Decision Support System Honorary Employee Performance Appraisal with TOPSIS method the Public Works Department and Spatial Deli Serdang

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Abstract-Honorary employee performance appraisal on the Department of Public Works and Spatial Deli Serdang conducted on 10 honorary staff as samples of employee performance appraisal of data as material for consideration of the continuation of the cooperative relationship for the future budget. Components of employee performance appraisal on conducted on 10 honorary staff as samples of employee performance appraisal of data as material for consideration of the continuation of the cooperative relationship for the future budget. Components of employee performance appraisal on the Department of Public Works and Spatial Deli Serdang namely work performance, performance quantity, performance discipline, cooperation, and commitment. Problems with the employee performance appraisal process that occur due to unclear criteria and weight of the appraisal. A method in the decision support system can help the optimal decision making process that is TOPSIS method in Determining the performance appraisal of honorary employees. There are three employee performance weights, which are very good, good, and quite good, from 10 employees Categorized by performance appraisal, after being applied with the TOPSIS method, Joko Suprapto Obtained value = 0.8394 and Suhendra value = 0.7862 both honorary employees are Categorized by assessment very good performance.

Keywords: Decision Support System (DSS), TOPSIS Method, Honorary Employees.

1. Introduction

Developments in information technology over the years that the sooner a challenge for the users themselves and to encourage every sector of both formal and informal organizations or other agencies to be able to use it as a support kenerja votes employees.

Department of Public Works and Spatial Power Deli Serdang have Honorer working were about 40 people. The biggest obstacle honorary implementation of performance assessment is the limited time and human resources involved in a long kinerjaWaktu ratings in assessing the ratio between the number of assessors is 19 (the head section): 40 (honorarium). Starting from the above-mentioned limitations needed a new system that can aid decision-making. Then the required supporting resources such as software that is reliable capabilities and human resources that have a good performance at the Department of Public Works and Spatial Deli Serdang.

2. Theory

A. Decision Support System
Kusri (2017: 15) Decision Support System (DSS), is generally defined as a system that is capable of providing good ability and the ability of problem solving capability of communicating to the problem semiterstuktur. Specifically, CMS is defined as a system that supports the work of a manager or group of managers in a semi-structured problem solving by providing information or suggestion towards the particular decision

B. methods Tospsis
TOPSIS is one of multiple criteria decision-making methods or alternative option is an alternative that has the smallest distance from the negative ideal solution from a geometrical point by using the Euclidean distance. However, the alternative that has the greatest distance from the negative ideal solution. Therefore, TOPSIS into account both the distance of the positive ideal solution and the distance to the negative ideal solution simultaneously. The optimal solution in TOPSIS method obtained by finding the relative proximity of a positive alternative to the ideal solution, TOPSIS to rank alternatives based on the priority value relative proximity to an alterantif idealposif solution. Alternatives has been ranked then be used as a reference for decision makers to choose the best solution is desired.

Steps metdode TOPSIS is segbai follows:
1) Ranking each alternative

Technique For Order Preference by Similarity to Ideal Solution (TOPSIS) require performance ratings of each alternative () on each of the criteria () are normalized, namely:

\[ r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}} \]  

with i = 1,2, .., m and j = 1,2, ...., n

Information:
- \( r_{ij} \) = Normalized performance rating
- \( x_{ij} \) = Value crips
- i = Suitability of alternative value of the criteria to m
- j = Suitability of alternative value at every alternative to the n

2) Creating a weighted normalized decision matrix.

\[ y_{ij} = \ldots \]  

with i = 1,2, .., M and j = 1,2, .., N.

Information:
- \( y_{ij} \) = Ranking weights normalized
- \( w_i \) = Weight value preferences

3) Determining the ideal solution matrix of positive and negative ideal solution matrix. The ideal solution is positive () and negative ideal solution () can be determined based on the normalized weight rating () is as follows:

\[ A^+ = (y_1^+, y_2^+, \ldots, y_n^+) \]
\[ A^- = (y_1^-, y_2^-, \ldots, y_n^-) \]

Where:
- \( y_j^+ \) = Max, if j is an attribute profits
- \( y_j^- \) = Min y_j, If j is an attribute profits
- \( y_j^- \) = Min, if j is an attribute charge

4) Determine the distance between the value of each alternative () with a positive ideal solution and the ideal solution negatif.

\[ D_i^+ = \sqrt{\sum_{j=1}^{n} (y_i^+ - y_{ij})^2} \]
\[ D_i^- = \sqrt{\sum_{j=1}^{n} (y_i^- - y_{ij})^2} \]

Information:
- \( D_i^+ \) = jarak antara alternatif \( A_i \)solusi ideal positif
- \( D_i^- \) = jarak antara alternatif \( A_i \)solusi ideal negatif

5) Determining the value of preference for each alternative () is formulated as follows:

\[ V_i = \frac{D_i^-}{D_i^- + D_i^+} \]  

with i = 1,2, .., N

Value \( V_i \) Larger indicate that the preferred alternative \( A_i \)

so the method Technique For Order Preference by Similarity to Ideal Solution (TOPSIS) is a model used to assist in the completion of the decision, especially in a state where a lot of goals or criteria are considered.

3. Research methods

A. Framework Research

The method used in this research is the method of flowchart.
B. Research sites
This research was conducted in Mahogany Way, Lubukpakam I / II Lubukpakam Deli Serdang North Sumatra.

C. Case study
The case studies carried out for research that is housed in at the Department of Public Works and Spatial Deli Serdang. In this case the researchers will observe or analyze the process of employee performance evaluation honoreruntuk help the Department of Public Works and pentaaan space in improving the performance of permanent employees, the data information obtained from the Departments of Public Works and Spatial Planning and criteria determined in accordance with the conditions that existed at the Agency tersebut. This research is compiled into the stages of preparation of the framework of the thesis, the selection of cases is done to develop the methods used.

4. Analysis And Design

A. Analysis and Discussion
In these discussions, do some steps to analyze and design systems aimed at determining the Honorary Employee Performance Assessment at the Department of Public Works and Spatial Deli Serdang by using Method Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). So that the expected results of this study can be used for decision-making for Employee Performance Appraisal to be used as an alternative for agencies in determining employee performance appraisal results. To gather data, researchers used several techniques as follows:

There are five criteria in this study each criterion has a weight of preference based on importance of each criterion. The preference weights obtained from the Department of Public Works and Spatial temporary employee performance evaluation.

| Code | name Criteria         | Weight |
|------|-----------------------|--------|
| K1   | Work performance      | 4      |
| K2   | Quality performance   | 4      |
| K3   | performance discipline| 3      |
| K4   | Cooperation           | 3      |
| K5   | Commitment            | 3      |

Fig 1. Framework Research
B. Troubleshooting Using WP Algorithm

1) Determining Criteria

| Code | Criteria Type Seed | Name Criteria | Weight |
|------|-------------------|---------------|--------|
| K1   | Work performance  | 4             |        |
| K2   | Quality performance| 4             |        |
| K3   | performance discipline | 3         |        |
| K4   | Cooperation        | 3             |        |
| K5   | Commitment         | 3             |        |

2) Rating determine alternif of each criterion

| Alternative code | Alternative name   | K1 | K2 | K3 | K4 | K5 |
|------------------|--------------------|----|----|----|----|----|
| A1               | Supriono           | 4  | 4  | 3  | 4  | 5  |
| A2               | Danny Lopez        | 5  | 3  | 3  | 4  | 4  |
| A3               | Krina Budi         | 3  | 5  | 4  | 4  | 3  |
| A4               | Ansari             | 3  | 4  | 4  | 3  | 4  |
| A5               | Suhendra           | 5  | 4  | 4  | 4  | 3  |
| A6               | Nana Sutra Yogi    | 3  | 5  | 2  | 2  | 3  |
| A7               | Sugeng Wasino      | 4  | 5  | 3  | 3  | 3  |
| A8               | Joko Suprapto      | 5  | 3  | 4  | 5  | 4  |
| A9               | Agus Dwi Pranoto   | 3  | 2  | 4  | 3  | 3  |
| A10              | Heri Syahputra     | 2  | 3  | 2  | 2  | 2  |

3) Determining matrix ternomalisasi

a. Work performance

\[ [XK1] = \sqrt{4^2 + 5^2 + 3^2 + 3^2 + 5^2 + 4^2 + 5^2 + 3^2 + 2^2} = 12.1244 \]

then:

\[ \text{ra}1k1 = 0.3299 \]
\[ \text{ra}2k1 = 0.4124 \]
\[ \text{ra}3k1 = 0.2474 \]
\[ \text{ra}4k1 = 0.2474 \]
\[ \text{ra}5k1 = 0.4124 \]
\[ \text{ra}6k1 = 0.2474 \]
\[ \text{ra}7k1 = 0.3299 \]
\[ \text{ra}8k1 = 0.4124 \]
\[ \text{ra}9k1 = 0.2474 \]
\[ \text{ra}10k1 = 0.1650 \]

b. Quality performance

\[ [XK2] = \sqrt{4^2 + 3^2 + 5^2 + 4^2 + 3^2 + 4^2 + 5^2 + 2^2 + 3^2} = 12.4097 \]

then:

\[ \text{ra}1k2 = 0.3222 \]
\[ \text{ra}2k2 = 0.2417 \]
\[ \text{ra}3k2 = 0.4029 \]
\[ \text{ra}4k2 = 0.3222 \]
raSk2 = 0.3227 \frac{x_{a}^{5k2}}{[x_{k2}]} 12.4097
ra6k2 = 0.2417 \frac{x_{a}^{6k2}}{[x_{k2}]} 3
ra7k2 = 0.4029 \frac{x_{a}^{7k2}}{[x_{k2}]} 5
ra8k2 = 0.4029 \frac{x_{a}^{8k2}}{[x_{k2}]} 5
ra9k2 = 0.1612 \frac{x_{a}^{9k2}}{[x_{k2}]} 2
ra10k2 = 0.2417 \frac{x_{a}^{10k2}}{[x_{k2}]} 3

\text{c. Work discipline}

[Xk3] = \sqrt{3^2 + 4^2 + 4^2 + 5^2 + 5^2 + 2^2 + 3^2 + 4^2 + 4^2 + 2^2} = 11.8322
then:
ra1k3 = 0.2535 \frac{x_{a}^{1k3}}{[x_{k3}]} 11.8322
ra2k3 = 0.3381 \frac{x_{a}^{2k3}}{[x_{k3}]} 4
ra3k3 = 0.3381 \frac{x_{a}^{3k3}}{[x_{k3}]} 4
ra4k3 = 0.4226 \frac{x_{a}^{4k3}}{[x_{k3}]} 5
ra5k3 = 0.4226 \frac{x_{a}^{5k3}}{[x_{k3}]} 5
ra6k3 = 0.1690 \frac{x_{a}^{6k3}}{[x_{k3}]} 2
ra7k3 = 0.2535 \frac{x_{a}^{7k3}}{[x_{k3}]} 3
ra8k3 = 0.3381 \frac{x_{a}^{8k3}}{[x_{k3}]} 4
ra9k3 = 0.3381 \frac{x_{a}^{9k3}}{[x_{k3}]} 4
ra10k3 = 0.1690 \frac{x_{a}^{10k3}}{[x_{k3}]} 3

\text{d. Cooperation}

[Xk4] = \sqrt{4^2 + 3^2 + 4^2 + 5^2 + 4 + 2^2 + 3^2 + 5^2 + 3 + 2^2} = 11.5326
then:
ra1k4 = 0.3468 \frac{x_{a}^{1k4}}{[x_{k4}]} 4
ra2k4 = 0.2601 \frac{x_{a}^{2k4}}{[x_{k4}]} 3
ra3k4 = 0.3468 \frac{x_{a}^{3k4}}{[x_{k4}]} 4
ra4k4 = 0.4336 \frac{x_{a}^{4k4}}{[x_{k4}]} 5
ra5k4 = 0.4336 \frac{x_{a}^{5k4}}{[x_{k4}]} 4
ra6k4 = 0.1734 \frac{x_{a}^{6k4}}{[x_{k4}]} 2
ra7k4 = 0.2601 \frac{x_{a}^{7k4}}{[x_{k4}]} 3
ra8k4 = 0.4336 \frac{x_{a}^{8k4}}{[x_{k4}]} 5
ra9k4 = 0.2601 \frac{x_{a}^{9k4}}{[x_{k4}]} 3
ra10k4 = 0.1734 \frac{x_{a}^{10k4}}{[x_{k4}]} 2

\text{e. Commitment}

[Xk5] = \sqrt{5^2 + 4^2 + 4^2 + 4^2 + 4 + 3 + 3^2 + 4^2 + 3^2 + 2^2} = 11.6619
then:
ra1k5 = 0.4287 \frac{x_{a}^{1k5}}{[x_{k5}]} 5
ra2k5 = 0.3430 \frac{x_{a}^{2k5}}{[x_{k5}]} 4
ra3k5 = 0.3430
ra4k5 = 0.3430
ra5k5 = 0.3430
ra6k5 = 0.2572
ra7k5 = 0.2572
ra8k5 = 0.3430
ra9k5 = 0.2572
ra10k5 = 0.1715

4) Determining the ideal solution matrix of positive and negtive ideal solution

\[ y_1 = \text{Max} \{ 1.3196; 1.6496; 0.9896; 0.9896; 1.6496; 0.9896; 0.9896; 0.66 \} = 1.6496 \]
\[ y_2 = \text{Max} \{ 1.2892; 0.9668; 1.6116; 1.6116; 1.2892; 0.9668; 1.6116; 0.6448; 0.9668 \} = 1.6116 \]
\[ y_3 = \text{Max} \{ 0.7605, 1.0143, 1.0143, 1.2678, 1.2678, 0.507, 0.7605, 1.0143, 1.0143, 0.507 \} = 1.2768 \]
\[ y_4 = \text{Max} \{ 0.6936; 0.5202; 0.6936; 0.8672; 0.6936; 0.3468; 0.5202; 0.8672; 0.5202; 0.3468 \} = 0.8672 \]
\[ y_5 = \text{Max} \{ 0.8574; 0.686; 0.686; 0.686; 0.5144; 0.5144; 0.5144; 0.686; 0.5144; 0.0343 \} = 0.8574 \]

Negative ideal solution is calculated as follows:

\[ y_1 = \text{Min} \{ 1.3196; 1.6496; 0.9896; 0.9896; 1.6496; 0.9896; 0.9896; 0.66 \} = 0.66 \]
\[ y_2 = \text{Min} \{ 1.2892; 0.9668; 1.6116; 1.6116; 1.2892; 0.9668; 1.6116; 0.6448; 0.9668 \} = 0.6448 \]
\[ y_3 = \text{Min} \{ 0.7605, 1.0143, 1.0143, 1.2678, 1.2678, 0.507, 0.7605, 1.0143, 1.0143, 0.507 \} = 0.507 \]
\[ y_4 = \text{Min} \{ 0.6936; 0.5202; 0.6936; 0.8672; 0.6936; 0.3468; 0.5202; 0.8672; 0.5202; 0.3468 \} = 0.3468 \]
\[ y_5 = \text{Min} \{ 0.8574; 0.686; 0.686; 0.686; 0.5144; 0.5144; 0.5144; 0.686; 0.5144; 0.0343 \} = 0.0343 \]

Sperasi determine the distance in Alternatives to Ideal Solution Positive and Negative Ideal Solution

DA1 += \[
\sqrt{(1.6496-1.3196)^2+(1.6116-1.2892)^2+(1.2678-1.7605)^2+(0.8672-0.6936)^2+(0.8574-0.8574)^2}
\]
\[= 0.7073 \]

DA2 += \[
\sqrt{(1.6496-1.6496)^2+(1.6116-0.9668)^2+(1.2678-1.0143)^2+(0.8672-0.507)^2+(0.8574-0.686)^2}
\]
\[= 0.7936 \]

DA3 += \[
\sqrt{(1.6496-0.9896)^2+(1.6116-1.6116)^2+(1.2678-1.0143)^2+(0.8672-0.6936)^2+(0.8574-0.686)^2}
\]
\[= 0.7479 \]

DA4 += \[
\sqrt{(1.6496-0.9896)^2+(1.6116-1.2892)^2+(1.2678-1.2678)^2+(0.8672-0.8672)^2+(0.8574-0.686)^2}
\]
\[= 0.7543 \]

DA5 += \[
\sqrt{(1.6496-1.6496)^2+(1.6116-1.2892)^2+(1.2678-1.2678)^2+(0.8672-0.6936)^2+(0.8574-0.686)^2}
\]
\[= 0.4043 \]

DA6 += \[
\sqrt{(1.6496-0.9896)^2+(1.6116-0.9668)^2+(1.2678-0.507)^2+(0.8672-0.3468)^2+(0.8574-0.5144)^2}
\]
\[= 1.3486 \]

DA7 += \[
\sqrt{(1.6496-1.3196)^2+(1.6116-1.6116)^2+(1.2678-0.7605)^2+(0.8672-0.507)^2+(0.8574-0.5144)^2}
\]
\[= 0.7774 \]

DA8 += \[
\sqrt{(1.6496-1.6496)^2+(1.6116-1.6116)^2+(1.2678-1.0143)^2+(0.8672-0.8672)^2+(0.8574-0.686)^2}
\]
\[= 0.3060 \]
a. Positive distance Ideal Solution

The formula used to find the distance a positive ideal solution as follows:

\[ D_i^+ = \sqrt{\sum_{j=1}^{n} (y_{ij} - y_i)^2} \]

\[ D_{a1} = \sqrt{(1.3196 - 0.66)^2 + (1.2982 - 0.6448)^2 + (1.2678 - 0.507)^2 + (0.3468 - 0.3468)^2 + (0.5144 - 0.343)^2} \]
\[ = 1.1399 \]

\[ D_{a2} = \sqrt{(1.6496 - 0.66)^2 + (0.9668 - 0.6448)^2 + (1.0143 - 0.507)^2 + (0.5202 - 0.3468)^2 + (0.686 - 0.343)^2} \]
\[ = 1.2199 \]

\[ D_{a3} = \sqrt{(0.9896 - 0.66)^2 + (1.6116 - 0.6448)^2 + (1.0143 - 0.507)^2 + (0.6936 - 0.3468)^2 + (0.686 - 0.343)^2} \]
\[ = 1.2404 \]

\[ D_{a4} = \sqrt{(0.9896 - 0.66)^2 + (1.2982 - 0.6448)^2 + (1.2678 - 0.507)^2 + (0.3468 - 0.3468)^2 + (0.686 - 0.343)^2} \]
\[ = 1.2211 \]

\[ D_{a5} = \sqrt{(1.6496 - 0.66)^2 + (1.2982 - 0.6448)^2 + (1.2678 - 0.507)^2 + (0.6936 - 0.3468)^2 + (0.686 - 0.343)^2} \]
\[ = 1.4870 \]

\[ D_{a6} = \sqrt{(0.9896 - 0.66)^2 + (0.9668 - 0.6448)^2 + (0.507 - 0.507)^2 + (0.3468 - 0.3468)^2 + (0.5144 - 0.343)^2} \]
\[ = 0.4916 \]

\[ D_{a7} = \sqrt{(1.3196 - 0.66)^2 + (1.6116 - 0.6448)^2 + (1.7605 - 0.507)^2 + (0.5202 - 0.3468)^2 + (0.5144 - 0.343)^2} \]
\[ = 1.2221 \]

\[ D_{a8} = \sqrt{(1.6496 - 0.66)^2 + (1.6116 - 0.6448)^2 + (1.0143 - 0.507)^2 + (0.8672 - 0.3468)^2 + (0.686 - 0.343)^2} \]
\[ = 1.5999 \]

\[ D_{a9} = \sqrt{(0.8986 - 0.66)^2 + (0.6448 - 0.6448)^2 + (0.507 - 0.507)^2 + (0.3468 - 0.3468)^2 + (0.5144 - 0.343)^2} \]
\[ = 0.6523 \]

\[ D_{a10} = \sqrt{(0.66 - 0.66)^2 + (0.9668 - 0.6448)^2 + (0.507 - 0.507)^2 + (0.3468 - 0.3468)^2 + (0.343 - 0.343)^2} \]
\[ = 0.3220 \]

6) Determining kedakatan positive relative to the ideal solution

\[ V_{a1} = \frac{1.1399}{1.1399 + 0.773} = 0.6171 \]
\[ V_{a2} = \frac{1.2199}{1.2199 + 0.7936} = 0.6059 \]
\[ V_{a3} = \frac{1.2404}{1.2404 + 0.7497} = 0.6238 \]
\[ V_a = \frac{1.2211 + 0.7543}{1.4870} = 0.6182 \]
\[ V_a = \frac{1.4870 + 0.4043}{0.4916} = 0.7862 \]
\[ V_a = \frac{0.4916 + 1.3486}{1.2211} = 0.2671 \]
\[ V_a = \frac{1.2211 + 0.7774}{1.5999} = 0.6112 \]
\[ V_a = \frac{1.5999 + 0.3060}{0.6523} = 0.3353 \]
\[ V_a = \frac{0.6523 + 1.2933}{0.3220} = 0.1689 \]

Table 5

| No. | Alternative   | Total value | appraisal |
|-----|--------------|-------------|-----------|
| 1   | Supriono     | 0.6171      | Well      |
| 2   | Danny Lopez  | 0.6059      | Well      |
| 3   | Krina Budi   | 0.6238      | Well      |
| 4   | Ansari       | 0.6182      | Well      |
| 5   | Suhendra     | 0.7862      | Very good |
| 6   | Nana Sutra Yogi | 0.2671 | Pretty good |
| 7   | Sugeng Wasisno | 0.6112 | Well      |
| 8   | Joko Suprapto | 0.8394      | Very good |
| 9   | Agus Dwi Pranoto | 0.3353 | Pretty good |
| 10  | Heri Syahputra | 0.1689 | Pretty good |

The results of the above table shows the ranking of greatest value is in the name of Joko Suprapto alternative to 0.8394 and Suhendra value with the value of the selected alternative 0.7862merupakan as a temporary employee with the performance appraisal is unbelievably good.

5. Conclusion

Based on research that has been done the conclusions that can be derived from the development of Decision Support Systems Penilaaiin Honorary Employee Performance using TOPSIS method is as follows:

a) Decision support system temporary employee performance assessment modeling designed using the Unified Modeling Language (UML) which teridri of use case diagrams, activity diagrams and class diagrams. Systems built with Visual Basic Net 2010 and uses MySQL as the database

b) Implementation Method (Technique For Others Referenceby Similarity to Ideal Solution) TOPSIS Assessment temporary employee performance by adjusting criteria and using the weights to be used with the method.

c) This research resulted in a decision support system that daoat help the Department of Public Works and Spatial Deli Serdang in determining the temporary employee performance assessment with precise and accurate.

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