

Decision Support System For Supplementary Food Recipients (PMT) By Using The Simple Additive Weighting (SAW) Method

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ABSTRACT

Additional Food Recipients (PMT) is a program that is held in every village, especially in the Kubah Sentang Village, which is budgeted annually by the Village Officials through the APBN Fund. The importance of PMT for this Kubah Sentang village is because the poverty rate is quite high reaching 65% and the nutritional intake obtained is very limited especially for toddlers aged 6-59 months. This has led to the need to build a system that can facilitate government agencies, especially in the Kubah Sentang Village Office to select additional food recipients using a Decision Support System with the Simple Additive Weighting (SAW) method. Decision support systems are very necessary in government agencies, especially in the Kubah Sentang Village Office to select recipients of supplementary food (PMT) for the community. The determination of the criteria for additional food recipients is determined from the age of the baby, nutritional status, income of parents, and class of electric power. This study also produced a system that was able to display recommendations for prospective supplementary food recipients with the results of criteria and preference weights that were determined by the system's needs.

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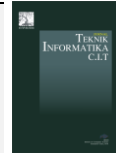
1. Introduction

In the Science of Technology, a decision support system is a branch of science that lies between information systems and intelligent systems. Science and technology are also one of the computational methods used for decision making in accelerating the performance of an agency especially in government in the Kubah Sentang Village Office.

So far what has been done by the government of the Kubah Sentang Village in the selection of supplementary food recipients (PMT) has not been effective, due to the lack of attention and insight of the posyandu cadres in selecting the community who should receive additional food. PMT at the Kubah Sentang Village Office is very important to do because the poverty rate is quite high reaching 65% and the nutritional intake obtained is very limited, especially for toddlers aged 6-59 months.

The method used by the author in the decision support system for Supplementary Food Recipients (PMT) in Kubah Sentang Village is Simple Additive Weighting (SAW). SAW method is a method that requires the decision matrix normalization process to a scale that can be compared with all existing alternative ratings. So here an implementation will be made to determine whether / not feasible to receive additional food assistance (PMT) from the village government.

In conducting this research, it is limited to how to design and build a decision support system for



supplementary food reception (PMT) in the Kubah Sentang Village.

2. Theory

2.1 Decision Support System

Alex Rikki, Murni Marbun, Jonson R. Siregar (2016) argues that a Decision Support System is an alternative process that provides the ability to solve problems with a process of collecting data into information, and added factors that need to be considered in determining a decision.

Decision Support System is also known as decision-making operation research and management science, the difference is if first to solve a problem that must be calculated manually iteration (usually to find the minimum, maximum, or optimum value), now the computer has offered its ability to solve the same problem in a relatively short time (Kusrini, 2018: 18).

a. Metode Simple Additive Weighting (SAW)

Metode SAW dikenal sebagai metode dengan penjumlahan terbobot dari kinerja setiap alternatif-alternatif pada semua atribut. Metode SAW juga merupakan teknik dalam menentukan nilai terbaik dari kriteria-kriteria yang telah ditentukan. Maka dari itu Metode SAW disarankan untuk menyelesaikan suatu masalah dalam sistem pengambilan keputusan multi proses.[2]

- Formula for doing Normalization

$$R_{ij} = \left\{ \begin{array}{l} \frac{x_{ij}}{\max_i x_{ij}} \text{ If } j \text{ is an attribute of profit ("benefit")} \\ \frac{\min_i x_{ij}}{x_{ij}} \text{ If this is an attribute of profit ("cost")} \end{array} \right\} \dots (1)$$

Where :

R_{ij} = Normalized performance rating
 Max_{ij} = Maximum value of each row and column
 Min_{ij} = Minimum value of each row and column
 X_{ij} = Rows and columns of the matrix

- Formula for calculating preference values:

$$V_1 = \sum_{j=1}^n W_j R_{ij} \dots (2)$$

3. Research Method

3.1 Data Collection

In collecting data used in this study consists of primary and secondary data, namely as follows:

1. Primary data

a. Field Study

In conducting a Field Study (Field Study) the writer uses to get the data needed in writing a thesis as follows:

a) Observation

Observation is an accurate data collection method that is done by direct observation of the location to be conducted research.

b) Interview

By conducting interviews, the data collection process will be carried out through a question and answer system to the Village Head and Local Communities. Data Sekunder.

b. Literature Study

Primary data Receiving Additional Food (PMT) Using the simple additive weighting (SAW) method to select recipients of supplementary food. Literature study materials are obtained from books both local and international, articles, journals, and e-books from the Internet.

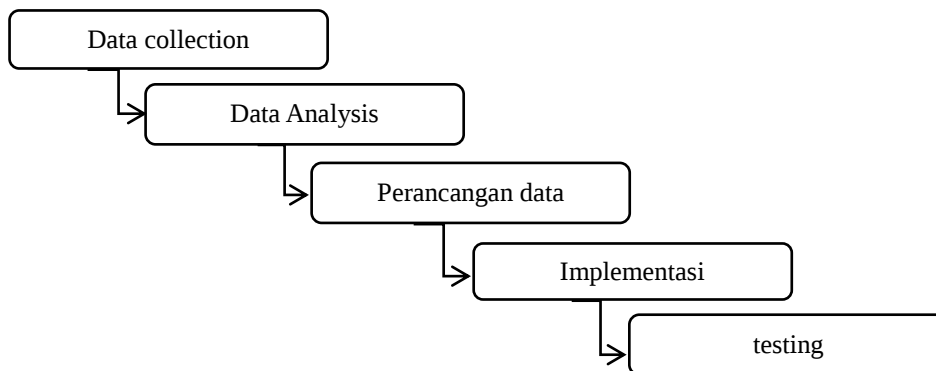
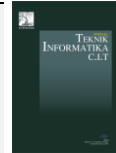


Fig 1. Research Framework

4.1 Analysis

The following is a flowchart of the Simple Additive Weighting method which is used as a solution to the problem of determining Additional Food Recipients in the Kentang Sentang Village Using the Simple Additive Weighting Method.

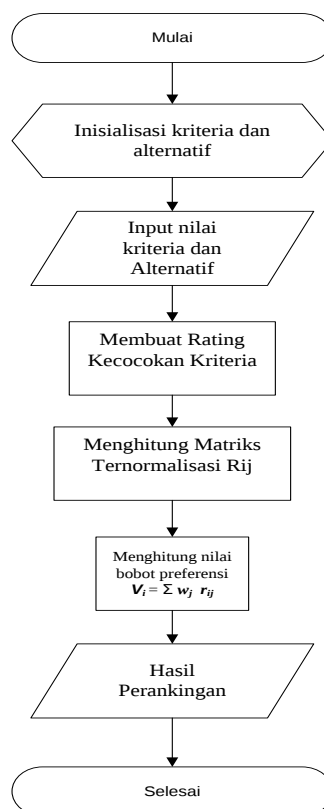


Fig 2. Flowchart SAW Method

a. Determine Criteria

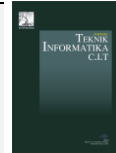
The criteria used in this study to obtain eligibility for additional food program recipients are as follows :

- 1) Baby age
- 2) Nutritional status
- 3) Parents' income
- 4) Tariff / electric power



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b. Determining Weight Preferences (W)

Table 1.
Criteria Weight

Criteria	Weight	Percentage
Baby Age	0.35	35%
Nutritional status	0.25	25%
Parents' income	0.25	25%
Tarif/electric power	0.15	15%
Total	1	100%

c. Make a match rating table of each alternative on each criteria References

Table 2.
Assessment of Alternative

No	alternative code	NIP	Name	k1	k2	k3	k4
1	Altr 1	1207320501140001	Mhd. Rayan	1	0.5	0.75	0.75
2	Altr 2	1207321701170001	Raka Raditya	0.75	0.75	0.75	0.75
3	Altr 3	1207321404150001	Ahmad Abyan Sakan lbs	0.75	0.75	0.50	0.5
4	Altr 4	1207326111170001	Satria Pujiawan	0.25	0.5	0.50	0.5
5	Altr 5	1207321506150003	Gilang Ramadhan	0.75	0.5	0.50	0.5
6	Altr 6	1207321905170001	Dhafin Ghifari	0.5	0.5	0.50	0.5
7	Altr 7	1207322610150004	Rangga Pradika	0.75	0.75	0.75	0.5
8	Altr 8	1207325301160001	Khayla Almira M	0.75	0.75	0.50	0.75
9	Altr 9	120732095170001	M. Alnabilsyah	0.25	0.5	0.25	0.25
10	Altr 10	1207324112140002	Putri Aulia	0.25	0.75	0.50	0.75

d. Decision matrix X

R =	1	0.5	75	0.75
	0.75	0.75	75	0.75
	0.75	0.75	50	0.5
	0.25	0.5	50	0.5
	0.75	0.5	50	0.5
	0.5	0.5	50	0.5
	0.75	0.75	75	0.5
	0.75	0.75	50	0.75
	0.25	0.5	25	0.25
	0.25	0.75	50	0.75

e. Do the normalization process

$$R_{11} = 1 / \text{Max} (1, 0.75, 0.75, 0.25, 0.75, 0.5, 0.75, 0.75, 0.25, 0.25)$$

$$R_{11} = 1$$

$$R_{21} = 0.75 / \text{Max} (1, 0.75, 0.75, 0.25, 0.75, 0.5, 0.75, 0.75, 0.25, 0.25)$$

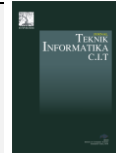
$$R_{21} = 0.75$$

$$R_{31} = 0.75 / \text{Max} (1, 0.75, 0.75, 0.25, 0.75, 0.5, 0.75, 0.75, 0.25, 0.25)$$

$$R_{31} = 0.75$$

$$R_{41} = 0.25 / \text{Max} (1, 0.75, 0.75, 0.25, 0.75, 0.5, 0.75, 0.75, 0.25, 0.25)$$

$$R_{41} = 0.25$$



f. Normalized matrix (R)

$$R = \begin{bmatrix} 1 & 0.66667 & 0.33333 & 1 \\ 0.75 & 1 & 0.33333 & 1 \\ 0.75 & 1 & 0.5 & 0.66667 \\ 0.25 & 0.66667 & 0.5 & 0.66667 \\ 0.75 & 0.66667 & 0.5 & 0.66667 \\ 0.5 & 0.66667 & 0.5 & 0.66667 \\ 0.75 & 1 & 0.33333 & 0.66667 \\ 0.75 & 1 & 0.5 & 1 \\ 0.25 & 0.66667 & 1 & 0.3333 \\ 0.25 & 1 & 0.5 & 1 \end{bmatrix}$$

g. Forming a Normalized Matrix

$$\begin{aligned} V1 &= (0.35*1) + (0.25*0.667) + (0.25*0.333) + (0.15*1) \\ &= 0.35 + 0.1667 + 0.0833 + 0.15 \\ &= 0.75 \end{aligned}$$

$$\begin{aligned} V2 &= (0.35*0.75) + (0.25*1) + (0.25*0.333) + (0.15*1) \\ &= 0.2625 + 0.25 + 0.0833 + 0.15 \\ &= 0.74583 \end{aligned}$$

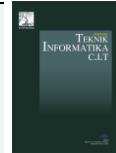
$$\begin{aligned} V3 &= (0.35*0.75) + (0.25*1) + (0.25*0.5) + (0.15*0.667) \\ &= 0.2625 + 0.25 + 0.125 + 0.1 \\ &= 0.7375 \end{aligned}$$

$$\begin{aligned} V4 &= (0.35*0.25) + (0.25*0.667) + (0.25*0.5) + (0.15*0.667) \\ &= 0.0875 + 0.16667 + 0.125 + 0.1 \\ &= 0.47917 \end{aligned}$$

h. Recapitulation of Assessment of Prospective Beneficiaries

Table. 3
Recapitulation of assessment PMT

No	Nama	Nilai Akhir	Keterangan
1	Mhd. Rayan	0.75000	Layak
2	Raka Raditya	0.74583	Layak
3	Ahmad Abyan Sakan	0.73750	Layak
4	Satria Pujiawan	0.47917	Tidak Layak
5	Gilang Ramadhan	0.65417	Layak
6	Dhafin Ghifari	0.56667	Tidak Layak
7	Rangga Pradika	0.69583	Layak
8	Khayla Almira M	0.78750	Layak
9	M. Alnabilsyah	0.55417	Tidak Layak
10	Putri Aulia	0.61250	Layak



4.1.1 Use case Diagram

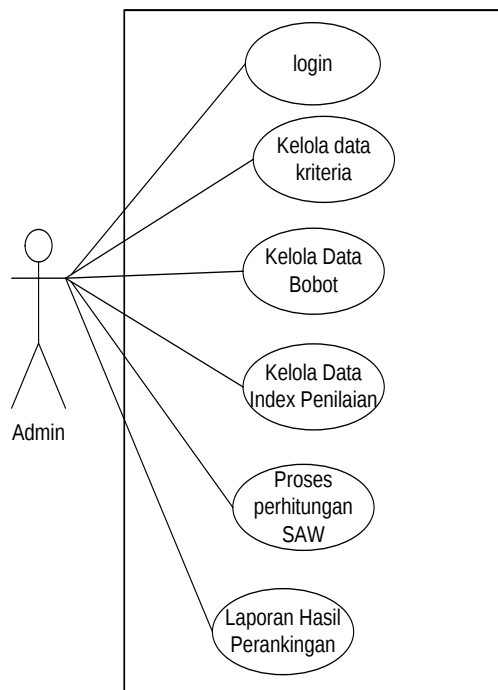


Fig 2. Use Case Diagram

4.2 Implementation System

a. Display Login From

Fig 3. Login Form

b. Main menu display

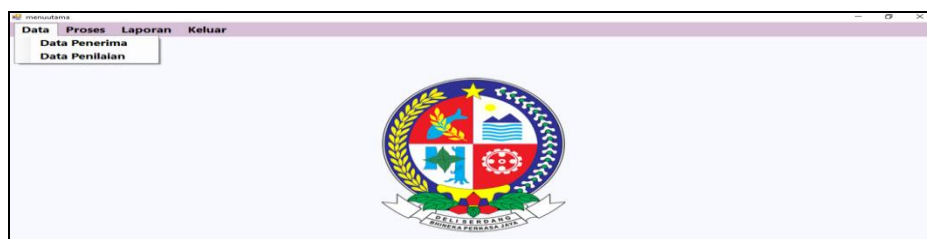
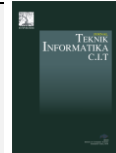


Fig 4. Main Course



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c. Display Recipient Data Form

NIK	Nama	Alamat	Tgl Lahir	Jenkel	Agama	Kont
1207320501140001	Mhd. Rayan	Jl. Besar Pematang Bura N...	3/3/2019	Pria	Islam	0811
120732095170001	M. Anabilsyah	Jl. Besar Desa Datuk Setia No. 89	3/3/2019	Pria	Islam	0811
120732140150001	Ahmad Abyan Sakan Ibs	Dusun 1 G. Kelambir	9/3/2019	Pria	Islam	0811
120732150150003	Gilang Ramadhan	Jl. Besar DS Kelambir	9/3/2019	Pria	Islam	0811
120732170150001	Raka Raditya	Jl. Besar DS Kelambir No. 1...	9/3/2019	Pria	Islam	0811
120732190150001	Dhafin Ghifari	Jl. Besar DS Kelambir No. 1...	9/3/2019	Pria	Islam	0811
120732261150004	Rangga Pradika	Jl. Besar DS Kelambir No. 12	9/3/2019	Pria	Islam	0811

Figure 5. Recipient Data Form

d. References sh Display Assessment Data Form

NIK	Nama	K1	K2	K3	K4
1207320501140001	Mhd. Rayan	1	0.5	0.75	0.75
120732095170001	M. Anabilsyah	0.75	0.75	0.75	0.75
120732140150001	Ahmad Abyan Sakan Ibs	0.75	0.75	0.5	0.5
1207321506150003	Gilang Ramadhan	0.75	0.5	0.5	0.5
1207321701170001	Raka Raditya	0.5	0.5	0.5	0.5
1207321905170001	Dhafin Ghifari	0.5	0.5	0.5	0.5
1207322610150004	Rangga Pradika	0.75	0.75	0.75	0.5
1207324112140002	Putri Aulia	0.75	0.75	0.5	0.75

Figure 6. Assessment Data Form

e. Display Calculation Result Form

Kode Kegiatan	Nama	K1	K2	K3	K4	K5
1207320501140001	Mhd. Rayan	1	0.5	0.75	0.75	
120732095170001	M. Anabilsyah	0.75	0.75	0.75	0.75	
1207321404150001	Ahmad Abyan Sakan Ibs	0.75	0.75	0.5	0.5	
1207321506150003	Gilang Ramadhan	0.75	0.5	0.5	0.5	
1207321701170001	Raka Raditya	0.5	0.5	0.5	0.5	
1207321905170001	Dhafin Ghifari	0.5	0.5	0.5	0.5	
1207322610150004	Rangga Pradika	0.75	0.75	0.75	0.5	
1207324112140002	Putri Aulia	0.75	0.75	0.5	0.75	

Data Penilaian: NIK: 1207321404150001, Nama: Ahmad Abyan Sakan Ibs, K1: 0.75, K2: 0.75, K3: 0.5, K4: 0.5, Hasil: 0.8375

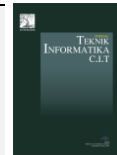
Figure 5. Calculation Result Form

f. Display Report Form

NIK	Nama	Nilai	Keterangan
1207321404150001	Ahmad Abyan Sakan Ibs	0.84	Layak
1207321905170001	Dhafin Ghifari	0.67	Layak
1207321701170001	Gilang Ramadhan	0.75	Layak
1207321506150003	Satria Pujiawan	0.58	Tidak Layak
1207320501140001	Mhd. Rayan	0.90	Layak
1207326111170001	Putri Aulia	0.76	Layak
1207322610150004	Rangga Pradika	0.80	Layak
1207325301160001	M. Anabilsyah	0.60	Layak
120732095170001	Raka Raditya	0.90	Layak
1207324112140002	Khayla Almira M	0.94	Layak

9/4/2019
Kepala Desa
Kubah Sentang

Figure 5. Report Form



5. Conclusion

- 1) Problems that occur regarding the determination of Additional Food Recipients in the Kentang Sentang Village can be solved by applying the Simple Additive Weighting Method.
- 2) Implementation of a Decision Support System for the determination of Additional Food Recipients in Kubah Sentang Village by adjusting criteria and using weights to be used with Simple Additive Weighting.
- 3) Applications that adopt the Simple Additive Weighting Method can already be used to determine the Additional Food Recipients in the Kentang Sentang Village.

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