Application of TOPSIS Method in Exemplary Selection at the Tanjungbalai District Court

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Abstract. This exemplary election is a person who becomes a role model/role model for a particular role, where the behavior is followed by other employees. The importance of developing behavior and work culture in the fields of professionalism, integrity, and honesty of the District Court is the basis for the Chairperson of the Tanjungbalai District Court in making an exemplary selection program. In terms of selecting the best candidate, manual methods are still less effective. For this reason, the use of the Technique method for order preference by similarity to ideal solution (TOPSIS) in decision support systems in exemplary selection is more effective, to assist management in making decisions. In this research, the criteria used are professionalism, integrity, honesty, responsibility, discipline where the final result of the highest score will be used as a decision in the choice of exemplary leadership.

1. Introduction
Technological developments are very important to assist the process of work activities in every company and government agency. By using technology, it can support work programs created by agencies to provide an assessment of employee performance. For example in an exemplary selection program. This exemplary election is a person who becomes a role model/role model for a particular role, where the behavior is followed by other employees. The importance of developing behavior and work culture in the fields of professionalism, integrity, and honesty of the District Court is the basis for the Chairperson of the Tanjungbalai District Court in making an exemplary selection program. In this election using the Topsis method, Topsis is one of the Decision Support System (DSS) methods [1],[2]. Decision Support System is an interactive information system that functions to assist management in making decisions[3],[4],[5]. Based on this, the researcher conducted a study to find a solution in determining role models to make it easier for the Tanjungbalai District Court to overcome any errors in assessing the performance and discipline of employees through the application of information technology as a solution in the selection of role models in the agency.

2. Methodology
TOPSIS (Technique for order preference by similarity to ideal solution) is one of the calculation models of the MADM (Multi-Attribute Decision Making) method [6],[7]. TOPSIS includes a multicriteria decision-making method, referral. The principle of TOPSIS is that the chosen alternative must have the closest distance from the positive ideal solution and the farthest distance from the negative ideal solution, seen from a geometric angle using the Euclidean distance to determine the relative proximity of an alternative to the optimal solution, reference [8],[9]. Using the Topsis method can regain popularity to support multi-criteria decision making [10]. The sequence of steps in the Topsis method [11].
a) Creating a normalized decision matrix. Topsis requires a normalized performance rating of each alternative (Ai) on each criterion (Ci), namely:

$$\text{rij} = \frac{x_{ij}}{\sqrt{\sum_{j=1}^{n} x_{ij}^2}}$$ \hspace{1cm} (1)

where \(i = 1, 2, \ldots, m\); and \(j = 1, 2, \ldots, n\).

Information:
\text{rij} = \text{normalized performance rating}
\text{xij} = \text{crisp value}
\text{i} = \text{the suitability of the alternative values against each criterion up to m}
\text{j} = \text{match the criterion value against each alternative up to n}

b) Creating a weighted normalized decision matrix.

$$\text{yij} = w_i \cdot \text{rij}$$ \hspace{1cm} (2)

where \(i = 1, 2, \ldots, m\); and \(j = 1, 2, \ldots n\);

Information:
\text{yij} = \text{normalized weight decision ranking.}
\text{wi} = \text{preference weight value}

c) Determine the positive ideal solution matrix and the negative ideal solution matrix. The positive ideal solution (A+) and the negative ideal solution (A-) can be determined based on the normalized weight ranking (yij) as follows:

$$\text{A}^+ = (y_{11}^+, y_{21}^+, \ldots, y_{m1}^+)$$ \hspace{1cm} (3)

$$\text{A}^- = (y_{11}^-, y_{21}^-, \ldots, y_{m1}^-)$$ \hspace{1cm} (4)

Information:
\text{A}^+ = \text{positive ideal solution}
\text{A}^- = \text{negative ideal solution}

d) Determine the distance between the value of each alternative with the positive and negative ideal solution matrix. The distance between the alternative (Ai) and the positive ideal solution is defined as:

$$D_{i}^+ = \sqrt{\sum_{j=1}^{n} (y_{ij}^+ - y_{ij})^2}$$ \hspace{1cm} (5)

The distance between the alternative (Ai) and the negative ideal solution is defined as:

$$D_{i}^- = \sqrt{\sum_{j=1}^{n} (y_{ij}^- - y_{ij})^2}$$ \hspace{1cm} (6)

Information:
\text{Di}^+ = \text{distance between alternatives (Ai) of positive ideal solutions.}
\text{Di}^- = \text{distance between alternatives (Ai) of negative ideal solutions.}
\text{yi}^+ = \text{max yi}; \text{if j is a financial attribute}
\text{min yi}; \text{if j is the cost attribute}
\text{yi}^- = \text{min yi}; \text{if j is the profit attribute.}
\text{max yi}; \text{if j is the loss attribute.}

e) Determine the preference value for each alternative. The preference value for each alternative (Vi) is given as:
A larger $V_i$ value indicates that the alternative ($A_i$) with the highest value is preferred.

3. Result and Discussion

Table of criteria data on exemplary election decision support system in Tanjungbalai District Court.

| Name Criteria | Criteria weights |
|---------------|-----------------|
| Professionalism ($A_1$) | 5 |
| Integrity ($A_2$) | 4 |
| Honesty ($A_3$) | 4 |
| Responsibility ($A_4$) | 3 |
| Discipline ($A_5$) | 3 |

The results of the criteria that have been added to the application can be seen in Figure 1 below.

| Alternative | Professionalism ($A_1$) | Integrity ($A_2$) | Honesty ($A_3$) | Responsibility ($A_4$) | Discipline ($A_5$) |
|-------------|--------------------------|------------------|-----------------|------------------------|-------------------|
| Rudi        | 4                        | 2                | 3               | 3                      | 3                 |
| Sapriono    | 3                        | 3                | 4               | 4                      | 1                 |
| Souchi      | 5                        | 3                | 3               | 3                      | 2                 |
| Sugeng      | 2                        | 4                | 4               | 3                      | 3                 |
| Doharni     | 2                        | 4                | 3               | 5                      | 1                 |
| Radjiman    | 3                        | 5                | 3               | 4                      | 3                 |
| Forci       | 1                        | 4                | 3               | 5                      | 3                 |
| Suprayetno  | 5                        | 2                | 4               | 3                      | 2                 |
| Umi         | 1                        | 3                | 5               | 4                      | 2                 |
| Imran       | 4                        | 3                | 2               | 3                      | 3                 |

The results of the alternative candidates entered in the application can be seen in Figure 2 below.
The results of the matrix and the weights in the application can be seen in Figure 3 below.

The results of the normalized decision matrix areas in the following table.

| Name   | Professionalism (A1) | Integrity (A2) | Honesty (A3) | Responsibility (A4) | Discipline (A5) |
|--------|----------------------|----------------|--------------|----------------------|------------------|
| Rudi   | 0.381385036          | 0.184900065   | 0.271607238  | 0.250872603          | 0.390566733      |
| Sapriono | 0.286038777        | 0.277350098   | 0.362142984  | 0.334496804          | 0.130188911      |
| Souchi  | 0.476731295          | 0.277350098   | 0.271607238  | 0.250872603          | 0.260377822      |
| Sugeng  | 0.190692518          | 0.369800131   | 0.271607238  | 0.418121005          | 0.130188911      |
| Doharni | 0.190692518          | 0.369800131   | 0.271607238  | 0.418121005          | 0.260377822      |
| Radjiman | 0.286038777         | 0.462250164   | 0.271607238  | 0.334496804          | 0.390566733      |
| Forci   | 0.095346259          | 0.369800131   | 0.271607238  | 0.418121005          | 0.390566733      |
| Suprayetno | 0.476731295       | 0.184900065   | 0.271607238  | 0.250872603          | 0.260377822      |
| Umi     | 0.095346259          | 0.277350098   | 0.45267873   | 0.334496804          | 0.260377822      |
| Imran   | 0.381385036          | 0.277350098   | 0.181071492  | 0.250872603          | 0.390566733      |

The weighted normalized weight value.

| Name   | Professionalism (A1) | Integrity (A2) | Honesty (A3) | Responsibility (A4) | Discipline (A5) |
|--------|----------------------|----------------|--------------|----------------------|------------------|
| Rudi   | 1.906925178          | 0.739600262   | 1.086428953  | 0.752617809          | 1,171700199      |
| Sapriono | 1.430193884         | 1.109400392   | 1.448571937  | 1.003490412          | 0.390566733      |
| Souchi  | 2.383656473          | 1.109400392   | 1.086428953  | 0.752617809          | 0.781133466      |
| Sugeng  | 0.953462589          | 1.479200523   | 1.448571937  | 0.752617809          | 1,171700199      |
| Doharni | 0.953462589          | 1.479200523   | 1.086428953  | 1.254363015          | 0.390566733      |
| Radjiman | 1.430193884          | 1.849000654   | 1.086428953  | 1.003490412          | 1,171700199      |
Next, determine the maximum and minimum value of each alternative from all criteria.

Table 5. Table of Calculating the Maximum and Minimum Values

| Alternative | Professionalism | Integrity | Honesty | Responsibility | Discipline |
|-------------|----------------|-----------|---------|----------------|------------|
| MAX         | 2.383656473    | 1.849000654 | 1.81071492 | 1.254363015 | 1.1717002 |
| MIN         | 0.476731295    | 0.739600262 | 0.724285968 | 0.752617809 | 0.39056673 |

Furthermore, calculations are carried out so that all candidates have a positive ideal solution value and a negative ideal value as in the following table:

Table 6. Table of Positive Ideal Values and Negative Ideal

| Name     | Ideal Positif | Ideal Negatif |
|----------|---------------|---------------|
| Rudi     | 1.49478439    | 1.66936263    |
| Sapriono | 1.503447223   | 1.27803375    |
| Souchi   | 1.214861859   | 2.01415136    |
| Sugeng   | 1.60159373    | 1.38168047    |
| Doharni  | 1.821254056   | 1.07572165    |
| Radjiman | 1.223363452   | 1.71584214    |
| Forci    | 2.073090914   | 1.24099711    |
| Suprayetno | 1.328987357 | 2.0768958    |
| Umi      | 2.097343944   | 1.23796585    |
| Imran    | 1.485381229   | 1.67104045    |

Then the calculation is carried out until all candidates have a ranking value so that the ranking results of each candidate will be obtained as in the following table:

Table 7. Rank Value Table

| Name | Score |
|------|-------|
| Rudi | 0.527586935 |
| Sapriono | 0.459479595 |
| Souchi | 0.623766836 |
| Sugeng | 0.463142299 |
| Doharni | 0.371325741 |
| Radjiman | 0.583777516 |
| Forci | 0.374461119 |
| Suprayetno | 0.609796551 |
| Umi | 0.371169674 |
| Imran | 0.529409762 |
4. Conclusion

The use of the topsis method in decision support systems in exemplary selection can be applied. This Decision Support System assists the management of the Tanjungbalai District Court in making decisions on exemplary elections in the working environment of the Tanjungbalai District Court.

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