

Decision Support System for Recipients of the Family Hope Program with the Simple Additive Weighting Method

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Abstract

One alternative in decision making that is quite effective is the Decision Support System (SPK). The decision support system for acceptance of the Family Hope Program (PKH) acceptance is in accordance with the criteria set by the PKH assistants in Nagari Banja Loweh, to obtain more precise and accurate data on prospective PKH recipients. The method used in designing this decision support system is the Simple Additive Weighting (SAW) method. With this method officers can do weighting or ranking in recruiting alternative PKH beneficiary candidates, the result obtained is a decision support system that has an output of load ranking data from the highest preference value to the lowest preference value. From the ranking results, it was found that PKH beneficiary candidates had the highest preference value according to the needs of PKH beneficiaries in Nagari Banja Loweh.

Keywords: Decision Support System, *Simple Additive Weighting* (SAW), Accurate, Ranking, Preferences

Abstract

One alternative in decision making that is quite effective is the Decision Support System (SPK). The decision support system for determining acceptance of the Family Hope Program (PKH) is in accordance with the criteria set by PKH assistants in Nagari Banja Loweh, in order to obtain more precise and accurate data on prospective PKH recipients. The method used in designing this decision support system is the *Simple Additive Weighting* (SAW) method. With this method officers can weight or rank in determining alternatives as potential PKH beneficiaries, the results obtained are a decision support system that has the output of a ranking of population data from the highest preference value to the lowest preference value. From the ranking results, it was found that PKH beneficiary candidates had the highest preference value in accordance with the needs of PKH beneficiaries in Nagari Banja Loweh.

Keywords: Decision Support System, *Simple Additive Weighting* (SAW), Accurate, Ranking, Preferences .

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1. Introduction

People's welfare is one of the goals of the country, in its implementation it is mandatory to be able to reduce the total poverty rate in Indonesia. Poverty is a major and environmental problem of every country. Poverty cannot be eliminated by any country, but with a firm determination, poverty can be suppressed or minimized. In Indonesia, the level of poverty is still relatively high, although it appears to be shrinking slowly.

The Family Hope Program (PKH) which is a conditional cash assistance program or in other countries is known as Conditional Cash Transfers (CCT). PKH is a program of providing conditional social assistance to poor families which is inaugurated as PKH beneficiary families. That way, through this program it is hoped that there will be an increase in the quality of life of the household members concerned [1]. The existence of PKH aims to improve the socio-economic conditions of KM, increase the level of education of KM children and improve the health and nutritional status of pregnant women and toddlers KM.

In the end, it is hoped that PKH will not only be able to reduce poverty and increase human resources, especially for the very poor, but can also break the poverty chain itself. [2]

This has resulted in subjectivity in determining PKH participants, especially if some of the potential participants who are poor or less able have eligibility levels that are not much different. In this case the data collection system still uses old information that has not been updated, on the other hand every year the population always faces changes in patterns of social status and information processing is still done manually. For this reason, it is necessary to design an automatic application system that can assist in supporting decisions on determining recipients of encouragement for poor families.

Along with the growth of science and technology, the use of computers in various fields is a must. A *Computer Based Information System*, one of which is a *Decision Support System*, is an interactive computer data system that can share alternative solutions to decision makers [3]. Decision Support Systems are

interactive information systems that provide information, modeling, and data manipulation. This system is used to assist decision making in semi-structured situations and unstructured situations, where no one knows for sure how decisions should be made [4].

The method used is the *Simple Additive Weighting* (SAW) method, which is a method that uses a weighted sum with a rating for each alternative. This procedure is used to select the best alternative from several alternatives used in determining PKH beneficiary candidates based on the specified criteria. [5]. To be able to make a decision support system for decision making with the SAW method, there are steps that must be taken, namely determining the criteria that will be used as a reference in decision making, making a decision matrix based on criteria, then normalizing the matrix based on equations that are adjusted to the type of attribute (attribute benefits or costs) so as to obtain a normalized matrix, determine the suitability rating (weight) of each alternative on each criterion, look for alternative values, namely the sum of the multiplication of the normalized matrix R with vector (v) weights to obtain alternative values. [6].

Systems that are implemented without understanding the prospective benefits for a particular context will not reach their full potential in contributing to organizational performance. The quality of a system can be measured and documented in various ways. Simple decisions can be made immediately without much deliberation. But complex decisions are given more time and thought because they directly touch the bottom line of a business. SPK carries out a structured decision-making process and helps decision makers identify the best acceptable solution for a particular problem. [7].

With the SPK's ability to make decisions according to the method designed, it is hoped that it can assist in making decisions for assistance to poor families in Nagari Banja Loweh in a more precise and directed manner. Based on the description above, a study was conducted using the title: "Decision Support System for Determining Acceptance of the Family Hope Program (PKH) in Nagari Banja Loweh using the Simple Additive Weighting (SAW) Method".

2. Research methodology

Research methodology is a branch of science that talks about ways of carrying out research (which includes the activities of searching, recording, formulating, analyzing and compiling reports) based on scientific facts or symptoms.

The research framework is a concept or stages that will be carried out in research. So that the steps taken by the author in this design do not deviate from the subject of discussion and are easier to understand, the

sequence of research steps will be made systematically so that they can be used as clear and easy guidelines for solving existing problems. The research framework that the authors conducted in the research will be described in Figure 1.

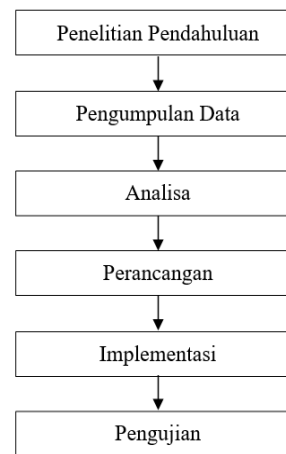


Figure 1. Research Framework

The research stage is a sequence of processes or steps that will be carried out in completing this research. The stages of this research are as follows:

3.1 Preliminary Research

Preliminary research is the first step in conducting research. The purpose of this stage is to find out the problems that occur quickly, so that it is hoped that the research can provide the most optimal solution to solving these problems.

2.2. Data Collection

At the data collection stage, the writer searches for and collects various references and information related to the sale and ordering of clothes so that the research results are in accordance with what is desired, there is also the necessary data.

2.3. Analysis

In the analysis phase there are 3 stages, namely the stages of data analysis, process analysis and system analysis.

2.4. Design

In this design stage, researchers will use the Unified Modeling Language (UML) which functions to clearly describe the design of the system to be made.

2.5. Implementation

System implementation is the stage of laying the system so that it is ready to operate. Implementation aims to confirm the design modules, so that users can provide input to the development of the SPK application. At this stage the design of the SPK application is carried out using the PHP programming language and MySQL database.

2.6. Testing

This test is focused on the functionality of the SPK application which includes function, interface and database errors. Testing is carried out directly using the Google Chrome Web Browser program and the Xampp Web Server program so that you can find out what the expected results are. In this trial phase it is carried out using the localhost server which is a Virtual Server for testing programs based on PHP Programming.

3. Results and Discussion

The procedure steps in applying the Simple Addictive Weighting (SAW) method to the case of determining PKH beneficiaries. Broadly speaking the SAW method has five steps, including:

1. Determine the criteria that will be used as a reference in decision making, namely KDi.
2. Gives a weight value for each criterion as W.
3. Provides a suitability rating value for each alternative on each criterion.
4. Create a decision matrix based on criteria (Kdi).
5. Normalize the matrix based on the equation adjusted for the type of attribute (attribute profit or attribute cost) so that the normalized matrix R is obtained.

At this stage an analysis of the Simple Addictive Weighting Method will be carried out to perform calculations based on existing formulas as well as examples of implementing these formulas will be carried out in stages.

Criteria

The criteria are the basis for the assessment, where each criterion is given a weight. The data that becomes the criteria for decision making can be seen in Table 1.

Table 1. Criteria Table

Code	Criteria	Weight
KD01	Pregnant mother	1.5
KD02	Toddler	1.5
KD03	Seniors > 60	1.5
KD04	Disabilities	1.5
KD05	Elementary School student	0.5
KD06	Junior High School student	0.5
KD07	Senior High School student	0.5
KD08	The number of dependents	1.0
KD09	Income of the head of the family	1.5

Criteria Match Value

For each each criterion has a criterion match value. This criterion value describes how suitable an alternative is to a criterion. The following is a list of criteria values for the Decision Support System that will be designed.

Table 2. Table for Pregnant Women

Criteria	Mark
Exist	7
There isn't any	3

Table 3. Toddler Table

Criteria	Mark
Exist	7
There isn't any	3

Table 4. Table of Elderly > 60

Criteria	Mark
Exist	7
There isn't any	3

Table 5. Table of Disabilities

Criteria	Mark
Exist	7
There isn't any	3

Table 6. Table of Elementary School Children

Criteria	Mark
Exist	7
There isn't any	3

Table 7. Table of Middle School Children

Criteria	Mark
Exist	7
There isn't any	3

Table 8. Table of High School Children

Criteria	Mark
Exist	7
There isn't any	3

Table 9. Table of Total Dependents

Criteria	Mark
>5	7
2-5	5
1	3
No Exist dependents	1

Table 10. Table of Income of the Head of the Family

Criteria	Mark
>2,000,000	3
1,500,000-2,000,000	5
0-1500000	7

Match Rating of Each Alternative on the Criteria

Table of conversion of quality values to numeric values to determine the criteria compatibility rating with alternative criteria as shown in Table 11.

Table 11. Alternative Match Rating Table

A	K1	K2	K3	K4	K5	K6	K7	K8	K9
a	3	3	3	7	7	7	3	5	3
b	3	3	7	3	3	3	3	1	7

c	7	7	3	3	7	7	3	5	3
d	3	3	7	3	3	3	3	3	7
e	7	7	7	3	3	7	3	5	3
f	3	7	7	3	7	3	3	5	5
g	3	7	3	3	7	3	7	5	5
h	3	3	3	3	7	7	7	5	5
i	3	7	3	3	7	7	7	5	5
j	7	3	3	3	7	3	3	5	7

Normalization Matrix

The formula for normalizing is :

$$r_{ij} = \begin{cases} \frac{iX_{ij}}{\text{Max } X_{ij}} & \text{Jika } j \text{ atribut Keuntungan (benefit)} \\ \frac{\text{Min } X_{ij}}{X_{ij}} & \text{Jika } j \text{ atribut biaya (cost)} \end{cases}$$

The following are the results of calculations from the normalization matrix:

$$R = \begin{bmatrix} 0.429 & 0.429 & 0.429 & 1.000 & 1.000 & 1.000 & 0.429 & 0.200 & 1.000 \\ 0.429 & 0.429 & 1.000 & 0.429 & 0.429 & 0.429 & 0.429 & 1.000 & 0.429 \\ 1.000 & 1.000 & 0.429 & 0.429 & 1.000 & 1.000 & 0.429 & 0.200 & 1.000 \\ 0.429 & 0.429 & 1.000 & 0.429 & 0.429 & 0.429 & 0.429 & 0.333 & 0.429 \\ 1.000 & 1.000 & 1.000 & 0.429 & 0.429 & 1.000 & 0.429 & 0.200 & 1.000 \\ 0.429 & 1.000 & 1.000 & 0.429 & 1.000 & 0.429 & 0.429 & 0.200 & 0.600 \\ 0.429 & 1.000 & 0.429 & 0.429 & 1.000 & 0.429 & 1.000 & 0.200 & 0.600 \\ 0.429 & 0.429 & 0.429 & 0.429 & 1.000 & 1.000 & 1.000 & 0.200 & 0.600 \\ 0.429 & 1.000 & 0.429 & 0.429 & 1.000 & 1.000 & 1.000 & 0.200 & 0.600 \\ 1.000 & 0.429 & 0.429 & 0.429 & 1.000 & 0.429 & 0.429 & 0.200 & 0.429 \end{bmatrix}$$

Weight Ranking

The process of ranking the weights that have been determined using the following formula:

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

The following is the result of the calculation of the weight ranking :

Table 12. Table of Ranking Results

No	A	Final score
1	e	7,774
2	c	7.203
3	a	6,347
4	f	6,318
5	i	6032
6	g	5,747
7	b	5,721
8	j	5.206
9	h	5.176
10	d	5,054

The greatest value ie 7,774 , so alternative A is the alternative chosen as the best alternative that has the potential to become PKH assistance recipients

3.1 Implementation

Login Page Display

login form is used for system security. To be able to enter the Website-Based Decision Support System (SPK), you must enter *your username and password* , by clicking on the login menu, then fill it in as shown in Figure 2.

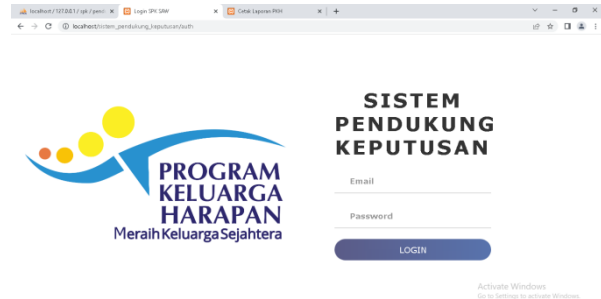


Figure 2 . Login Page Display .

User Data Input Page Display

The user data input page is a display form used by the leadership to input user data. To display this view, click user data and click add, then fill in, click save as shown in Figure 3.

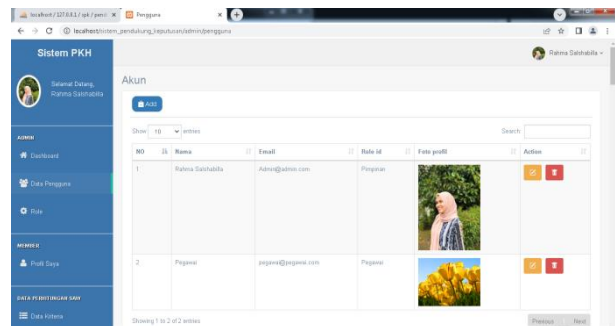


Figure 3 . User Data Input Page Display

Criteria Data Page Display

This page is a display of the criteria data page. On this page the process of managing criteria data can be carried out, adding data, editing data or deleting data such as FIGURE 4 .

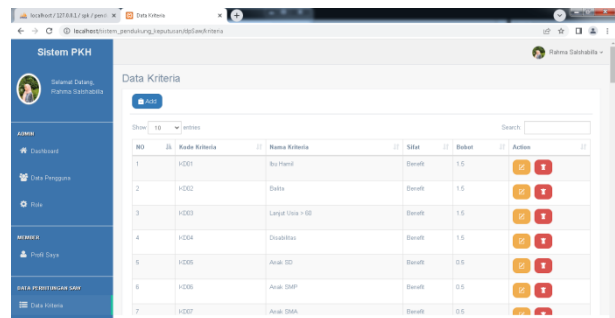


Figure 4 . Criteria Data Page Display

5.3 PKH Calculation Input Page Display

This page displays the PKH calculation input page. On this page the process can be carried out population data management, such as FIGURE 5 .

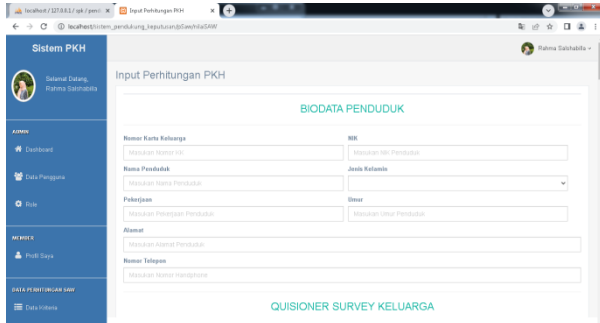


Figure 5 . Calculation Input Page Display PKH

Ranking Result Data Page Display

This page is a display of ranking results data pages. On this page, the results of PKH beneficiary data management can be obtained, such as Figure 6 .

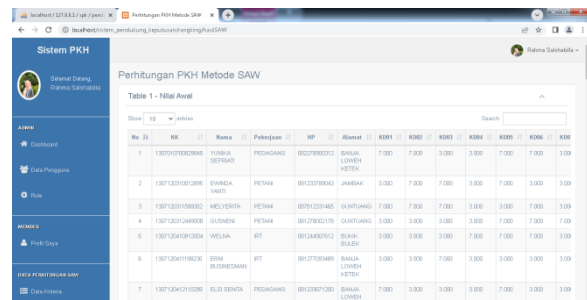


Figure 6 . Rank Result Data Display

View of the PKH Report Data Page

This page is a display of the PKH report data page. On this page, the data report printing process can be carried out as shown in Figure 7 .

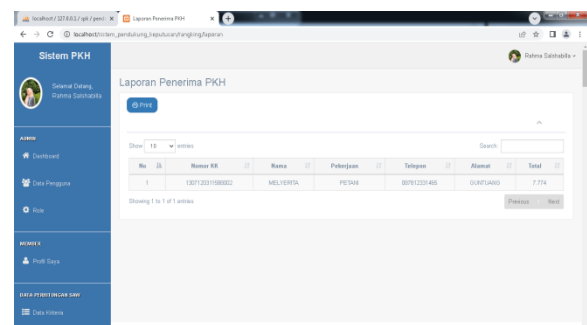


Figure 7 . View of the PKH Report Data Page

4. Conclusion

Based on the results of the research and discussion previously described on the decision support system for determining beneficiaries of the Family Hope Program (PKH) using the Simple Additive Weighting (SAW) method, it can be concluded that by implementing this decision support system it can facilitate decision making to determine a family. poor who are entitled/eligible to receive PKH assistance from the Government. You can then determine PKH beneficiary candidates using the criteria that have been determined precisely and accurately. Can record households belonging to poor families in Nagari Banja Loweh.

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