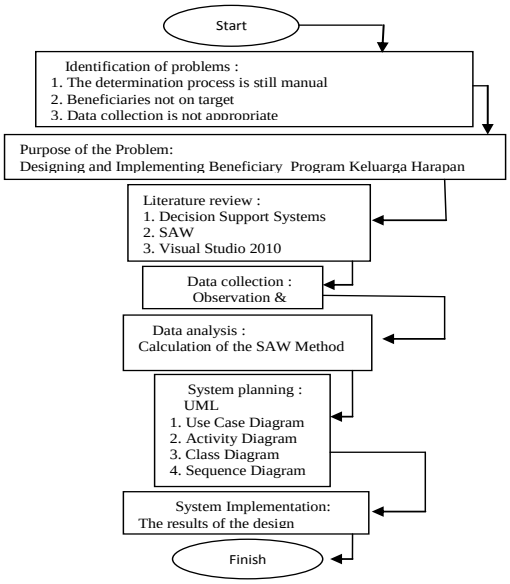

Figure 1. Research Framework

4. Result

4.1 Settlement Algorithm

a. Determine Criteria

The criteria to be taken in the determination of PKH beneficiaries are: Income, Dependents, Houses and Assets

b. Determination of Match Ratings.

Table 1.
Association of Weight Criteria

Criteria	Description	Weight Criteria		Score
C1	Income	2.200.00-2.600.000	Not good	4
		1.900.000-2.100.000	Enough	3
		1.300.000- 1.800.000	Well	2
		0- 1.200.000	Very good	1
C2	Dependents	0	Not good	4
		1 - 3 Person	Enough	3
		3 - 5 Person	Well	2
		➢ 5	Very good	1
C3	House	Roof tiles, concrete walls, ceramic floors	Not good	4
		Zinc roofing, concrete walls, plaster floors	Enough	3
		Zinc roofing, wooden walls, plank floors	Well	2
		Thatched roof, bamboo walls, dirt floor	Very good	1
C4	Assets	Land or Building	Not good	4
		Car	Enough	3
		Motorcycle	Well	2
		Bike	Very good	1

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c. Family Data

Fill in family data in accordance with the criteria that have been set with valid data.

Table 2.
Family Value Data

Code	Name Head of family	SET			
		Income (C1)	**Dependents (C2)**	**House (C3)**	**Asset (C4)**
A1	Damaria	4.000.000	4	Well	Motorcycle
A2	Asniati	2.200.000	2	Enough	Motorcycle
A3	Nurdewi	3.300.000	6	Very good	Bike
A4	Rukmini	1.200.000	4	Very good	Motorcycle
A5	Aisah	900.000	5	Not good	Motorcycle

d. Alternative rating criteria table

Table 3.
Match Ratings

Alternative	Criteria			
	C1	**C2**	**C3**	**C4**
Damaria	4	2	2	2
Asniati	3	3	3	2
Nurdewi	4	1	1	1
Rumini	2	2	1	2
Aisah	1	2	3	2

e. Decision Matrix x

$$\begin{Bmatrix} 4 & 2 & 2 & 2 \\ 3 & 3 & 3 & 2 \\ 4 & 1 & 1 & 1 \\ 2 & 2 & 1 & 2 \\ 1 & 2 & 3 & 2 \end{Bmatrix}$$

f. Normalize the X matrix

1) For Income Criteria (C1).

$$r1,1 = \frac{4}{Min\{1,2,1,3,4\}} = \frac{4}{1} = 4$$
$$r2,1 = \frac{3}{Min\{1,2,1,3,4\}} = \frac{3}{1} = 3$$
$$r3,1 = \frac{4}{Min\{1,2,1,3,4\}} = \frac{4}{1} = 4$$
$$r4,1 = \frac{2}{Min\{1,2,1,3,4\}} = \frac{2}{1} = 2$$
$$r4,1 = \frac{1}{Min\{1,2,1,3,4\}} = \frac{21}{1} = 1$$

2) For Coverage Criteria (C2).

$$r1,2 = \frac{2}{Max\{3,2,4,3,3\}} = \frac{2}{4} = 0.5$$
$$r2,2 = \frac{3}{Max\{3,2,4,3,3\}} = \frac{3}{4} = 0.75$$

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$$r3,2 = \frac{1}{Max\{3,2,4,3,3\}} = \frac{1}{4} = 0.25$$
$$r4,2 = \frac{2}{Max\{3,2,4,3,3\}} = \frac{2}{4} = 0.5$$
$$r5,2 = \frac{2}{Max\{3,2,4,3,3\}} = \frac{2}{4} = 0.5$$

3) For Home Criteria (C3)

$$r1,3 = \frac{2}{Min\{3,2,4,4,2\}} = \frac{2}{2} = 1$$
$$r2,3 = \frac{3}{Min\{3,2,4,4,2\}} = \frac{3}{2} = 1.5$$
$$r3,3 = \frac{1}{Min\{3,2,4,4,2\}} = \frac{1}{2} = 0,5$$
$$r4,3 = \frac{1}{Min\{3,2,4,4,2\}} = \frac{1}{2} = 0.5$$
$$r5,3 = \frac{3}{Min\{3,2,4,4,2\}} = \frac{3}{2} = 1.5$$

4) For Vehicle Criteria (C4)

$$r1,4 = \frac{2}{Min\{3,3,4,3,3\}} = \frac{2}{3} = 0.67$$
$$r2,4 = \frac{2}{Min\{3,3,4,3,3\}} = \frac{2}{3} = 0.67$$
$$r3,4 = \frac{1}{Min\{3,3,4,3,3\}} = \frac{1}{3} = 0,33$$
$$r4,4 = \frac{2}{Min\{3,3,4,3,3\}} = \frac{2}{3} = 0.67$$
$$r5,4 = \frac{2}{Min\{3,3,4,3,3\}} = \frac{2}{3} = 0.67$$

g. Normalized Result (R) matrix

Table 4.
Normalization Results

4	0.5	1	0.67
3	0.75	1.5	0.67
4	0.25	0.5	0.33
2	0.5	0.5	0.67
1	0.5	1.5	0.67

h. Calculation of rating values

A1 = (4 x 4) + (4 x0.5) + (4 x 1)+ (4 x 0.67)
= 16 + 2 + 4 + 2.68
= 24.68

A2 = (4 x 3) + (4 x0.75) + (4 x 1.5)+ (4 x 0.67)
= 12 + 3 + 6 + 2.68
= 23.68

A3 = (4 x 4) + (4 x 0.25) + (4 x 0.5) + (4 x 0.33)
= 4 + 1 + 2 + 1.32
= 8.32

A4 = (4 x 2) + (4 x 0.5) + (4 x 0.5) + (4 x 0.67)
= 8 + 2 + 2+ 2.68

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= 14.68

A5 = (4 x 1) + (4 x 0.5) + (4 x 1.5) + (4 x 0.67)
= 4 + 2 + 6 + 2.68
= 12.28

Table 5
.Alternative Information Tables

Alternative	Set	Description
Damaria	24.68	Not feasible
Asniati	23.68	Not feasible
Nurdewi	8.32	Worthy
Rumini	14.68	Worthy
Aisah	12.28	Worthy

4.2 System Design

a.Use Case Diagrams

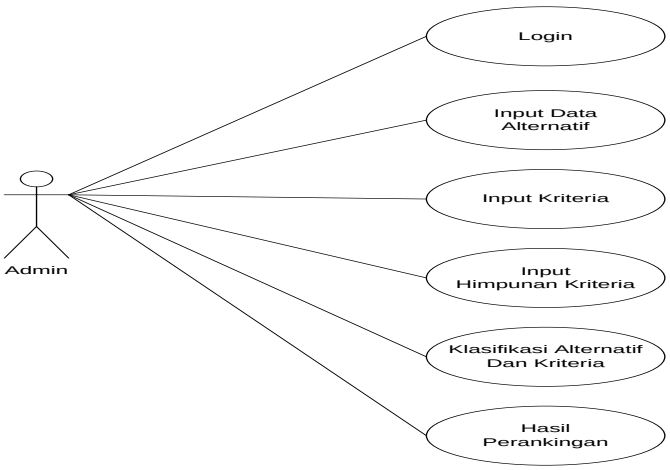

Figure 2. Use Case Diagram

4.3 System Implementation

a. Citizen data page

Figure 3. Citizen Data

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b. Assessment Form

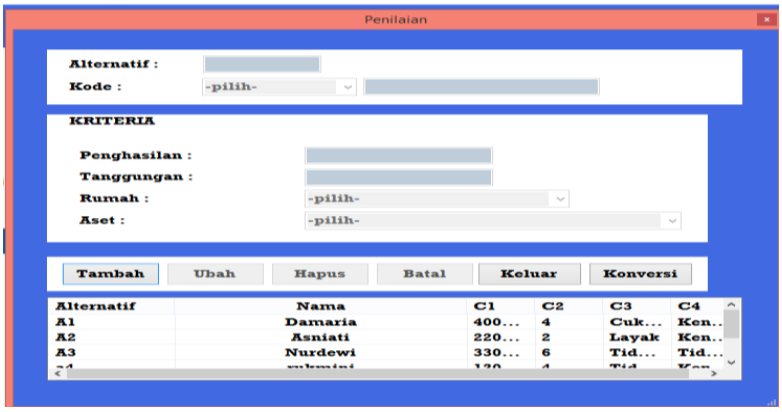

Figure 4. Assessment Process Page Design

c. Assessment Results

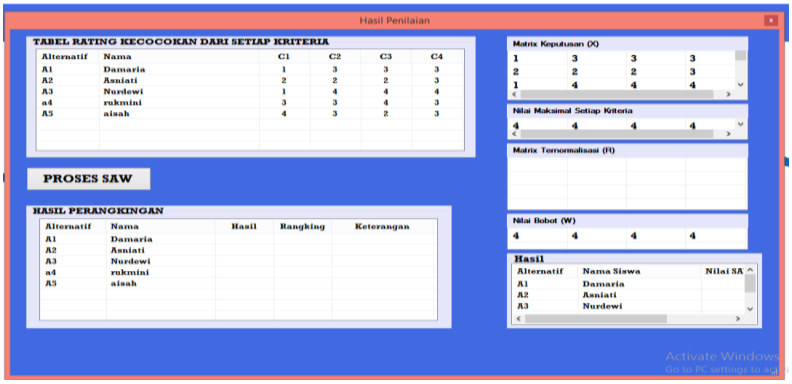

Figure 5. Design of Data Results Page Assessment

d. Report

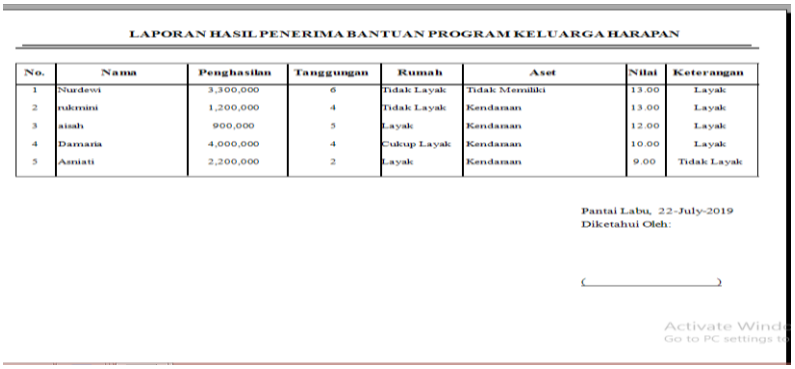

Figure 6. Report Page

5. Conclusion

Based on the results of the process of designing and making a decision support system for beneficiary decisions in Durian Village, Pantai Labu sub-district, the authors conclude that they are:

a. Problems that occur regarding the determination of whether or not residents receive assistance can be resolved by applying the Simple Additive Weighting Method (SAW).
b. By applying the Simple Additive Weighting Method (SAW) to determine the prospective beneficiaries of the Programn Keluarga Harapan in Durian Village can be adjusted to the criteria and use weights to be used with the algorithm.

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c. The system used was built with the Visual Studio 2010 programming language and Microsoft Access 2016 to determine the prospective beneficiaries of the Program Keluarga Harapan (PKH) in the Durian Pantai Labu Village quickly and accurately.

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