DECISION SUPPORT SYSTEM FOR RANKING ACTIVE WASTE BANKS IN MAKASSAR CITY USING TOPSIS AND VIKOR METHODS

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Diajukan untuk Memenuhi Sebagian Syarat
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ABSTRAK

Ahmad Ruslandia Papua. Sistem Pendukung Keputusan Perangkingan Bank Sampah Aktif di Kota Makassar Dengan Metode TOPSIS dan VIKOR. Dibimbing oleh Tasrif Hasanuddin dan Mardiyyah Hasnawi.

Di kota makassar sendiri setidaknya terdapat 1000 bank sampah yang pernah ada, namun hal tersebut terus berkurang hingga tahun 2023 hanya terdapat 381 bank sampah yang aktif. Banyaknya bank sampah yang tutup dikarenakan kurangnya pengetahuan masyarakat terhadap pemanfaatan bank sampah, penelitian ini bertujuan untuk melakukan perankingan pada bank sampah aktif di kota makassar dengan menggunakan teknik MCDM (Multi-Criteria Decision Making) terdapat dua metode MCDM yang akan digunakan yaitu metode TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) dan metode VIKOR (VIseKriterijumska Optimizacija I Kompromisno Resenje). Kedua metode ini memiliki kesamaan dimana metode ini sama-sama mencari nilai terdekat ke solusi ideal, namun menggunakan cara normalisasi dan fungsi agregrasi yang berbeda. Hasil dari penelitian ini menujukkan terdapat perangkingan yang sama pada penggunaan metode TOPSIS dan VIKOR. Dimana perhitungan metode TOPSIS meperhitungkan nilai bobot kriteria lalu memperhitungkan nilai kriteria sementara metode VIKOR memperhitungkan nilai kriteria tertinggi lalu memperhitungkan nilai bobot kriteria.

Kata kunci: *Perangkingan, Bank Sampah, MCDM, TOPSIS, VIKOR*

ABSTRACT

Ahmad Ruslandia Papua. Decision Support System for Ranking Active Waste Banks in Makassar City Using the TOPSIS and VIKOR Methods. Supervised by Tasrif Hasanuddin and Mardiyyah Hasnawi.

In the city of Makassar, there were initially around 1000 waste banks, but this number has decreased significantly, and by 2023 only 381 waste banks remain active. The decline in the number of waste banks is primarily due to the community's lack of knowledge regarding the utilization of waste banks. This research aims to rank the active waste banks in Makassar using the MCDM (Multi-Criteria Decision Making) technique. Two MCDM methods will be utilized in this study: the TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) method and the VIKOR (VIseKriterijumska Optimizacija I Kompromisno Resenje) method. Both methods share a common goal of finding the closest value to the ideal solution, but they differ in their normalization and aggregation functions. The results of this study indicate that the rankings obtained using the TOPSIS and VIKOR methods are consistent. The TOPSIS method calculates the criterion weight values and then the criterion values, while the VIKOR method first considers the highest criterion values and then calculates the criterion weight values.

Keywords: *Ranking, Waste Bank, MCDM, TOPSIS, VIKOR*

INTRODUCTION

A. Background of The Paper

Waste banks are facilities designed for sorting and collecting recyclable waste, which can be reused and hold economic value[1]. The Waste Bank Center (BSI) is a local institution authorized to facilitate the formation and management of Waste Bank Unit (BSU), which then become partners with the Environmental and Sanitation Technical Implementation Unit (UPTD) to manage waste by implementing the 3R system and making waste have economic value. Waste banks in the city of Makassar began operating in 2011 with 9 units, and over a period of 5 years, the Makassar city government gradually targeted 1000 waste banks to be present and spread throughout the neighborhoods (RW) in Makassar[2]. In 2020, the number of waste banks in Makassar was 939 units, with 341 still active and 598 of them already closed. These waste banks are spread across 15 districts in Makassar[3]. Based on data obtained from the Ministry of Environment and Forestry in 2023, there are at least 381 active waste banks out of the 1000 waste banks that have ever existed[4].

Previous research relevant to this topic includes a study by Fiermanzah in 2021, which indicates the lack of public knowledge about waste utilization. The research aimed to understand the community's behavior regarding waste bank utilization. The results of the study identified that the variables most influential in community behavior towards waste bank utilization are knowledge and family support[5]. Based on that research, it's understood that knowledge about waste banks significantly influences community engagement in waste bank utilization. Therefore, to enhance public knowledge and improve the efficiency and effectiveness of waste banks, a decision support system is needed to rank the most active waste banks in Makassar city.

In this research, the aim is to rank active waste banks in Makassar city using the Multi Criteria Decision Making (MCDM) technique. Two MCDM methods will be employed: the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) and the VIseKriterijumska Optimizacija I Kompromisno Resenje (VIKOR) method. This ranking is conducted to identify the most active waste banks based on specific criteria to enhance the efficiency and effectiveness of waste management in Makassar city. Implementing both TOPSIS and VIKOR methods is deemed appropriate for ranking active waste banks in Makassar city. TOPSIS method operates on the principle that the selected alternative should have the closest distance to the positive ideal solution and the farthest from the negative ideal solution, while the VIKOR method employs Utility Measure and Regret Measure values to prioritize advantages. Both methods are multi-criteria approaches that seek the nearest

value to the ideal solution but utilize different normalization and aggregation functions.[6][7].

Although the TOPSIS and VIKOR methods have the same objectives, the rankings obtained using these methods often differ[8]–[11], However, there are also studies indicating that rankings using both the TOPSIS and VIKOR methods yield the same results[10], [12], [13]. In this research, we will compare both methods to calculate waste bank data based on predetermined criteria, namely Operational Hours, Operational Schedule, Number of Customers, Number of Employees, and Amount of Collected Waste. This will enable us to generate a ranking system for the most active waste banks in Makassar city.

LITERATURE REVIEW

A. Multi Criteria Decision Making (MCDM)

Multi Criteria Decision Making (MCDM) is a decision-making method used to determine the best alternative from a set of alternatives based on several specific criteria. The goal of MCDM is to evaluate m alternatives A_i $(i = 1,2, \dots m)$ against a set of criteria C_j $(j = 1,2, \dots n)$. The following is the arrangement of alternatives and criteria into a Decision Matrix (X). The purpose of this process is to facilitate the weighting process and so forth[14].

$$X = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \dots & \dots & \dots & \dots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix}$$

Determining the preference weights for each criteria based on the level of importance between one criteria and another. The comparison values of the importance level between one criteria and another can be expressed as follows[6][15]:

Sangat Tidak Penting	=	1
Tidak Penting	=	2
Cukup Penting	=	3
Penting	=	4
Sangat Penting	=	5

B. TOPSIS (Technique for Order Preference by Similarity to Ideal Solution)

TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) is one of the decision-making methods first introduced by Hwang and Yoon in 1981. The basic concept of TOPSIS is that the selected alternative should have the shortest distance to the positive ideal solution and the longest distance to the negative ideal solution[16], By comparing the relative distances, the priority order of alternatives can be determined[17].

Ranking the most active waste bank alternatives using the TOPSIS method aims to obtain the best alternative solution, which is the solution with the shortest distance to the positive ideal solution and the farthest distance from the negative ideal solution[18].

The steps for ranking the most active waste banks using TOPSIS method are as follows :

1. Creating the decision matrix (X).

2. Determining the weight values.

3. Creating the normalized decision matrix.

The calculation of the normalized decision matrix is carried out using the following formula:

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

with

$i = 1,2, \ldots m$

and

$j = 1,2, \ldots n$

where

r_{ij} = Ranking the performance of-i alternative on-j criteria

x_{ij} = The i alternative on-j criteria

$\sqrt{\sum_{i=1}^{m} x_{ij}^2}$ = The square root of the sum of the squares of each alternative on one criteria.

4. The multiplication between the weight and the value of each attribute

The decision matrix is then multiplied by the weight and the value of each attribute, using the following formula :

$$y_{ij} = w_j \times r_{ij}$$

with

y_{ij} = The normalized weight value of alternative i on j criteria

w_j = Criteria Weight

i = $1,2, \ldots m$

j = $1,2, \ldots n$

5. Determining the positive ideal solution matrix and the negative ideal solution matrix

$$A^+ = (y_1^+, y_2^+, y_3^+, \cdots, y_n^+)$$

$$A^- = (y_1^-, y_2^-, y_3^-, \cdots, y_n^-)$$

With the condition :

$$y_i^+ = \begin{cases} max\ y_{ij} & = \text{If Attribute } j \text{ is Benefit} \\ min\ y_{ij} & = \text{If Attribute } j \text{ is Cost} \end{cases}$$

$$y_i^- = \begin{cases} max\ y_{ij} & = \text{If Attribute } j \text{ is Cost} \\ min\ y_{ij} & = \text{If Attribute } j \text{ is Benefit} \end{cases}$$

6. Determining the distance between the value of each alternative and the positive ideal solution and negative ideal solution matrix
   The distance between alternative A_i and the positive ideal solution is formulated as :

$$D_i^+ = \sum_{j=1}^{n} \left(y_i^+ - y_{ij}\right)^2$$

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

$$D_i^- = \sum_{j=1}^{n} \left(y_i - y_{ij}^-\right)^2$$

   where D is the value of the distance of the alternative.

7. Determining the preference value for each alternative
   The preference value for each alternative is calculated using the formula :

$$v_i = \frac{D_i^-}{D_i^- + D_i^+}$$

   Where V represents the preference value.

C. VIKOR (VIseKriterijumska Optimizacija I Kompromisno Resenje)

VIKOR (VIseKriterijumska Optimizacija I Kompromisno Resenje) is one of the decision-making methods first introduced by Serafim Opricovic in 1998. The basic concept of VIKOR is to select alternatives that approach the ideal solution by optimizing multi criteria in a complex calculation system, then rank the data by considering the Values or Regrets (R) of each alternative[19][20].

Ranking the most active waste bank alternatives using the VIKOR method aims to obtain a ranking result of alternatives that approaches the ideal solution by proposing compromise solutions[18].

The steps for ranking the most active waste banks using the VIKOR method are as follows :

1. Creating the decision matrix (X)

2. Determining the weight values

3. Determining the maximum and minimum values of the ideal solution for each criteria to create a normalization matrix

$$N_{ij} = \frac{(f_j^+ - x_{ij})}{(f_j^+ - f_j^-)}$$

Where :

N_{ij} = Elements of the Normalized Matrix

f_j^+ = The Best/Positive Element of Criteria *J*

f_j^- = The Worst/Negative Element of Criteria *J*

Determining the positive ideal value (f_j^+) and negative ideal value (f_j^-) as the ideal solutions

4. Performing weighting of each alternative and normalized criteria
Performing multiplication of the normalized data (N) with the predetermined criteria weights (W).

$$F_{j=1}^* = W_j \times N_{ij}$$

Where :

F_{ij}^* = The value of the data that has been normalized and weighted for alternative i on criteria *j*

W_j = The weight value for criteria *j*

N_{ij} = The normalized data value for i and *j*

5. Calculating the Utility Measure (S) and Regret Measure (R) values
The Utility Measure (S) and Regret Measure (R) are calculated using the following formulas :

$$S_i = \sum_{j=1}^{n} w_j \frac{(f_j^+ - x_{ij})}{(f_j^+ - f_j^-)}$$

S_i is the manhattan distance normalized and weighted

$$R_i = max_j \left[w_j \frac{(f_j^+ - x_{ij})}{(f_j^+ - f_j^-)} \right]$$

R_i is the chebyshev distance normalized and weighted

6. Calculating the VIKOR index (Q)

Afterwards, the VIKOR index for alternative i is calculated using the following formula :

$$Q_i = v\left[\frac{S_i - S^-}{S^+ - S^-}\right] + (1 - v)\left[\frac{R_i - R^-}{R^+ - R^-}\right]$$

Where

$S-$ = $min_i(S_i)$

$S+$ = $max_i(S_i)$

$R-$ = $min_i(R_i)$

$R+$ = $max_i(R_i)$

v represents the strategic weight value ranging from 0 to 1, with a value of v assumed to be 0,5. After finding the value of Q_i, the ranking of alternatives is determined from the lowest value. This is because the value of S_j is measured from the farthest point of the ideal solution, while the value of R_j is measured from the nearest point of the ideal solution.

RESEARCH METHODOLOGY

A. TOPSIS and VIKOR Method

The TOPSIS and VIKOR methods are Multi Criteria Decision Making (MCDM) methods, used to select among multi criteria. TOPSIS and VIKOR focus on ranking results by discussing the outcomes of different alternatives and criteria that have been calculated. They also have simple concepts and calculation processes. This system is web-based, intended to facilitate access for users.

B. Method of Data Collecting

1) Questionnaire

A questionnaire is a tool for collecting data by providing a list of questions to individuals who will provide responses or answer questions in the research. The individuals who respond to the questions are called respondents. The list of questions provided can be closed-ended (answer options are provided, and respondents choose from the provided answers) or open-ended (respondents can answer according to their preference regarding the question, respondents directly answer about themselves or others) or a combination of both[21].

2) Interview Technique

The interview technique involves collecting data through direct or indirect communication by the researcher to respondents/informants, providing a list of questions to be answered directly or at another opportunity[21].

3) Library Research

Literature review is attempted with the aim of recognizing the procedures to be used to resolve the case under surveillance and obtaining reference basics in applying the method to be used, by reviewing books, articles, and journals that can be used as references on the topic to be addressed.

RESEARCH RESULT AND DISCUSSION

A. Criteria and Alternative

In this study, the criteria used for ranking the most active waste banks are operational hours, operational schedule, number of customers, number of employees, and amount of waste collected. The determination of these criteria is based on the Regulation of the Minister of Environment and Forestry of the

Republic of Indonesia Number 14 of 2021 concerning Waste Management at Waste Banks. The following table represents the data values of the criteria :

Tabel 1. Criteria Data Values

Criteria Name	Crips Name	Values
Operational Hours	<= 2 Hours	1
Operational Hours	> 2 Hours s.d. 4 Hours	2
Operational Hours	> 4 Hours s.d. 6 Hours	3
Operational Hours	> 6 Hours s.d. 8 Hours	4
Operational Hours	>= 8 Hours	5
Operational Schedule	1 Days	1
Operational Schedule	2 Days	2
Operational Schedule	3 Days	3
Operational Schedule	4 Days	4
Operational Schedule	5 Days	5
Number of Customers	<= 50 Household	1
Number of Customers	> 50 Household s.d. 100 Household	2
Number of Customers	> 100 Household s.d. 150 Household	3
Number of Customers	> 150 Household s.d. 200 Household	4
Number of Customers	>= 200 Household	5
Number of Employees	<= 5 Employees	1
Number of Employees	> 5 Employees s.d. 10 Employees	2
Number of Employees	> 10 Employees s.d. 15 Employees	3
Number of Employees	> 15 Employees s.d. 20 Employees	4
Number of Employees	>= 20 Employees	5
Amount of Collected Waste	<= 20 KG/ Week	1
Amount of Collected Waste	> 20 KG s.d. 40 KG/ Week	2
Amount of Collected Waste	> 40 KG s.d. 60 KG/ Week	3
Amount of Collected Waste	> 60 KG s.d. 80 KG/ Week	4
Amount of Collected Waste	> 80 KG/ Week	5

The alternatives to be selected for ranking the most active waste banks are :

Tabel 2. Alternative Data

ID	Code	Alternative	Information
1	A01	Pelita Bangsa	BSU
2	A02	Pelita Harapan	BSU
3	A03	Kreatif Pemuda	BSU
4	A04	Kemapertika	BSU
5	A05	Teratai Pampang	BSU

B. Creating the Decision Matrix (X)

Table 3 shows the statistical relationship between alternatives and criteria. The following are the values given to form the decision matrix (X) based on the preference values of each criteria for all alternatives :

Tabel 3. Decision Matrix (X)

Alternative	Criteria				
	C1	C2	C3	C4	C5
Pelita Bangsa	3	2	1	2	3
Pelita Harapan	1	1	5	1	2
Kreatif Pemuda	5	2	1	1	4
Kemapertika	1	1	1	2	1
Teratai Pampang	4	2	2	3	1

C. Determining the Weight Values

The preference weight values range from 1 to 5. The higher the preference value of a criteria, the higher the level of importance of that criteria in making a decision. The preference values for each criteria are determined as follows :

Tabel 4. Weight Values

ID	Code	Criteria Name	Attribute	Weight
1	C1	Operational Hours	Benefit	4
2	C2	Operational Schedule	Benefit	4
3	C3	Number of Customers	Benefit	4
4	C4	Number of Employees	Benefit	3
5	C5	Amount of Collected Waste	Benefit	5

D. Calculation of the TOPSIS Method

1. Creating The Normalized Decision Matrix

The values of each reference point (X_{ij}) for all alternatives are summed, then the value of each criteria m is divided by the total sum of the criteria. With the equation as follows:

$$[X1] = \sqrt{(3)^2 + (1)^2 + (5)^2 + (1)^2 + (4)^2} = 7.211$$

$$r11 = \frac{3}{7.211} = 0.416$$

$$r21 = \frac{1}{7.211} = 0.138$$

$$r31 = \frac{5}{7.211} = 0.693$$

And so on until the value (R) is obtained as follows :

Tabel 5. R Vulues

R1	R2	R3	R4	R5
0.416	0.534	0.176	0.458	0.538
0.138	0.267	0.883	0.229	0.359
0.693	0.534	0.176	0.229	0.718
0.138	0.267	0.176	0.458	0.179
0.554	0.534	0.353	0.688	0.179

2. The Multiplication Between The Weight and Value of Each Attribute

After obtaining the normalized matrix, the values in the normalization matrix are then multiplied by the preference values for each criteria :

$$W = (w_1, w_2, \cdots, w_{1n})$$

$$Y = \begin{cases} w_{11}, r_{11}, \cdots, w_{1n}, r_{1n} \\ w_{m1}, r_{m1}, \cdots, w_{mn}, r_{mn} \end{cases}$$

$$w = (4,4,4,3,5)$$

$$y_{11} = w_1 \times r_{11} = 4 \times 0.416 = 1.6641$$

$$y_{21} = w_1 \times r_{21} = 4 \times 0.138 = 0.5547$$

$$y_{31} = w_1 \times r_{31} = 4 \times 0.693 = 2.7735$$

The process continues until the following matrix is obtained :

Tabel 6. Y Values

Y1	Y2	Y3	Y4	Y5
1.6641	2.1380	0.7071	1.3764	2.6940
0.5547	1.0690	3.5355	0.6882	1.7960
2.7735	2.1380	0.7071	0.6882	3.5921
0.5547	1.0690	0.7071	1.3764	0.8980
2.2188	2.1380	1.4142	2.0647	0.8980

3. Determining the Positive Ideal Solution Matrix and the Negative Ideal Solution Matrix

After finding the matrix for the positive and negative ideal solutions, the following equations become clear :

$$A^+ = (y_1^+, y_2^+, y_3^+, \cdots, y_n^+)$$

$$A^- = (y_1^-, y_2^-, y_3^-, \cdots, y_n^-)$$

Then the results are obtained as shown in the table below:

Tabel 7. A^+ and A^- values

$A+$	2.7735	2.1380	3.5355	2.0647	3.5921
$A-$	0.5547	1.0690	0.7071	0.6882	0.8980

4. Determining the Distance Between the Value of Each Alternative and the Positive Ideal Solution and the Negative Ideal Solution Matrix

The positive ideal solution is calculated as follows:

$$D_1^+ = \sqrt{\begin{matrix}(1.6641 - 2.7735)^2 + (2.1380 - 2.1380)^2 + (0.7071 - 3.5355)^2 \\ +(1.3764 - 2.0647)^2 + (2.6940 - 3.5921)^2\end{matrix}}$$

$$= 3.242$$

The negative ideal solution is calculated as follows:

$$D_1^- = \sqrt{\begin{matrix}(1.6641 - 0.5547)^2 + (2.1380 - 1.0690)^2 + (0.7071 - 0.7071)^2 \\ +(1.3764 - 0.6882)^2 + (2.6940 - 0.8980)^2\end{matrix}}$$

$$= 2.464$$

5. Determining the preference value for each alternatives

A larger value of V_i indicates that alternative V_i is more preferred. Calculating the preference value:

$$v_1 = \frac{2.464}{2.464 + 3.242} = 0.4319$$

The process continues until it produces rankings as shown in the table below :

Tabel 8. TOPSIS Ranking Results

Alternative	Name	V	Rank
A01	Pelita Bangsa	0.4319	3
A02	Pelita Harapan	0.4701	2
A03	Kreatif Pemuda	0.5371	1
A04	Kemapertika	0.1285	5
A05	Teratai Pampang	0.4196	4

E. Calculation of the VIKOR Method

1. **Determining The Maximum and Minimum Values of The Ideal Solution for Each Criteria to Create a Normalization Matrix**

Tabel 9. Maximum and Minimum Values

Max	5	2	5	3	4
Min	1	1	1	1	1

$$N_{11} = \frac{(5-3)}{(5-1)} = \frac{(2)}{(4)} = 0.5$$

$$N_{12} = \frac{(2-2)}{(2-1)} = \frac{(0)}{(1)} = 0$$

$$N_{13} = \frac{(5-1)}{(5-1)} = \frac{(4)}{(4)} = 1$$

And so on until it produces the following normalization values:

Tabel 10.Normalization Matrix

N_{ij} **Matrix**				
0.5	0	1	0.5	0.333
1	1	0	1	0.667
0	0	1	1	0
1	1	1	0.5	1
0.25	0	0.75	0	1

2. **Performing Weighting of Each Alternative and Normalized Criteria**

The next step is to calculate the multiplication of the matrix N_{ij} by W_{ij} in each column

$w = (4,4,4,3,5)$

Tabel 11.W Matrix

W_{ij} **Matrix**				
2	0	4	1.5	1.667
4	4	0	3	3.333
0	0	4	3	0
4	4	4	1.5	5
1	0	3	0	5

3. **Calculating the Utility Measure (S) and Regret Measure (R)**

$$R^1 = 2\ ;\ 0\ ;\ 4\ ;\ 1.5\ ;\ 1.667 = 4$$

$$S^1 = 2 + 0 + 4 + 1.5 + 1.667 = 9.167$$

Tabel 12.Utility Values (S) and Regret Measure (R)

S Values	R Values
9.167	4
14.333	4
7	4
18.5	5
9	5

4. Calculating the VIKOR Index (Q)

$$Q_1 = 0.5\left[\frac{9.167 - 7}{18.5 - 7}\right] + (1 - 0.5)\left[\frac{4 - 4}{5 - 4}\right]$$

$$= 0.5\left[\frac{2.167}{11,5}\right] + (0.5)\left[\frac{0}{1}\right] = 0.094$$

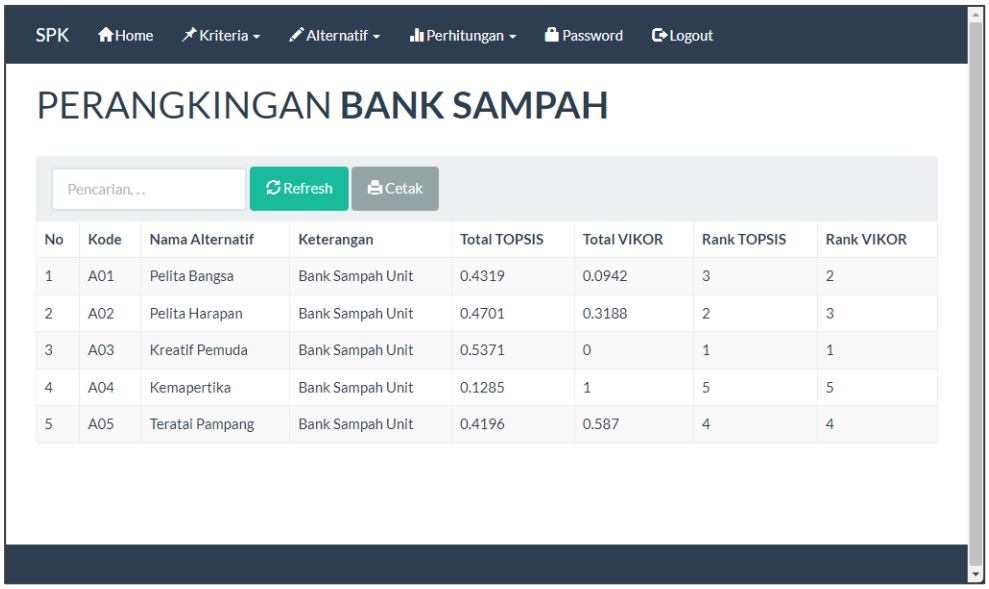
The process continues until it produces rankings as shown in the table below :

Tabel 13.VIKOR Rangking Result

Alternative	Name	V	Rank
A01	Pelita Bangsa	0.094	2
A02	Pelita Harapan	0.319	3
A03	Kreatif Pemuda	0	1
A04	Kemapertika	1	5
A05	Teratai Pampang	0.587	4

F. Main Page

Figure 1 depicts the main page view after the user successfully logs into the system. It displays the ranking results of active waste banks with calculations using the TOPSIS and VIKOR methods.


SPK
Home
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Alternatif
Perhitungan
Password
Logout
PERANGKINGAN BANK SAMPAH
Pencarian...
Refresh
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No
Kode
Nama Alternatif
Keterangan
Total TOPSIS
Total VIKOR
Rank TOPSIS
Rank VIKOR
1
A01
Pelita Bangsa
Bank Sampah Unit
0.4319
0.0942
3
2
2
A02
Pelita Harapan
Bank Sampah Unit
0.4701
0.3188
2
3
3
A03
Kreatif Pemuda
Bank Sampah Unit
0.5371
0
1
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4
A04
Kemapertika
Bank Sampah Unit
0.1285
1
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A05
Teratai Pampang
Bank Sampah Unit
0.4196
0.587
4
4

Gambar 1

CONCLUSION

A. Conclusion

Conclusion of this research :

1. The use of TOPSIS and VIKOR methods in ranking waste banks resulted in alternatives A_3, A_4 and A_5 obtaining the same ranking. Where A_3 is the most active waste bank unit, while A_4 is the less active waste bank unit in Makassar city.
2. Ranking with the TOPSIS method has a low level of risk because it considers the distance of alternatives from the non-ideal solution. On the other hand, ranking with the VIKOR method has a higher level of risk because it only measures the proximity of values to its ideal solution. The calculation using the TOPSIS method shows that alternative A_3 achieved a preference value of 0.5371, which is the highest among the alternatives, thus securing the top ranking. Meanwhile, the VIKOR method calculation for alternative A_3 resulted in an index value of 0, the lowest among the alternatives, also securing the top ranking.
3. The TOPSIS method first considers the criterion weight values before calculating the criterion values. In contrast, the VIKOR method first considers the highest criterion values and then calculates the criterion weight values.

REFERENCES

[1] I. N. Syahbiba, *Studi Kriteria Perencanaan Bank Sampah Melalui Aplikasi Berbasis Android*. 2017.

[2] M. Selomo, A. B. Birawida, A. Mallongi, and M. Muammar, "Bank Sampah Sebagai Salah Satu Solusi Penanganan Sampah Di Kota Makassar," *Media Kesehat. Masy. Indones.*, vol. 12, no. 4, pp. 232–240, 2017, doi: 10.30597/mkmi.v12i4.1543.

[3] D. K. dan Informatika, *Profil Kota Makasar*. 2021.

[4] Kementrian Lingkungan Hidup, "Sistem Informasi Manajemen Bank Sampah (SIMBA)." https://simba.menlhk.go.id/portal/

[5] A. J. Fiermanzah, Muhammad Syafar, Andi Yusuf, "PERILAKU MASYARAKAT TERHADAP PEMANFAATAN BANK SAMPAH DI KELURAHAN KAPASA RAYA KOTA MAKASSAR," vol. 21, no. 2, pp. 364–372, 2021.

[6] N. A. U. N. Muljadi, W. Widekso, and W. T. Atmojo, "Perbandingan Sistem Pendukung Keputusan TOPSIS dengan VIKOR dalam Pemilihan Hubungan Kerjasama," *Techno.Com*, vol. 21, no. 2, pp. 224–236, 2022, doi: 10.33633/tc.v21i2.5889.

[7] A. Pratama, R. M. Kurnia, and V. Ilhadi, "Sistem Pengambilan Keputusan Penentuan Kualitas Biji Kopi Ekspor Menggunakan Metode TOPSIS dan VIKOR (Studi Kasus : Biji Kopi Ekspor Pada Tiap Koperasi)," *J. Ilm. SINUS*, vol. 21, no. 2, p. 1, 2023, doi: 10.30646/sinus.v21i2.689.

[8] S. Bansal, "S . Bansal , M . Chhimwal A . Jayant (2015) ' A Comprehensive VIKOR and TOPSIS Method For Supplier Selection In Supply Chain Management : A Case Study ' Journal of Material Science and Me ... TRACK 1 : Mechanical Engineering A COMPREHENSIVE VIKOR AND TO," no. November, 2015.

[9] H. Jati, "Comparison of University Webometrics Ranking Using Multicriteria Decision Analysis: TOPSIS and VIKOR Method," *World Acad. Sci. Eng. Technol.*, vol. 71, pp. 1663–1669, 2012, [Online]. Available: www.harvard.edu

[10] S. Opricovic and G. H. Tzeng, "Compromise solution by MCDM methods: A comparative analysis of VIKOR and TOPSIS," *Eur. J. Oper. Res.*, vol. 156, no. 2, pp. 445–455, 2004, doi: 10.1016/S0377-2217(03)00020-1.

[11] A. Shekhovtsov and W. Salabun, "A comparative case study of the VIKOR and TOPSIS rankings similarity," *Procedia Comput. Sci.*, vol. 176, pp. 3730–3740, 2020, doi: 10.1016/j.procs.2020.09.014.

[12] A. Chauhan and R. Vaish, "A Comparative Study on Decision Making Methods with Interval Data," *J. Comput. Eng.*, vol. 2014, pp. 1–10, 2014, doi: 10.1155/2014/793074.

[13] E. Cevikcan, S. Cebi, and I. Kaya, "Fuzzy VIKOR and fuzzy axiomatic design versus to fuzzy TOPSIS: An application of candidate assessment," *J. Mult. Log. Soft Comput.*, vol. 15, no. 2–3, pp. 181–208, 2009.

[14] A. Ramadhani, R. Santoso2, and R. Rahmawati, "PEMILIHAN PERUMAHAN TERFAVORIT MENGGUNAKAN METODE VIKOR DAN TOPSIS DENGAN GUI MATLAB (Studi Kasus: Perumahan Mijen

Semarang),” *J. Gaussian*, vol. 8, no. 3, pp. 330–342, 2019, doi: 10.14710/j.gauss.v8i3.26678.
[15] Titin Kristiana, “Sistem Pendukung Keputusan Dengan Menggunakan Metode TOPSIS Untuk Pemilihan Lokasi Pendirian Grosir Pulsa,” *Paradigma*, vol. 20, no. 1, pp. 8–12, 2018, [Online]. Available: https://repository.nusamandiri.ac.id/index.php/unduh/item/235936/2908-9372-1-PB.pdf
[16] H. S. Shih, H. J. Shyur, and E. S. Lee, “An extension of TOPSIS for group decision making,” *Math. Comput. Model.*, vol. 45, no. 7–8, pp. 801–813, 2007, doi: 10.1016/j.mcm.2006.03.023.
[17] R. Rahim *et al.*, “TOPSIS Method Application for Decision Support System in Internal Control for Selecting Best Employees,” *J. Phys. Conf. Ser.*, vol. 1028, no. 1, 2018, doi: 10.1088/1742-6596/1028/1/012052.
[18] V. Number, “Information Systems Engineering and Business Intelligence,” vol. 2, no. 1, p. 6333, 2016.
[19] M. W. P. Agatmadja and A. Suri, “Penerapan Metode Vikor Dalam Pemilihan Calon Peserta Olimpiade Olahraga Siswa Nasional (O2SN),” *JURIKOM (Jurnal Ris. Komputer)*, vol. 5, no. 2, pp. 91–96, 2018.
[20] D. Siregar *et al.*, “Multi-Attribute Decision Making with VIKOR Method for Any Purpose Decision,” *J. Phys. Conf. Ser.*, vol. 1019, no. 1, 2018, doi: 10.1088/1742-6596/1019/1/012034.
[21] Raihan *et al.*, “Metode Penelitian,” *Kementeri. Kesehat. Republik Indones.*, vol. 59, no. April, p. 150, 2015.