

## IMPLEMENTATION DECISION SUPPORT SYSTEM DETERMINING ELIGIBILITY OF DIRECT CASH AID RECIPIENT COMMUNITIES

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**Abstract:** Pulau Kopung Sentajo Village Government in determining communities recipients of Direct Cash Assistance (BLT) has not used a computerized system so that in decision making errors will often occur in the suitability criteria for potential BLT recipients. So things like this will increase the possibility that poor or underprivileged people will lose out to people who live better lives and also take a lot of time because they still use manual systems. In terms of the report produced, it does not display the criteria for potential recipients clearly and in detail. In solving the problem, a decision support system will be used using the simple additive weighting method. So this research produces a computerized system to support decision making that determines people's suitability as recipients of direct cash assistance. With this computerized system, it will make it easier to determine the eligibility of people receiving Direct Cash Assistance and produce effective reports with calculations that comply with existing criteria. By implementing this computerized decision support system, 7 people are recommended who are eligible to receive direct cash assistance with the highest score of 2,875 and the lowest score of 2,750 so that these results can assist the village head in determining the community's suitability as recipients of direct cash assistance.

**Keywords:** assistance; BLT; SAW; FMADM;

**Abstrak:** Pemerintah Desa Pulau Kopung Sentajo dalam menentukan masyarakat sebagai penerima Bantuan Langsung Tunai (BLT) belum menggunakan sistem yang terkomputerisasi sehingga dalam pengambilan keputusan akan sering terjadi kesalahan dalam perbandingan kriteria kesesuaian calon penerima BLT. Sehingga hal seperti ini akan memperbesar kemungkinan masyarakat miskin atau kurang mampu akan kalah dengan masyarakat yang kehidupannya lebih baik dan juga memakan banyak waktu karena masih menggunakan sistem manual. Dari segi laporan yang dihasilkan, tidak menampilkan kriteria calon penerima secara jelas dan rinci. Dalam penyelesaian masalah akan digunakan sistem penunjang keputusan dengan metode simple additive weighting. Maka dengan penelitian ini menghasilkan sistem yang terkomputerisasi untuk mendukung pengambilan keputusan menentukan kelayakan masyarakat sebagai penerima bantuan langsung tunai. Dengan sistem yang terkomputerisasi ini, maka akan memberikan kemudahan dalam menentukan kelayakan masyarakat penerima Bantuan Langsung Tunai dan menghasilkan laporan yang efektif dengan perhitungan yang sesuai dengan kriteria yang ada. Dengan penerapan sistem pendukung keputusan yang terkomputerisasi ini maka direkomendasikan 7 orang yang layak menerima bantuan langsung tunai dengan skor tertinggi 2,875 dan skor terendah 2,750 sehingga hasil tersebut dapat membantu kepala desa dalam menentukan kelayakan masyarakat sebagai penerima bantuan tunai langsung.

**Kata Kunci:** bantuan; BLT; SAW; FMADM

### INTRODUCTION

Pulau Kopung Sentajo Village is

one of the villages located in Sentajo Raya District, Kuantan Singingi Regency, this village is the only village

in Sentajo Raya District which is located on the Batang Kuantan river. The community's economy is classified as lower middle class so this Direct Cash Assistance (BLT) very helpful daily life of the village community.

Direct Cash Assistance (BLT) is assistance provided by the government to underprivileged poor families, so that they can improve their level of social welfare order to reduce the economic burden which is increasingly pressing on their lives, as a result of the increase in the price of daily basic commodities and also the price of fuel which could disrupt the economy [1]. To receive BLT assistance, the government provides several conditions for the people who are entitled to receive this assistance in each village.

Decision Support System (DSS) or Decision Support System (DSS) is a system that is able to provide problem solving capabilities and communication capabilities for problems with semi-structured and unstructured conditions. System is used to assist decision making semi-structured situations and unstructured situations, where no one knows exactly how the decision should be made [2].

The Pulau Kopung Sentajo Village Government, when determining communities as recipients of Direct Cash Assistance, is not supported by a computerized system, so when making decisions, errors often occur regarding the comparison of criteria according to the regulations for distributing direct cash assistance. So conditions like this will increase the possibility that poor or underprivileged people will not receive direct cash assistance or the selection of recipients of direct cash assistance will be based on family and those closest to them. Determining recipients of direct

cash assistance using manual calculations will also take a lot of time and the resulting report will not be very effective because it does not directly display the value of each potential recipient according to the criteria in the rules for receiving direct cash assistance. To create transparency in accordance with the basis of direct cash assistance distribution, computerized system is the most effective as a decision support system in assisting village heads.

Previous research was conducted by (Handayani R. N. and Hariyanti I., 2022) this research discussed the Decision Support System for Determining Prospective Direct Cash Assistance (BLT) Recipients Using the SAW Method [2], then other research was conducted by (Putra P. P. et al., 2022) research This study discusses the decision support system for determining blt recipients using the saw method [3], then research (Sari R. et al., 2022) this research discusses the decision support system for direct cash aid (blt) recipients using the website-based simple additive weighting (saw) method [4], further research (Patrolan E. and Kusnanto G., 2023) discusses the design and design of a decision support system for receiving direct cash assistance using the simple additive weighting method [5]. Next, research (Aminah S., Abdullah A. and Istikoma, 2023) discusses the Decision Support System for BLT Acceptance Using the Multi Attribute Utility Theory Method [6]. Next, research (Safitri H. and Zaeniah, 2023) discusses the decision support system for blt recipients using the simple additive weighting method in tempos village [7]. Next, research (Prahartiwi L. I. and Rosita D., 2022) discusses the Decision Support System for Direct Cash Assistance Recipients Using Simple Additive

Weighting (SAW) in Sukatenang Village [8]. Next is research (Putra R. T. S. and Wibowo S. A. and Pranoto Y. A., 2021) which discusses the decision support system for blt receipt in sampang district using the saw method and web-based ahp method [9].

**METHOD**

Simple Additive Weighting (SAW) is a weighted addition method. The basic concept of the SAW method is to find the weighted sum of the performance ratings for each alternative on all criteria. The SAW method requires a process of normalizing the decision matrix (x) to a scale that can be compared with all existing alternative ratings. The SAW method recognizes 2 attributes, namely profit criteria (benefits) and cost criteria (costs). The fundamental difference between these two criteria is in the selection of criteria when making decisions [3]. The following is the formula(1) for normalization in the SAW method [10]:

$$r_{ij} = \begin{cases} \frac{x_{ij}}{\max_i x_{ij}} & \text{if } j \text{ is a benefit attribute} \\ \frac{\min_i x_{ij}}{x_{ij}} & \text{if } j \text{ is the cost attribute} \end{cases} \quad (1)$$

Where :

Rij = Normalized performance rating

Maxij = The maximum value of each row and column

Minij = Minimum value of each row and column

Xij = The rows and columns of the matrix Where Rij are the normalized performance ratings of the alternative Ai on the attribute Cj; i =1,2,...m and j= 1,2,...,n.

In determining which people truly deserve to receive Direct Cash Assistance (BLT), the author proposes several criteria as follows :

1. C1 = Income
2. C2 = Age
3. C3 = Job
4. C4 = Target Category

Data used in this research is data from people who live in the village of Pulau Kopung Sentajo. Community data used in this research is data from communities receiving direct cash assistance in September 2023. Data collection was carried out by direct observation in the field and interviews with the Pulau Kopung Sentajo Village Government. The criteria and weighting process that will be used in determining recipients of Direct Cash Assistance (BLT) can be seen as follows.

Criteria used in decision making

Process completing Decision Support System in determining the recipients of Direct Cash Assistance (BLT) requires weighting of each predetermined criterion. There are 4 (four) criteria that will be used in determining recipients of Direct Cash Assistance (BLT) in Pulau Kopung Sentajo Village are as follows:

The first criterion is conversion income with fuzzy numbers. Table 1 has fuzzy and crisp values for each income range.

Table 1. Income

Income Value	Fuzzy Numbers	Score
> 2 Million	Low	0
1 – 2 Million	Medium	0,33
< 1 Million	Height	0,67
No Income	Very High	1

The second criterion is age converted to fuzzy numbers. Table 2 has fuzzy and crisp values for each age range.

Table 2. Age

Age Value	Fuzzy Numbers	Score
< 15 Year	Very Low	0
15 s/d 30 Year	Low	0,25
31 s/d 50 Year	Medium	0,5
51 s/d 70 Year	Height	0,75
> 70 Year	Very High	1

The third criterion is that job is converted into fuzzy numbers. Table 3 has fuzzy and crisp values for each job range.

Table 3. Work

Work Value	Fuzzy Numbers	Score
Self-Employed	Low	0
Peasant	Medium	0,5
No Working	Very High	1

The fourth criterion is that the Target Category is converted into fuzzy numbers. Table 4 has fuzzy values and crisp for each target category range.

Table 4. Target Category

Target Category Value	Fuzzy Numbers	Score
Healthy	Very Low	0
Extreme Poor	Low	0,25
Chronic Pain	Medium	0,5
Elderly	Height	0,75
Disabled	Very High	1

Even though the decision value assumption meets the criteria for Eligible and Inadequate based on the total ranking value obtained from Community data as recipients of Direct Cash Assistance (BLT), there are variables as minimum standards that must be met in order to the community deserves to be given Direct Cash Assistance (BLT).

**Research Flow Chart**

Research flow diagram provides an overview of the research steps carried

out. The following are the existing research steps[11].

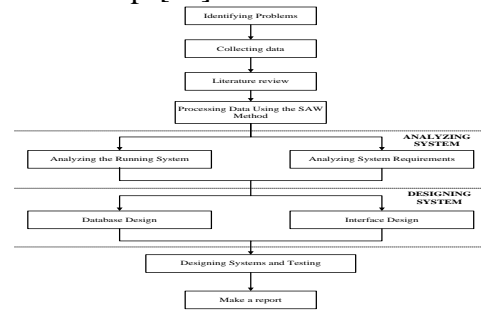


Figure 1. Flow diagram of research steps

**RESULT AND DISCUSSION**

Results are based on Fuzzy Multiple Attribute Decision Making (FMADM) calculations, namely algorithm calculations to determine recipients of Direct Cash Assistance by applying the Simple Additive Weighting (SAW) method. generate a ranking of each community data. The following is the community data used in table 6. The steps for solving it are as follows. The first step criteria used as a reference in Ci decision making. Second step rank the suitability of alternatives for each criterion. Based on the completion steps above, they will be applied in table 5 below.

Table 5 above explains that people receiving Direct Cash Assistance (BLT) who have carried out various tests will be ranked based on 4 predetermined criteria, namely C1 (Income), C2 (Age), C3 (Employment), C4 (Target Category) with previous values have been converted to fuzzy numbers.

Community data for 15 people in the table above was converted into fuzzy numbers.

Table 5. Community Data Table

Nu	Alternatives	Criteria			
		C1	C2	C3	C4
1	Intan Sori	No income	88 Year	Peasant	Elderly
2	Nurani	No income	83 Year	Peasant	Elderly
3	Nur Amra	No income	77 Year	Peasant	Elderly
4	Asamsia	No income	88 Year	Peasant	Elderly
5	Rayusmalaili	No income	25 Year	Peasant	Disabled
6	Buje Mansurudin	No income	55 Year	Peasant	Disabled
7	Arlusman	No income	55 Year	Peasant	Disabled
8	Zonia	No income	24 Year	Peasant	Disabled
9	Atika Mulyani	No income	5 Year	Peasant	Healthy
10	Baini	No income	75 Year	Peasant	Elderly
11	Nita Anggraini	1 Million	22 Year	No Working	Extreme Poor
12	Aidil Fitra	No income	13 Year	No Working	Extreme Poor
13	Reyhan Kadri Ananda	No income	13 Year	No Working	Extreme Poor
14	Ih Fanul Fatiha	No income	17 Year	No Working	Extreme Poor
15	Revhan Renata	No income	16 Year	No Working	Extreme Poor

Table 6. Community Data Alternatives and Criteria

Nu	Alternatives	Criteria			
		C1	C2	C3	C4
1	Intan Sori	1	1	0,5	0,75
2	Nurani	1	1	0,5	0,75
3	Nur Amra	1	1	0,5	0,75
4	Asamsia	1	1	0,5	0,75
5	Rayusmalaili	1	0,25	0,5	1
6	Buje Mansurudin	1	0,75	0,5	1
7	Arlusman	1	0,75	0,5	1
8	Zonia	1	0,25	0,5	1
9	Atika Mulyani	1	0	0,5	0
10	Baini	1	1	0,5	0,75
11	Nita Anggraini	0,67	0,25	1	0,25
12	Aidil Fitra	1	0	1	0,25
13	Reyhan Kadri Ananda	1	0	1	0,25
14	Ih Fanul Fatiha	1	0,25	1	0,25
15	Revhan Renata	1	0,25	1	0,25

Table 6 above states all community values which will be added up to C1, C2, C3 and C4 to produce values using a fuzzy number model. here are the next steps :Decision Matrix And Matrix Normalization. Create a decision matrix according to the criteria in Ci, then normalize the matrix based on the equation so that it matches the attribute type and get a normalized matrix R.

Based on table 7, produce a decision matrix X from formula (1). Next

normalization of the decision matrix is carried out using the equation formula. According to the results of the normalization calculation of the matrix X, the normalized matrix R can be determined as follows.

$$R = \begin{pmatrix} 1 & 1 & 0,5 & 0,75 \\ 1 & 1 & 0,5 & 0,75 \\ 1 & 1 & 0,5 & 0,75 \\ 1 & 1 & 0,5 & 1 \\ 1 & 0,25 & 0,5 & 1 \\ 1 & 0,75 & 0,5 & 1 \\ 1 & 0,75 & 0,5 & 1 \\ 1 & 0,25 & 0,5 & 0 \\ 1 & 0 & 0,5 & 0,75 \\ 1 & 1 & 0,5 & 0,25 \\ 0,67 & 0,25 & 1 & 0,25 \\ 1 & 0 & 1 & 0,25 \\ 1 & 0 & 1 & 0,25 \\ 1 & 0,25 & 1 & 0,25 \\ 1 & 0,25 & 1 & 0,25 \\ 1 & 1 & 1 & 1 \end{pmatrix}$$

Vector multiplication with a normalized matrix R.

The next stage determines the level of importance of the existing criteria, with the symbol (W). The existing criteria are then determined by the level of importance according to the existing weight values using the formula, namely the nth/n-1st variable. below are alternative suitability ratings:

Table 7 shows the criteria values for direct cash assistance.

Table 7. Level of Importance of Each Criteria

Criteria	Fuzzy Numbers	Score
(C1) Income	Very Important (P)	1
(C2) Age	Very Important (P)	1
(C3) Employment	Very Important (P)	1
(C4) Target Category	Important (P)	0,5

Following is weighting in the form of fuzzy numbers taken from table 7.

$$W = [ 1 \ 1 \ 1 \ 0,5 ]$$

Final stage is ranking by multiplying the weights (W) by the normalized matrix (R). All ranking values V1-V15 from the results of multiplication with normalization are combined in table 8. Table 8 groups the results of data on communities receiving direct cash assistance so that ranking is needed to get perfect results. by sorting the highest scores to get first place

In determining recipient community for Direct Cash Assistance in Pulau Kopung Sentajo Village, only a few people were selected because Direct Cash Assistance (BLT) has a Quota determined by the local government, so a selection was carried out to find the community as recipients of Direct Cash Assistance (BLT), and if there is the same ranking then the only person who can make a decision is the leader in Pulau Kopung Village.

Table 8. Results of Community Decisions as Prospective BLT Recipients

No	Alternatives	Criteria				Results	Ranking	Information
		C1	C2	C3	C4			
1.	Nur Amra	1	1	0,5	0,375	2,875	1	L
2.	Baini	1	1	0,5	0,375	2,875	2	L
3.	Intan Sori	1	1	0,5	0,375	2,875	3	L
4.	Asamsia	1	1	0,5	0,375	2,875	4	L
5.	Nurani	1	1	0,5	0,375	2,875	5	L
6.	Buje Mansurudin	1	0,75	0,5	0,5	2,750	6	L
7.	Arlusman	1	0,75	0,5	0,5	2,750	7	L
8.	Revhan Renata	1	0,25	1	0,125	2,375	8	TL
9.	Ih Fanul Fatiha	1	0,25	1	0,125	2,375	9	TL
10.	Zonia	1	0,25	0,5	0,5	2,250	10	TL
11.	Rayusmalaili	1	0,25	0,5	0,5	2,250	11	TL
12.	Aidil Fitra	1	0	1	0,125	2,125	12	TL
13.	Reyhan Kadri Ananda	1	0	1	0,125	2,125	13	TL
14.	Nita Anggraini	0,67	0,25	1	0,125	2,045	14	TL
15.	Atika Mulyani	1	0	0,5	0	1,500	15	TL

From table 8 above, the results of the decision state that 7 people in the community were declared eligible (L) because these 8 people had a score above 2,500 which was considered a more appropriate score as recipients of Direct Cash Assistance (BLT) who were selected using the SAW method. Or a minimum standard could also be created so that if the value is met, it can be said that it is appropriate or not to receive direct cash assistance in Pulau Kopung Sentajo Village provided that the decision is still held by the highest leadership in the village, namely the Village Head of Pulau Kopung Sentajo.

### Design and Implementation Process

General description of the system by applying the Simple Additive Weighting (SAW) method which is designed to make it easier for users to know how a system runs and will also be useful for penetrating the work system being implemented. In this system design, it is explained how a system is formed and separated.

### Add Community Rating Page

This add community assessment data page is used by the admin to input community assessment data based on existing data at the research sit

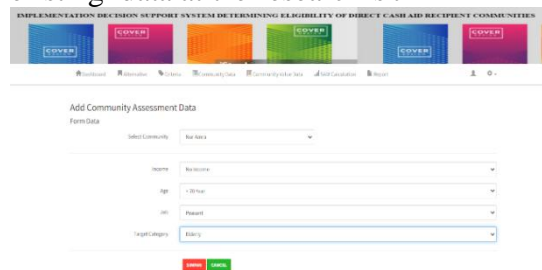


Figure 2. Add Community Rating Page

### Final Calculation Report Data Page

The final calculation report data page is useful for displaying the final result data from the existing value

conclusions, where on this page there is a ranking of each potential recipient of direct cash assistance and also information on the ranking obtained

Number	Name Community	Income	Age	Job	Target Category	Value	Ranking	Information
1	...	...	...	...	...	2,375	1	...
2	...	...	...	...	...	2,375	2	...
3	...	...	...	...	...	2,375	3	...
4	...	...	...	...	...	2,375	4	...
5	...	...	...	...	...	2,375	5	...
6	...	...	...	...	...	2,375	6	...
7	...	...	...	...	...	2,375	7	...
8	...	...	...	...	...	2,375	8	...
9	...	...	...	...	...	2,375	9	...
10	...	...	...	...	...	2,375	10	...
11	...	...	...	...	...	2,375	11	...
12	...	...	...	...	...	2,375	12	...
13	...	...	...	...	...	2,375	13	...
14	...	...	...	...	...	2,375	14	...
15	...	...	...	...	...	2,375	15	...
16	...	...	...	...	...	2,375	16	...
17	...	...	...	...	...	2,375	17	...
18	...	...	...	...	...	2,375	18	...

Figure 3. Final Calculation Report Data Page

### Final Report Print Page

The printed page data report is a report on the final calculation results that can be reported by the admin in printed form and can be used as consideration by the village head.

Figure 4. Final Report Print Page

### CONCLUSION

Produce computerized system to support decisions determine the eligibility of people receiving Direct Cash Assistance. With computerized system, it will be easy and fast to determine the eligibility of people who receive Direct Cash Assistance. With a computerized system, reports in determining the eligibility of people receiving Direct Cash Assistance will be more effective because calculations are in accordance with existing criteria. With the application of a computerized

decision support system, 7 people were recommended as worthy recipients of direct cash assistance with the highest score of 2,875 and the lowest score of 2,750 so that these results can help the village head in determining the suitability of the community receiving direct cash assistance.

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