

Topsis Method To Determine Recipients Of Covid 19 Social Assistance Funds

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ARTICLE INFO

ABSTRACT

Article history:

Received: 2021-02-27

Revised: 2021-04-04

Accepted: 2021-04-29

Keywords:

TOPSIS; DSS;

Social Assistance funds

Pandemic and social restrictions are inseparable things, with the existence of these restrictions, several sectors of life have changed, including the economic sector, the number of unemployed due to layoffs has increased because a number of companies have difficulty covering operational costs. The central government finally took a policy to provide social assistance to residents who met the criteria of being poor and the determination was left to the local government. The method used to assist decision making to determine suitable beneficiaries is to use TOPSIS. With the TOPSIS method, it is hoped that the assessment will be more precise because it is based on predetermined criteria and weight values so that more accurate results will be obtained. In this research, the results obtained from ranking to determine the priority for citizens to get Covid 19 social assistance and the results of residents who do not earn because they do not work while having dependents of more than 5 people who are more than 30 years old get the top priority

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1. Introduction

The Covid 19 pandemic enters its 2nd year to haunt people's lives in Indonesia from the start Announced in March 2020, to be precise On March 2, 2020, for the first time the government announced two cases of positive Covid-19 patients in Indonesia [1]. The Covid-19 pandemic has significantly eroded people's lives, and even from an economic standpoint it could have fatal consequences and led the Indonesian nation to the brink of economic recession. This fact really becomes a concern for state [2]. To ease the burden on the lives of its people, the government adopted a policy of providing social assistance in the form of direct cash assistance. The Coordinating Ministry for Human Development and Culture also ensures that the government continues to make improvements, especially regarding data. However, due to the dynamic nature of the data, data improvement is certain to take place continuously while the social assistance distribution process is carried out as directed by the President. He also revealed that there had been an agreement between the Ministry of Villages, Disadvantaged Areas and Transmigration and the Ministry of Social Affairs, including ensuring that there would be no overlapping distribution of social assistance and of course right on target [3]. According to Wiku Adisasmito, the head of the National Task Force for the Acceleration of Covid-19 Handling Expert Team, the peak of the pandemic is now unpredictable because the cases are very dynamic with people's behavior. [4].

A sub-district based on Government Regulation Number 73 of 2005 concerning Kelurahan is the work area of a lurah as a regency / city apparatus within a sub-district working area. The sub-district is led by a lurah who is under and responsible to the Regent / Mayor through the Camat [5]. Kelurahan in the implementation of the distribution of social assistance to the community is considered to be less than optimal due to the unpreparedness of the government and the unavailability of a decision support system to determine which poor families should be entitled to assistance [6].

Currently, social assistance is part of a government program during the COVID-19 pandemic, which in its distribution, if seen so far, has not reached all affected parties. This is due to inaccurate data held by the government. For this reason, a system is needed that can assist the government in updating data in the hope that policies issued by the government can run effectively [7]. Therefore, this study aims to map the problem of distributing social assistance during the COVID-19 pandemic. It is hoped that the results of this study can

provide an understanding of alternative solutions to the main problems related to the distribution of Covid-19 social assistance.

2. Research Methode

2.1. Decision Support System

Decision Support System (DSS) first disclosed in the early 1970's by Michael S. Scott Morton with the term Management Decision Systems [8][9]. In particular DSS is defined as a system that supports the work of a manager or a group of managers in solving semi-structured problems by providing information or suggestions leading to certain decisions. [10].

In a decision support system, a person's intellectual resources are combined with computer skills to help improve the quality of the decisions taken. Decision making is a process of choosing an action among several alternatives so that the desired goal can be achieved [11].

To help determine someone who deserves social assistance, a decision support system is needed. With the existence of the Decision Support System (DSS), it is hoped that the decision-making process can minimize the occurrence of wrong targets that often arise in the process of selecting citizens who want to get assistance.[12].

2.2. Technique for Order Performance by Similarity to Ideal Solution (TOPSIS)

Technique for Order Performance by Similarity to Ideal Solution (TOPSIS) using the principle that as an alternative the chosen one must have the longest distance from making a negative ideal decision from a geometric point of view by using the relative approach of the other alternatives [13]. The advantages of the TOPSIS algorithm include being easy to understand with a simple concept, computational efficiency, and having the ability to measure the relative performance of alternative decisions in the form of simple calculations. [11] and the most ideal in making a solution [14].

In previous research conducted by researchers published in scientific papers and journals regarding the use of Decision Support Systems (DSS) in the selection system using the TOPSIS method, namely, determining the quality of employees in supporting company progress is very important, so that many companies are trying to have qualified employees. There are various ways that can be done, namely by recruiting prospective employees according to the criteria desired by the company, it's just that so far many companies often have problems in the filing and selection process because they are done manually, it is very possible for errors to occur in this selection process so that the results are not in accordance with criteria for prospective employees desired by the company. One of the decision support systems (DSS) with the TOPSIS method for selecting employee admissions which has several criteria including English language test scores (TOEFL), graduation GPA scores, work experience, age, and Academic Potential Test (TPA). Meanwhile, to get the TPA score using verbal assessment criteria, numerical assessment, and logical assessment. The results of the test can be concluded that the SPK for recruitment using the TOPSIS method produces a system that can provide recommendations for the best applicants according to the specified criteria. The implementation of the SPK in the selection process for recruiting employees using the TOPSIS method has the objective that the organization / company can obtain employees who meet the criteria and meet the predetermined requirements.[15].

Therefore, the decision support system developed with the TOPSIS method can help in the best decision-making system with more accurate and faster calculation results so as to produce information that can be used as decision support. [16].

Several stages in calculating the TOPSIS Method are as follows:

- a. Making a decision matrix with the normalization process;

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^m x_{ij}^2}} \quad (1)$$

with $i=1,2,\dots,m$ dan $j=1,2,\dots,n$.

- b. Calculating the weighted normalization matrix value;

The ideal positive solution A^+ and the ideal solution negative A^- can be determined based on the normalized weight rating (y_{ij}) as:

$$x_{ij} = w_i r_{ij} \quad (2)$$

with $i=1,2,\dots,m$ and $j=1,2,\dots,n$.

- c. Calculate the value of the matrix of the positive ideal solution as well as the negative ideal solution matrix (A^+ dan A^-);

$$A^+ = (y1^+, y2^+, \dots, yn^+) \quad (3)$$

$$A^- = (y1^-, y2^-, \dots, yn^-) \quad (4)$$

with:

$$y1^+ \begin{cases} \max_1 y_{ij} \\ \min_1 y_{ij} \end{cases}$$

if j is cost

if j is benefit

$$y1^- \begin{cases} \max_1 y_{ij} \\ \min_1 y_{ij} \end{cases}$$

if j is benefit

if j is cost

- d. Determine the distance between the alternative value and the matrix from the positive ideal solution and the negative ideal solution;

The distance between the alternatives D_i and the positive ideal solution is defined as:

$$D_i^+ = \sqrt{\sum_{j=1}^n (y_i^+ - y_{ij})^2} \quad 2i = 1,2 \quad (5)$$

The distance between the alternative A_i and the negative ideal solution is defined as:

$$D_i^- = \sqrt{\sum_{j=1}^n (y_i^- - y_{ij})^2} \quad 2i = 1,2 \quad (6)$$

- e. Determine the preference value or the proximity value of each alternative or the preference value of the ideal solution.

TOPSIS requires a performance rating of each alternative A_i on each normalized C_j criterion.

The preference value for each alternative (V_i) is given as:

$$V_i = \frac{D_i^-}{(D_i^-) + (D_i^+)} \quad (7)$$

3. Result

In this study, the researchers took the location in the smallest government environment, namely the neighborhood unit in one of the urban villages in Bogor by using the interview method with village staff and observations made in Babakan Pasar Bogor Village using data samples from 10 residents who have criteria set by the local government. The criteria include daily income, occupation, number of dependents and age of the head of the family. In this study, the calculation is carried out using the TOPSIS method where the weights are determined from the existing criteria and then the type of attributes of each criterion is determined. The stages after describing alternatives with certain criteria and weights, determining the value of each alternative, creating a normalized matrix, calculating the weighted normalized matrix, then determining the positive and negative ideal values of each criterion based on attributes, then determining the preference value of each alternative and then ranking to determine the value of each alternative. get an alternative, in this case residents who are prioritized to get social assistance

Table 1.
Information Weights

Criteria Code	Criteria	Attribute	weights
C1	Income per day	Cost	5
C2	Profession	Cost	4
C3	The number of dependents	Benefit	4
C4	Age of Head of Family	Benefit	2

Weights	Information
1	Not important
2	Not too important
3	Quite important
4	Urgent
5	Very important

The determination of the weight is based on the results of the interview with the urban village but again the criteria in table 2 or the weight in table 1 given are only limited to submissions but the determination remains based on central government policy.

Table 2.
Determination of Criteria

Criteria Code	Criteria	Attribute	weights
C1	Income per day	Cost	5
C2	Profession	Cost	4
C3	The number of dependents	Benefit	4
C4	Age of Head of Family	Benefit	2

From the data for the poor that were obtained, the criteria were determined by weighting each alternative as in Table 3.

Table 3.
Determining the Value of the Alternative

Alternative	Criteria			
	C1	C2	C3	C4
RESIDENTS1	1	1	1	2
RESIDENTS2	2	2	1	2
RESIDENTS3	2	2	2	1
RESIDENTS4	2	1	2	3
RESIDENTS5	2	2	3	2
RESIDENTS6	1	1	3	2
RESIDENTS7	3	3	3	2
RESIDENTS8	3	2	2	1
RESIDENTS9	3	2	1	2
RESIDENTS10	3	2	1	3

From the alternatives made, then the formation of a normalized matrix is carried out by involving a divisor which is obtained from the weight of all alternatives in a criterion.

Table 4.
Normalized Matrix

Divider	7,348469228	6	6,557438524	6,633249581
	Income	Work	Dependent	Age



RESIDENTS1	0,1361	0,1667	0,1525	0,3015
RESIDENTS2	0,2722	0,3333	0,1525	0,3015
RESIDENTS3	0,2722	0,3333	0,3050	0,1508
RESIDENTS4	0,2722	0,1667	0,3050	0,4523
RESIDENTS5	0,2722	0,3333	0,4575	0,3015
RESIDENTS6	0,1361	0,1667	0,4575	0,3015
RESIDENTS7	0,4082	0,5000	0,4575	0,3015
RESIDENTS8	0,4082	0,3333	0,3050	0,1508
RESIDENTS9	0,4082	0,3333	0,1525	0,3015
RESIDENTS10	0,4082	0,3333	0,1525	0,4523

The positive ideal solution A+ and the negative ideal solution A can be determined based on the normalized weight rating (y_{ij}) $x_{ij} = w_{ij}r_{ij}$ with the formula with $i=1,2,\dots,m$ and $j=1,2,\dots,n$. As follows :

Table 5.
Weighted Normalized Matrix

Alternative	Income	Work	Dependent	Age
RESIDENTS1	0,6804	0,6667	0,6100	0,6030
RESIDENTS2	1,3608	1,3333	0,6100	0,6030
RESIDENTS3	1,3608	1,3333	1,2200	0,3015
RESIDENTS4	1,3608	0,6667	1,2200	0,9045
RESIDENTS5	1,3608	1,3333	1,8300	0,6030
RESIDENTS6	0,6804	0,6667	1,8300	0,6030
RESIDENTS7	2,0412	2,0000	1,8300	0,6030
RESIDENTS8	2,0412	1,3333	1,2200	0,3015
RESIDENTS9	2,0412	1,3333	0,6100	0,6030
RESIDENTS10	2,0412	1,3333	0,6100	0,9045

The weighted normalized matrix is obtained from Table 6 which is multiplied by the predetermined weight

Table 6.
Positive and Negative Ideal Values

MAX	0,6804	0,6667	1,8300	0,9045
MIN	2,0412	2,0000	0,6100	0,3015

Table 7.
Value of D + and D- for each alternative

D+	1,579281184	RESIDENTS1	D-	1,928869804	RESIDENTS1
	2,704139446	RESIDENTS2		0,999157895	RESIDENTS2
	1,860587649	RESIDENTS3		1,131150048	RESIDENTS3
	1,052506841	RESIDENTS4		1,725244947	RESIDENTS4
	1,215767353	RESIDENTS5		1,576923775	RESIDENTS5
	0,090909091	RESIDENTS6		2,282303839	RESIDENTS6
	3,229514504	RESIDENTS7		1,256694547	RESIDENTS7
	2,541001466	RESIDENTS8		0,903624628	RESIDENTS8
	3,384553263	RESIDENTS9		0,731678574	RESIDENTS9
	3,293644172	RESIDENTS10		0,89893315	RESIDENTS10

Benefit criteria are if the value is bigger the better then $D^+ = \max$ and $D^- = \min$ Cost criteria is if the value is getting smaller the better then $D^+ = \min$ and $D^- = \max$ Looking for D^+ D^- on each alternative as in Table 6 and Table 7.

Table 8.
Table of Prevention and Ranking

Alteratif	Prevensi (V)	Rangking
RESIDENTS1	0,5498	4
RESIDENTS2	0,2698	7
RESIDENTS3	0,3781	5
RESIDENTS4	0,6211	2
RESIDENTS5	0,5647	3
RESIDENTS6	0,9617	1
RESIDENTS7	0,2801	6
RESIDENTS8	0,2623	8
RESIDENTS9	0,1778	10
RESIDENTS10	0,2144	9

After determining the distance between the alternative value and the matrix of the positive ideal solution and the negative ideal solution, then Determining the preference value or the proximity value of each alternative or the preference value of the ideal solution.

TOPSIS requires a performance rating of each alternative A_i on each normalized C_j criterion. From this ranking, it is obtained that the categorized alternatives meet the criteria to be prioritized as beneficiaries of assistance, where residents are 6 with the highest rating at 0.9617.

4. Conclusion

This study aims to find the most appropriate criteria for social assistance recipients in order to provide targeted assistance based on the criteria used, namely the amount of income, occupation, number of dependents and age of the head of the family using sample data obtained by 10 residents. Based on the results of the analysis using the TOPSIS method, the highest preference value in the 6th citizen alternative with a value of 0.9617 where the resident does not earn because they do not work while having dependents of more than 5 people at the age of more than 30 years. By using this method, it is hoped that assistance can be right on target and in the future research can be carried out using other criteria or by building decision support program applications in accordance with the results of this study.

5. References

- [1] E. Pranita, "Diumumkan Awal Maret, Ahli: Virus Corona Masuk Indonesia dari Januari," *Kompas*, 2020. <https://www.kompas.com/sains/read/2020/05/11/130600623/diumumkan-awal-maret-ahli-virus-corona-masuk-indonesia-dari-januari#:~:text=Diumumkan Awal Maret%2C Ahli%3A Virus Corona Masuk Indonesia dari Januari,-Kompas.com - 11&text=KOMPAS.com - Pada 2 Maret,positif Covid-19 di Indonesia.>
- [2] H. Retnaningsih, "Bantuan Sosial bagi Pekerja di Tengah Pandemi Covid-19: Sebuah Analisis terhadap Kebijakan Sosial Pemerintah," *Aspirasi: J. Masal. Sos.*, vol. 11, no. 2, pp. 215–227, 2020, doi: 10.22212/aspirasi.v11i2.1756.
- [3] P. Mutiara, "2021, Bansos Covid-19 dalam Bentuk Tunai," *Kemenko PMK*, 2020. dalam bentuk tunai.
- [4] L. Tambunan, "Virus corona di Indonesia: Kapan puncak pandemi akan terjadi setelah penerapan 'new normal'?", *BBC Indonesia*, 2020. <https://www.bbc.com/indonesia/indonesia-53380880>.
- [5] S. Aprilianti, R. N. Pratiwi, and S. P. Rengu, "Gaya Kepemimpinan Lurah Sebagai Upaya Peningkatan Partisipasi Masyarakat Dalam Pembangunan," *J. Adm. Publik*, vol. 3, no. 1, pp. 96–101, 2015.
- [6] S. Suparmadi, "Sistem Pendukung Keputusan Seleksi Penerima Bantuan Sosial Untuk Keluarga Miskin Dengan Metoda Simple Additive Weighting (Saw)," *J. Sci. Soc. Res.*, vol. 4307, no. 1, pp. 21–28, 2019.
- [7] S. I. W. Rahmansyah, Resi Ariyasa Qadri, RTS Ressa Anggia Sakti, "PEMETAAN PERMASALAHAN PENYALURAN BANTUAN SOSIAL UNTUK PENANGANAN COVID-19 DI INDONESIA | Rahmansyah | JURNAL PKN (Jurnal Pajak dan Keuangan Negara)," *J. Pajak dan Keuang. Negara*, vol. 2, no. 1, pp. 90–102,



- 2020.
- [8] E. Agustini, “Sistem Pendukung Pengambilan Keputusan Penentuan Prioritas Properti di PT. ERA Bandung,” *Jur. Tek. Inform. Sekol. Tinggi Teknol. Telkom, Bandung*, 2004.
- [9] D. W. Nugraha, F. Teknik, J. T. Elektro, U. Tadulako, and S. S. Morton, “Sistem Pendukung Keputusan Pemilihan Desain Interior Menggunakan Metode Analytical Hierarchy Process (Ahp),” *J. Ilm. Foristek*, vol. 3, no. 2, pp. 279–285, 2013, doi: 10.12928/telkomnika.v2i1.1754.
- [10] J. Hermawan, *Membangun Decision Support System*, I. Yogyakarta: Penerbit Andi, 2005.
- [11] & L. T.-P. Turban E, Aronson JE, *Decision Support Systems and Intelligent Systems*, 7th ed. New Jersey: Pearson Prentice-Hall Education International., 2005.
- [12] I. P. Pertiwi, F. Fedinandus, and A. D. Limantara, “Sistem Pendukung Keputusan Penerima Program Keluarga Harapan (PKH) Menggunakan Metode Simple Additive Weighting,” *CAHAYAtech*, vol. 8, no. 2, p. 182, 2019, doi: 10.47047/ct.v8i2.46.
- [13] A. P. Windarto, “IMPLEMENTASI METODE TOPSIS DAN SAW DALAM MEMBERIKAN REWARD PELANGGAN,” *Kumpul. J. Ilmu Komput.*, vol. 4, no. 01, pp. 88–101, 2017
- [14] F. Riandari, P. M. Hasugian, and I. Taufik, “Sistem Pendukung Keputusan Menggunakan Metode TOPSIS Dalam Memilih Kepala Departemen Pada Kantor Balai Wilayah Sungai Sumatera II Medan,” *J. Inform. Pelita Nusant.*, vol. Vol. 2, no. 1, pp. 6–13, 2017.
- [15] E. G. Wahyuni and A. T. Anggoro, “Sistem Pendukung Keputusan Penerimaan Pegawai dengan Metode TOPSIS,” *Sains Teknol. dan Ind.*, vol. 14, no. 2, pp. 108–116, 2017.
- [16] E. Nurelasari and E. Purwaningsih, “Sistem Pendukung Keputusan Pemilihan Perumahan Terbaik dengan Metode TOPSIS Housing Selection Decision Support System Using the TOPSIS Method,” *J. Sist. dan Teknol. Inf.*, vol. 08, no. 4, pp. 317–321, 2020, doi: 10.26418/justin.v8i4.41036.