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# Decision Support System for Accepting Social Assistance for the Program Keluarga Harapan (PKH)

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## Abstract

Cibangkong Village is one of the villages in Pekuncen District, Banyumas Regency. The number of recipients of PKH cards (Program Keluarga Harapan) is 253 families, data on KPM (Beneficiary Families) prospective recipients of BPNT (Non-Cash Food Assistance) are 278 families, and data for recipients of BLT (Direct Cash Assistance) village funds are 217 people (source Cibangkong Village in 2021). With so many recipients of this assistance, village officials encountered several obstacles, one of which was that the recipients were not eligible to receive assistance. This needs to be handled, one of which is by creating a Decision Support System that can assist village officials in overcoming these problems. Decision Support System (DSS) is a system that can assist a person in making accurate and targeted decisions. This study aims to produce a Decision Support System for receiving social assistance from the Family Hope Program (PKH) in Cibangkong village. This research uses the Multi Attribute Utility Theory (MAUT) method. The result of this research is that the making of a decision support system for receiving social assistance for the Family Hope Program (PHK) in Cibangkong village can be used as a tool by the Cibangkong village apparatus to consider the feasibility of prospective recipients of PKH social assistance. The criteria used in the Decision Support System for receiving social assistance from the Family Hope Program (PHK) in Cibangkong village are 12, namely income, savings, consuming meat, milk and chicken, ability to pay for treatment, education of the head of the family, building area, type of floor, house walls, latrines/WC, lighting sources, drinking water sources, and cooking fuel.

*Keywords:* Decision Support System; Family Hope Program (PKH); Multi Attribute Utility Theory (MAUT)

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## 1. Introduction

The Family Hope Program (PKH) is a program that provides cash assistance to Very Poor Households (RTSM) [1]. In return, the RTSM is required to meet the requirements related to efforts to improve the quality of human resources (HR), namely education and health. The main objective of PKH is to reduce poverty and improve the quality of human resources, especially for the poor. This goal is also an effort to accelerate the achievement of the MDGs targets [2].

Several problems related to determining the acceptance of social assistance programs in Cibangkong village are still carried out manually, namely by using old data available at the village office [3]. Data collection is carried out 1-2 times every year. This makes the data in the village office less valid and effective, causing some beneficiaries to be off target [4]. Data collection is done by collecting KK (Family Card) which is used to see the number of family dependents and collecting salary slips for residents who work as PNS (Civil Employees), while for residents who work as farmers and entrepreneurs report their income using instant reporting to the village government [5].

To determine the eligibility of recipients of social assistance programs in Cibangkong village, one solution that can be used is to use a computerized system that can produce accurate data and in accordance with existing criteria [6]. This system will use a website platform. For this reason, researchers try to help these problems by developing a

Decision Support System [7]. The creation of a website-based Decision Support System is a good alternative by prioritizing effectiveness and efficiency in receiving PKH assistance [8].

The purpose of this decision support system is to determine eligible recipients for PKH assistance using the Multi Attribute Utility Theory (MAUT) method [9]. The end result is a ranking order of alternative evaluations that describes the choices of decision makers at the Cibangkong village office. The Decision Support System created is only used for data collection in Cibangkong village.

## 2. Method

### Decision Support System

Decision Support System is an interactive computer-based system that can assist decision makers in using data and models to solve unstructured problems [10]. Decision Support System (DSS) is a system that is used as a problem solving tool to assist decision makers (managers) in making decisions, but not to replace the manager's capacity, only to provide considerations [11].

### Multi Attribute Utility Theory (MAUT) Method

The Multi-Attribute Utility Theory (MAUT) method is a quantitative comparison method that usually combines various measures of costs, risks, and benefits [12]. Each existing standard has several alternatives that can provide solutions. To find an alternative approach that is close to the user's expectations to identify it, multiplication is carried out for a predetermined priority ratio. In order to use the best and closest results from these alternatives as a solution [13].

OFF is used to convert multiple interests to values in the range 0-1, where 0 represents the worst choice and 1 represents the best choice. This allows direct comparison of various sizes [14]. For the calculation of the entire evaluation value, several equations can be used to define, the formula is as follows:

$$V(x) = \sum_{i=1}^n W_i V_i(x) \quad (1)$$

Where  $V_i(x)$  is the evaluation value of an  $i$ -th object and  $W_i$  is a weight that determines the value of how important the  $i$ -th element is to other elements [14]. While  $n$  is the number of elements. The total of the weights is 1.

$$\sum_{i=1}^n W_i = 1 \quad (2)$$

For each dimension, the evaluation value  $V_i(x)$  is defined as the sum of the relevant attributes.

$$V_i(x) = \sum_{e=A_i} W_{ai} \cdot V_{ai}(I(a)) \quad (3)$$

Description :

$V(x)$  = evaluation value

$n$  = Number of elements/criteria

$i$  = Total weight is 1

$A_i$  = set of all relevant attributes

$V_{ai}(I(a))$  = evaluation of the actual level

$W_{ai}$  = weight that determines the impact of attribute evaluation on dimension

$v_i$  = the overall value of the alternative choice of a criterion

a = criteria

In summary, the steps in the MAUT method are as follows:

1. Break a decision into different dimensions.
2. Determine the relative weights on each dimension
3. List of all alternatives
4. Calculates the utility value of matrix normalization for each alternative according to its attributes.

$$U(x) = \frac{(x-x_i^-)}{x_i^+ - x_i^-} \tag{4}$$

Description :

U(x) = Normalized alternative weight

$x_i^+$  = minimum criterion value (worst weight)

$x_i^-$  = maximum criterion value (best weight)

x = Alternative weight

5. Multiply utility by weight to find the value of each alternative

### 3. Results and Discussion

Determination of prospective beneficiaries of PKH assistance in Cibangkong village using the MAUT method with the following stages:

#### Determining Alternative

In this study, the alternative used is the data of the residents of Cibangkong village which has been data by Cibangkong village officials, as follows:

Table 1. Citizen Alternative Data

No	Resident's Name	Address
1	Aswen	RT 04/RW 02
2	Kamsini	RT 04/RW 02
3	Waryati	RT 03/RW 02
4	Ratna Pradipta Sari	RT 03/RW 02
5	Warsiyem	RT 02/RW 02
6	Nikem	RT 03/RW 02
7	Nilem	RT 03/RW 02
8	Sutinah	RT 06/RW 02
9	Tijah	RT 04/RW 02
10	Feri Yulianti	RT 02/RW 02

#### Determining Criteria Components

This study uses the following criteria components: economic conditions, social conditions and building conditions.

#### Determining Criteria Weight

Based on the criteria that have been determined, then determine the weight of each criterion that has been determined. The weights for each criterion were obtained based on the results of discussions with Cibangkong village officials as follows:

Table 2. Criteria Component Weight

No	Criteria Component	Weight
1	Economy	0,1
2	Social	0,3
3	Building	0,6

## Determining the Priority of Sub-criteria Against Each Criterion

### Components of Economic Condition Criteria

The criteria for economic conditions have sub-criteria, namely: income and savings.

Table 3. Sub-Criteria Economic Condition

No	Variable	Criteria Name	Sub Criteria	Sub Criteria Weight Value
1	C1	Income	> Rp. 600.000	1
			< Rp. 600.000	2
2	C2	Savings	Own	1
			Do not own	2

### Components of Social Condition Criteria

The criteria for social conditions have sub-criteria, namely: consuming meat, milk, and chicken, being able to pay for treatment, and education of the head of the family.

Table 4. Social Condition Sub Criteria

No	Variable	Criteria Name	Sub Criteria	Sub Criteria Weight Value
1	C3	Consuming meat, milk and chicken	1x a week	1
			1x a month	2
			1x a year	3
2	C4	Ability to pay for treatment	Capable	1
			Unable	2
3	C5	Family head education	finished elementary school	1
			Not completed in primary school	2

### Components of Building Condition Criteria

The criteria for building conditions have sub-criteria, namely: building area, type of floor, house walls, latrines/WC, lighting sources, drinking water sources, cooking fuel.

Table 5. Sub Criteria for Building Conditions

No	Variable	Criteria Name	Sub Criteria	Sub Criteria Weight Value
1	C6	Building area	> 8m <sup>2</sup>	1
			< 8m <sup>2</sup>	2
2	C7	Floor type	Ceramic	1
			Cement	2
			Land	3
3	C8	House wall	Brick	1
			Wood	2
4	C9	Toilet	Own	1
			Do not own	2
5	C10	Lighting	Using electricity	1
			Does not use electricity	2
6	C11	Source of water	Well	1
			Unfiltered water	2
7	C12	Cooking fuel	Gas	1
			Oil	2
			Firewood	3

### Determining Alternative Data

The alternative data used is data that has been recorded by Cibangkong village officials based on the number of files received.

Table 6. Alternative Citizen Rating Score

No	Citizen Data	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
1	Aswen	2	1	2	2	2	2	1	2	1	1	2	2
2	Kamsini	1	1	2	2	1	1	2	2	1	1	2	1
3	Waryati	2	1	2	2	1	1	1	1	1	1	2	1
4	Ratna P. S.	1	1	2	2	1	1	2	2	2	1	2	1
5	Warsiyem	2	1	2	2	2	1	2	2	2	1	2	3
6	Nikem	1	1	2	2	1	1	2	1	2	1	2	1
7	Nilem	2	1	2	2	2	1	2	2	2	1	2	3
8	Sutinah	1	1	2	2	1	1	1	1	1	1	2	1
9	Tijah	2	1	2	2	2	1	2	2	2	1	2	3
10	Feri Yulianti	1	1	2	2	1	1	1	2	1	1	2	1

### Determining the Normalization Value of the Matrix

After determining the criteria and alternatives from the residents of Cibangkong village, the next step is to create a normalized matrix. The following is a normalized matrix:

Table 7. Normalization of Citizen Alternative Matrix

No	Citizen Data	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
1	Aswen	1	0	0,5	1	1	1	0	1	0	0	1	0,5
2	Kamsini	0	0	0,5	1	0	0	0,5	1	0	0	1	0
3	Waryati	1	0	0,5	1	0	0	0	0	0	0	1	0
4	Ratna P. S.	0	0	0,5	1	0	0	0,5	1	1	0	1	0
5	Warsiyem	1	0	0,5	1	1	0	0,5	1	1	0	1	1
6	Nikem	0	0	0,5	1	0	0	0,5	0	1	0	1	0
7	Nilem	1	0	0,5	1	1	0	0,5	1	1	0	1	1
8	Sutinah	0	0	0,5	1	0	0	0	0	0	0	1	0
9	Tijah	1	0	0,5	1	1	0	0,5	1	1	0	1	1
10	Feri Yulianti	0	0	0,5	1	0	0	0	1	0	0	1	0

### Ranking Results

From the results of the matrix multiplication, we can determine the ranking of the recipients of PKH assistance. The following is a ranking of the results of each alternative:

Table 8. Citizen Alternative Ranking Results

No	Citizen Alternative	Results	Ranking
1	Warsiyem	0,7	1
2	Nilem	0,7	2
3	Tijah	0,7	3
4	Aswen	0,65	4
5	Kamsini	0,45	5
6	Ratna P. S.	0,45	6
7	Nikem	0,35	7
8	Feri Yulianti	0,35	8
9	Waryati	0,3	9
10	Sutinah	0,25	10

## Alternative Data Input on Website

The screenshot shows a web application interface for 'SPK PKH' with a user role of 'admin'. The main menu on the left includes Dashboard, Data Penduduk, Komponen, Kriteria, Sub Kriteria, Penilaian, and Hasil. The 'Data Penduduk' section is active, displaying an 'Input Data' form. The form has three input fields: 'Nama', 'NIK', and 'Alamat', each with a placeholder 'Enter...'. Below the fields are two buttons: 'Tambah' (Add) and 'Reset'.

Figure 1. Population Data Menu Display

Figure 1. displays the population data menu. Here the admin can input the residents of the Cibangkong village by filling in the name, NIK, and address fields and then clicking add.

The screenshot shows the 'Daftar Penduduk' (List of Residents) menu. It features a search bar labeled 'Cari:' and a table with the following data:

No	Nama	NIK	Alamat	Aksi
1	Feri Yullianti	3302164202960004	RT02/RW02	[Edit] [Delete]
2	Tijah	3302165210470001	RT04/RW02	[Edit] [Delete]
3	Sutinah	3302165405780001	RT06/RW02	[Edit] [Delete]
4	Nitem	3302164312450002	RT03/RW02	[Edit] [Delete]
5	Nikem	3392145710790001	RT03/RW02	[Edit] [Delete]
6	Warsiyem	3302165601410001	RT02/RW02	[Edit] [Delete]
7	Ratna Pradipta Sari	3302164801900001	RT03/RW02	[Edit] [Delete]
8	Waryati	3302167010790002	RT03/RW02	[Edit] [Delete]
9	Kamsini	3302165008810002	RT04/RW02	[Edit] [Delete]

Figure 2. Display of Population Data List

Figure 2. shows a list of residents on the population data menu. Here the admin can change or delete resident data.

The screenshot shows the 'Data Komponen' (Component Data) menu. It features a search bar labeled 'Cari:' and an 'Input Data' form. The form has one input field: 'Nama Komponen' with a placeholder 'Enter...'. Below the field are two buttons: 'Tambah' (Add) and 'Reset'. Below the form is a 'Daftar Komponen' table with the following data:

No	Nama	Aksi
1	Ekonomi	[Edit] [Delete]
2	Kondisi Sosial	[Edit] [Delete]

Figure 3. Criteria Component Data Menu Display

Figure 3. displays the component menu. Here the admin can input the beneficiary component by filling in the component name column and then clicking add.

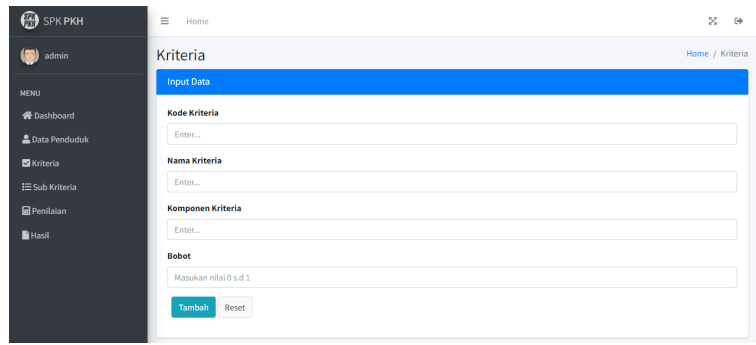


Figure 4. Criteria Menu Display

Figure 4. displays the criteria menu. Here the admin can input the criteria for the beneficiary by filling in the criteria code column, criteria name, criteria component, and weight and then click add.

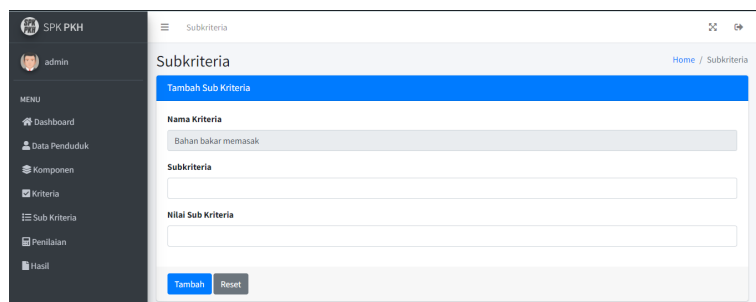


Figure 5. Sub-Criteria Menu Display

Figure 5. shows the sub criteria menu. Here the admin can add sub-criteria to the list of existing criteria.

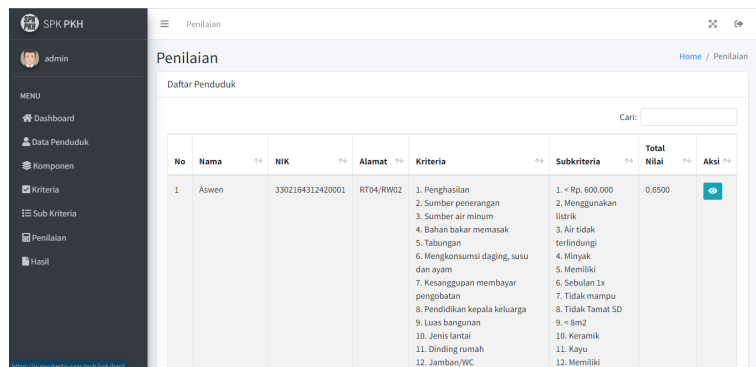
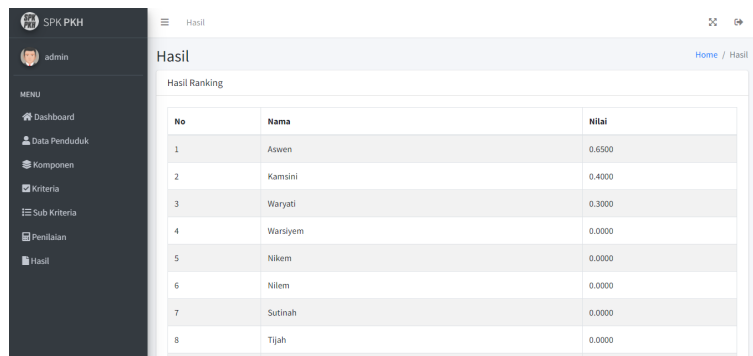


Figure 6. Rating Menu Display

Figure 6. displays the assessment menu. Here the admin performs the SPK calculation process to determine the results of which villagers deserve PKH social assistance.



No	Nama	Nilai
1	Aswen	0.6500
2	Kamsini	0.4000
3	Waryati	0.3000
4	Warsiyem	0.0000
5	Nikem	0.0000
6	Nilem	0.0000
7	Sutinah	0.0000
8	Tijah	0.0000

Figure 7. Display of Ranking Results

Figure 7. displays the results menu. Here the admin can see the results of the SPK calculation process according to the ranking or the largest value obtained by its citizens.

#### 4. Conclusion

Making a Decision Support System for receiving social assistance from the Family Hope Program (PHK) in Cibangkong village can be used as a tool by Cibangkong village officials to consider the eligibility of candidates for PKH social assistance. The criteria used in the Decision Support System for receiving social assistance from the Family Hope Program (PHK) in Cibangkong village are 12, namely income, savings, consuming meat, milk and chicken, ability to pay for treatment, education of the head of the family, building area, type of floor, house walls, latrines/WC, lighting sources, drinking water sources, and cooking fuel.

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