

Decision Support System Employee Performance Appraisal Method Using TOPSIS

Tri Benny Febrian¹, Agustina Simangunsong²

^{1,2} Engineering Informatics Program, STMIK Pelita Nusantara Medan, Jl. Iskandar Muda 1 Medan, North Sumatra 20154, Indonesia

E-mail: benny.vebriandz@gmail.com

Abstract-Employee performance is the level of achievement of an employee of a particular task that is influenced by internal and external factors of the company where the employee works. Employee performance is influenced by many factors Including competency, attendance, loyalty and length of work. The purpose of this study is to create and design a Decision Support System (DSS) for evaluating employee performance using the TOPSIS method and applying the method to employee performance evaluation SPK. TOPSIS is a decision-making method that has multiple criteria or criteria. This type of research is a quantitative descriptive method that presents methods and research objects based on numbers. The study population was 42 employees at PT Catur Karya Sentosa and used as many as four employees as research samples and the data were collected by interview method. The results Showed that the calculation of employee performance using the TOPSIS algorithm runs well and efficiently and can be done every month so as to minimize or even Eliminate the employee performance appraisal method subjectively. Ranking taken from the results of this method is that the final result after the calculation of positive and negative ideal solutions as consideration of the final decision making by the board of directors.

Keywords: SPK, TOPSIS, The Performances

1. Introduction

Along with the times, human beings can not be separated with the use of technology. All work will be easier and lighter to be resolved with the technology. Due to the technology all the activities or affairs easily solved and without consuming a long time in the finish. Computerized system has been used in many government agencies and companies. Included in the performance appraisal.

Decision-making system means managerial decision, but the decision has a variety of different contexts. Decision-making is not only satisfy one party but must be satisfactory to all parties.

2. Theory

2.2. Decision Support Systems (DSS)

According Bonczek (Turban, 2001) Decision Support System (DSS) as a computer-based system that consists of three interacting components.

2.3. TOPSIS method (Technique for Other Preferences by Similarity to Ideal Solution)

Technique For Order Preference by Similarity to Ideal Solution (TOPSIS) is one of multiple criteria decision-making methods or alternative options based on the concept that the best alternative was selected not only has the shortest distance from the positive ideal solution but it also has the longest distance from the negative ideal solution.

TOPSIS stage of completion method is as follows:

a. 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: $A_i C_j$

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

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

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

b. Creating a weighted normalized decision matrix.

$$y_{ij} = w_i \cdot r_{ij}$$

With $i = 1, 2, \dots, M$ and $j = 1, 2, \dots, N$.

Information :

y_{ij} + Ranking weights normalized , w_i = Weight value preferences

- c. 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: $A^+ A^- y_{ij} A^+ = (y_1^+, y_2^+, \dots, y_n^+) A^- = (y_1^-, y_2^-, \dots, y_n^-)$

A^+ = Solusi ideal positif A^- = Solusi ideal negatif

Where :

y_j^+ is = Max, if j is an attribute profits y_{ij} Min, if j is an attribute charge y_{ij}

y_j^- is = Min, if j is an attribute profits y_{ij} Max, if j is an attribute charge y_{ij}

$j = 1, 2, \dots, N$

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

The distance between the alternatives () with a positive ideal solution formulated as follows A_i

$$D_i^+ = \sqrt{\sum_j^n (y_i^+ - y_{ij})^2} ; i = 1, 2, \dots, m$$

Distance between alternatives (A_i) With negative ideal solution formulated as follows:

$$D_i^- = \sqrt{\sum_{j=t}^n (y_i^- - y_{ij})^2} ; i = 1, 2, \dots, m$$

Information :

D_i^+ = jarak antara alternatif (A_i) solusi ideal positif

D_i^- = jarak antara alternatif (A_i) solusi ideal negatif

- e. Determining the value of preference for each alternative () is formulated as follows: V_i

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

$i = 1, 2, \dots,$

The larger value indicates that the preferred alternative. $V_i A_i$

3. Research methods

3.1. Problem analysis

In the identification system so expect investigators found problems that exist at the time of the performance appraisal which later researchers can deduce the existing problems so that researchers can find solutions to these problems.

3.2. Data collection

Data collection was conducted by interview. Interviews were conducted in the area concerned about the performance appraisal in order to obtain the specified criteria and the data obtained will certainly be collected for further processing in order to meet the criteria in making a good system.

3.4. Data Analysis Research

Data analysis aims to analyze the collected data is data that has been collected can solve the problems that exist in this study through scientific procedures and produce answers that objective so that it can become a reference in the resolution of existing problems.

3.5. Penentuan Kriteria

At this stage it does is determine the criteria and sub-criteria that have been determined from the study in accordance with the results of interviews that have been obtained from the object of research that has been conducted by researchers, based on data so found the necessary criteria.

3.6. development System

Development of this system is carried out starting from system design up to manufacture the system in accordance with the purposes of the object of research conducted in which already applied TOPSIS Method.

3.7. Penerapan Metode TOPSIS

The steps to do that is by applying TOPSIS method to resolve the existing problems is the problem of the performance appraisal. In the application of this method to do some steps in accordance with the method tersebut untuk produce the performance appraisal.

3.8. testing Systems

At this stage it does is testing a system that has been created whether it went well or there are still many shortcomings in the system that has been made and with the testing of this system researchers can tell whether the system has been made in accordance with the wishes of the PT. Catur Karya Sentosa.

4. Analysis

4.1 Data analysis

Data analysis was done with the purpose to process data into information that is easily understood and can be solutions to problems. The methods used in this research is the method of TOPSIS. The criteria used as a reference for employee performance appraisal process goes this well namely: Competence, Attendance, Loyalty and Old Works.

4.2 Analysis Method of TOPSIS

a. Mengidentifikasi Assessment Criteria

Based on the research results, it is necessary to identify the assessment criteria, namely:

table 1
Data Criteria

No.	name Criteria	Code
1	Competence	C1
2	Presence	C2
3	Loyalty	C3
4	Length of work	C4

b. Alternative determination

table 2
Alternative Data

No.	Employee name	Alternative code	Competence	Presence	Loyalty	Length of work
1	precious	A1	75	78	90	5
2	Yuda	A2	70	82	85	4
3	hymn	A3	70	85	80	4
4	Nani	A4	75	80	70	3

c. Weight Determination Preferences

table 3
weights Preferences

code Criteria	name Criteria	Weight
C1	Competence	0.1
C2	Presence	0.2
C3	Loyalty	0.25
C4	Length of work	0.2

d. Finding Rating normalized Of Any Alternatives and Criteria

To search for normalized Rating From Any Alternative A_i and criterion C_j is calculated by $r_i =$

$$\frac{x_{ij}}{\sqrt{\sum_{i=1}^m x_{ij}^2}}; \text{ with}$$

$i = 1, 2, \dots, m; j = 1, 2, \dots, n,$

From the above data, the result in the following table:

table 4
Nilai Ternormalisasi

Alternative	Criteria			
	C1	C2	C3	C4
A1	.5170	15.1712	.5515	.6154
A2	.0690	15.9492	15.9492	.4923
A3	.0690	16.5327	16.5327	.4923
A4	.5170	15.5602	15.5602	.3692

e. Finding Value Decision normalized (Y) whose elements are defined R (Ij)

To search for decisions normalized value (y) whose elements are determined r_{ij} diihitung with w_{ij} r_{ij} ; with $i = 1, 2, \dots, m$; and $j = 1, 2, \dots, n$.

table 5
Weighted normalized value Y

Alternative	Criteria			
	Y1	Y2	Y3	Y4
A1	.0517	3.0324	.1378	.1230
A2	.0069	3.9873	3.9873	.0984
A3	.0069	3.3065	4.1331	.0984
A4	.0517	3.1120	3.8900	.0738

f. Finding The Ideal Solution Positive (A +)

Calculated as following:

Calculated by $A^+ = (y_1 + y_2 + \dots, y_n^+)$;

a) $Y1^+ = \text{Max} (0.0517; 0.0069; 0.0069; 0.0517) = 0.0517$

b) $Y2^+ = \text{Max} (3.0324; 3.9873; 3.3065; 3.3065; 3.1120) = 3.9873$

c) $Y3^+ = \text{Max} (0.1378; 3.9873; 4.1331; 3.8900) = 4.1331$

d) $Y4^+ = \text{Max} (0.1230; 0.0984; 0.0984; 0.0738) = 0.1230$

Then the value of:

$$A^+ = \{0.0517; 3.9873; 4.1331; 0.1230\}$$

g. Finding The Ideal Solution negative (A-)

Calculated by $A^- = (Y_1^-, Y_2^-, \dots, Y_n^-)$;

a. $Y_1^- = \text{Min} (0.0517; 0.0069; 0.0069; 0.0517) = 0.0069$

b. $Y_2^- = \text{Min} (3.0324; 3.9873; 3.3065; 3.3065; 3.1120) = 3.0324$

c. $Y_3^- = \text{Min} (0.1378; 3.9873; 4.1331; 3.8900) = 0.1378$

d. $Y_4^- = \text{Min} (0.1230; 0.0984; 0.0984; 0.0738) = 0.0738$

$$A^- = \{0.0069; 3.0324; 0.1378; 0.0738\}$$

h. Looking for Distance Between Value Weighted Every Positive Alternative To The Ideal Solution A_i^+

Calculated by $D_i^+ = \sqrt{\sum_{j=1}^n (y_{ij} - y_j^+)^2}$; $i = 1, 2, \dots, m$.

a. $D_1^+ = \sqrt{(0.0517 - 0.0517)^2 + (3.0324 - 3.9873)^2 + (0.1378 - 4.1331)^2 + (0.1230 - 0.1230)^2}$
 $= 4.1078$

b. $D_2^+ = \sqrt{(0.0069 - 0.0517)^2 + (3.9873 - 3.9873)^2 + (3.9873 - 4.1331)^2 + (0.0984 - 0.1230)^2}$
 $= 0.1543$

c. $D_3^+ = \sqrt{(0.0069 - 0.0517)^2 + (3.3065 - 3.9873)^2 + (4.1331 - 4.1331)^2 + (0.0984 - 0.1230)^2}$
 $= 0.6981$

d. $D_4^+ = \sqrt{(0.0517 - 0.0517)^2 + (3.1120 - 3.9873)^2 + (3.8900 - 4.1331)^2 + (0.0738 - 0.1230)^2}$
 $= 0.9096$

i. Looking for Distance Between Each Alternatives Against Weighted Value Solutions IdealNegatif A_i^-

Calculated by $D_i^- = \sqrt{\sum_{j=1}^n (y_{ij} - y_j^-)^2}$; $i = 1, 2, \dots, m$.

a. $D_1^- = \sqrt{(0.0517 - 0.0069)^2 + (3.0324 - 3.0324)^2 + (0.1378 - 0.1378)^2 + (0.1230 - 0.0738)^2}$
 $= 0.0063$

b. $D_2^- = \sqrt{(0.0069 - 0.0069)^2 + (3.9873 - 3.0324)^2 + (3.9873 - 0.1378)^2 + (0.0984 - 0.0738)^2}$
 $= 3.9669$

$$\begin{aligned}
 \text{c. } D^3 &= \sqrt{(0,0069 - 0,0069)^2 + (3,3065 - 3,0324)^2 + (4,1331 - 0,1378)^2 + (0,0984 - 0,0738)^2} \\
 &= 4.0054 \\
 \text{d. } D^4 &= \sqrt{(0,0517 - 0,0069)^2 + (3,1120 - 3,0324)^2 + (3,8900 - 0,1378)^2 + (0,0738 - 0,0738)^2} \\
 &= 3.7548
 \end{aligned}$$

4.3 Looking for Alternatives Against Proximity Every Ideal Solution

Calculated by $V_i = \frac{D_i^-}{D_i^- + D_i^+}$; $i = 1, 2, \dots, m$.

$$V1 = \frac{0,0063}{0,0063 + 4,1078} = 0.0015$$

$$V2 = \frac{3,9669}{3,9669 + 0,1548} = 0.9624$$

$$V3 = \frac{4,0054}{4,0054 + 0,6981} = 0.8516$$

$$V4 = \frac{3,7548}{3,7548 + 0,9096} = 0.8049$$

Based on calculations using TOPSIS method, the importance of the decisions that V2 (Judah) is the best employees because it has the highest value.

5. Implementation

table 6
Implementation of Application Interface

No.	Page	Information
1	Login	Login page for administrators
2	Main course	Main page aplikasi
3	Data	Contains admin data, the data criteria, sub-criteria of data, employee data and criteria for employees
4	Admin	As an administrator user data container
5	Criteria	As a data container assessment criteria category
6	employee	As a container for data and information of employees
7	criteria Employees	As a result the container criterion value per employee
8	Performance assessment	As the process of calculating the value of employees based on the criteria entered yng employees
9	out	Exit

6. Conclusion

Based on the exposure that has been presented above, writer concluded that the assessment of employees using TOPSIS algorithm is very effective with the following points:

- Calculation of employee performance using TOPSIS algorithm can be applied to the performance appraisal of each month.
- Perangkingan taken is the end result after the calculation of each solution alternaif both positive and negative, as consideration of a final decision by the board of directors.

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