
DECISION SUPPORT SYSTEM FOR MANAGER PLACEMENT IN THE PLANTATION INDUSTRY USING TOPSIS METHOD

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KEYWORDS

Decision Support
System; Plantation
Industry Manager;
TOPSIS

ABSTRACT

Accuracy in placing employees determines the performance of a company. Likewise done by PT XYZ in determining the placement of managers in the plantation industry by using a decision support system. This is done in order to minimize the level of subjectivity of the manager placement determination system at PT XYZ. This research aims to provide alternative preference values to prospective employees who will occupy manager positions in the plantation industry. The method used in the placement of managers with a decision support system is the technique for Order Preference by Similarity to the Ideal Solution (TOPSIS) method. The criteria used in this method are 7 criteria taken based on the criteria for BUMN talent management according to the Regulation of the Minister of BUMN Number PER-3 / MBU / 03/2023, these criteria are Professional Work Period, Variety of Work Experience, Managerial Competence, Technical Competence, Educational Strata, Performance Assessment Results, Level of Punishment that has been received. The results of this study are from the results of the calculation analysis through the TOPSIS method on 7 alternatives, then there is name number 5 managed to get the best score of 0.80 and was determined as a preference to be placed in class A garden.

INTRODUCTION

The plantation industry is one of the main economic sectors in Indonesia, from the point of view of contribution to the Indonesian state budget, the plantation sub-sector is currently one of the largest contributors to national economic growth, with a contribution rate to agricultural gross domestic product (GDP) of 34% or IDR 429.68 trillion. The role of plantations is increasing from year to year. Moreover, the world energy crisis has increasingly placed the position of plantations at a very important level because it is not only related to food issues but also penetrates into related food, feed, fuel (Widodo & Mahagiyani, 2022).

PT XYZ is a group of state-owned companies engaged in the plantation industry that manages various commodities, namely oil palm, rubber, sugar cane, and tea which are the main commodities. The location of PT XYZ business units is spread across Sumatra, Java, Kalimantan, and Sulawesi which are divided into 3 corporate entities and 13 Regions. As a plantation industry company in general that is labor intensive (labor industry) and has a large number of workers, the number of workers at PT XYZ in 2024 position is quite a lot, namely 80 thousand employees.

The large workforce of PT XYZ as a plantation company means that it requires excellent human resource management because this HR management factor is a crucial factor in achieving optimal productivity and profitability for individual employees and organizations. Human resource management (HRM) is an important factor for achieving company goals because it involves many common components such as human factors, attitudes, behavior, and society. Human resource management itself can be classified into operational and managerial forms. Operational responsibilities include policy-making, planning, implementation, auditing, evaluation, and performance appraisal, while managerial roles include getting support from upper management, increasing employee empowerment, providing continuous training, implementing an efficient remuneration system, and building teamwork (Chams & García-Blandón, 2019). With the classification of HR management, it will make the organization more effective and efficient. However, before leading to this, of course, a process is needed first. This is due to the need for HR management in terms of creating an optimal workforce individually. The form includes determining the placement of employees in the organization and providing opportunities for employees to develop their careers (Sahadewa & Rahmawati, 2021).

The previous explanation states that one of the important aspects of HR management is employee placement. One way to get quality human resources is to place these human resources based on their competencies and characteristics (Rivai, 2009). Proper employee placement will have an impact on improving employee performance, operational efficiency, and employee job satisfaction.

One of the problems during the employee position placement process is subjectivity so a system is needed that is able to select employees who are suitable or feasible to occupy positions in certain divisions. The criteria possessed by employees who are accepted must also be in accordance with the criteria needed so that they can overcome the problems in the position (Pramudita & Rizaldi, 2018). In plantation companies, one of the most crucial position placement processes is the placement of the Garden Manager, considering that this position is the top structure in the work unit of each garden. The Garden Manager is the top position in the work unit that is a profit center, the person who sits in the position will manage all resources in the garden and given the KPIs of production, productivity, and cost-effectiveness efficiency.

PT XYZ has special criteria in classifying the garden as a work unit, according to the decision letter of the director of PT XYZ they set 3 garden classifications, namely class A, class B, and class C gardens, where class A is the garden that has the highest complexity. The level of complexity and difficulty in managing the plantation is seen from 3 factors and 9 sub-factors. The first factor is technical culture complexity which consists of sub-factors of area, number of commodities, topography, and number of farm activities. The second factor is internal complexity consisting of sub-factors of the number of employees, employee education level, employee compliance level, fixed costs & depreciation. The third factor is external complexity which consists of 1 sub-factor, namely farm security.

Meanwhile, to classify personnel, PT XYZ seeks to guide the policy of the Ministry of SOEs in the Regulation of the Minister of SOEs Number PER-3 / MBU / 03/2023 concerning BUMN Organs and Human Resources which, among others, discusses the concept of talent management that important criteria for attracting talent to be placed in a particular company

are knowledge, experience, competency, personal attributes (Republik, 2023). The best personnel according to these criteria will be recommended to occupy class A farms.

Currently, the division in charge of HR at the head office of PT XYZ still processes the selection of manager placements to each garden class manually so the element of subjectivity is still quite large, therefore PT XYZ really needs a Decision Support System to help the placement of garden managers. In essence, the Decision Support System is a technique in the form of a model-based set/collection that is able to interactively make decisions. Decision Support Systems are useful for assisting decision-making in overcoming structured and semi-structured problems to be more effective by using analytical models and available data. The decision taken to solve a problem is seen from its structurality which consists of structured decisions (Structured Decision), semi-structured decisions (Semi-Structured Decision), and unstructured decisions (Unstructured Decision). So far, the concept of Decision Support Systems has developed rapidly in solving several problems. So that the application of the Decision Support System is able to provide quite effective results on a problem by providing alternative recommendations in making the final decision (Guswandi et al., 2021). In addition, decision support systems can also be defined as tools designed to assist users in making decisions by providing relevant information, data analysis, and modeling capabilities (Forcina et al., 2024).

TOPSIS (Technique for Order of Preference by Similarity to an Ideal Solution) is a multi-criteria decision-making method used to evaluate alternatives based on multiple criteria. It involves determining the distance of each alternative to the ideal solution and the distance to the negative ideal solution. The alternative that has the smallest distance to the ideal solution and the greatest distance to the negative ideal solution is considered the best choice (Jin et al., 2024). TOPSIS is one method of solving multi-criteria decision-making problems based on the concept that the best-selected alternative not only has the shortest distance from the positive ideal solution but also has the longest distance from the negative ideal solution. However, the alternative that has the smallest distance from the positive ideal solution does not necessarily have the largest distance from the negative ideal solution. Therefore, TOPSIS considers both, the distance to the positive ideal solution and the distance to the negative ideal solution simultaneously. The optimal solution in the TOPSIS method is obtained by determining the relative closeness of an alternative to the positive ideal solution. TOPSIS will rank alternatives based on the priority of the relative closeness value of an alternative to a positive ideal solution. The alternatives that have been ranked are then used as a reference for decision-makers to choose the best solution (Surya, 2018).

TOPSIS is widely used because the concept is simple and easy to understand, has efficient computation, and is able to measure the relative performance of alternative decisions in a simple mathematical form, besides TOPSIS can combine the relative weights of important criteria (Aqli et al., 2016). The steps in the TOPSIS method are as follows:

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

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

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

Where :

r_{ij} = normalized decision matrix

x_{ij} = weight of jth criterion on Ith alternative

The positive ideal solution A+ and negative ideal solution A- can be determined based on the normalized weight rating (yij) as follows

$$y_{ij} = w_{ij} \cdot r_{ij} ;$$

$$A^+ = (y_{1+}, y_{2+}, \dots, y_{n+});$$

$$A^- = (y_{1-}, y_{2-}, \dots, y_{n-});$$

Where :

y_{ij} = weighted normalized matrix [i][j]

w_i = weight vector [i]

y_{j+} = max y_{ij} , if j is a profit attribute min y_{ij} if j is a cost attribute

y_{j-} = min y_{ij} , if j is a profit attribute max y_{ij} if j is a cost attribute

The distance between alternative AI and the positive ideal solution is formulated as:

$$D_i^+ = \sqrt{\sum_{j=1}^m (y_i^+ - y_{ij})^2} \quad ; i=1,2,\dots,m \quad (4)$$

Where :

D_i^+ = distance of alternative AI to the ideal solution

negative y_i^+ = positive ideal solution [i]

y_{ij}^{\dots} = weighted normalization matrix [i][j]

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

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

Where :

D_i^- = distance of alternative AI to the ideal solution

negative y_i^- = positive ideal solution [i]

y_{ij}^{\dots} = weighted normalization matrix [i][j]

The preference value for each alternative (V_i) can be seen in the formula below.

$$V_i = \frac{D_i^-}{D_i^- + D_i^+} \quad ; i=1,2,\dots,m \quad (6)$$

Where :

- V_i = closeness of each alternative to the ideal solution
 D_{i+} = distance of alternative A_i with the positive ideal solution
 D_{i-} = distance of alternative A_i with the negative ideal solution

TOPSIS algorithm is a decision support system algorithm with many criteria, TOPSIS stands for Technique for Order Preference by Similarity to Ideal Solution which considers the distance to the positive ideal solution and the distance to the negative ideal solution by taking the shortest distance from the positive ideal solution and the longest distance from the negative ideal solution, thus obtaining alternative preference values from comparisons to their relative distances (SALATIGA, 2020). TOPSIS is used because the concept is simple, easy to understand, computationally efficient, and has the ability to measure the relative performance of decision alternatives in a simple mathematical form (Asrul & Zuhriyah, 2021).

Based on previous research as a reference for this research, the first is Lecturer Performance Appraisal Using TOPSIS in the AMIK Mitra Gama case study. The research aims to build a decision support system using the Technique For Others Reference by Similarity to Ideal Solution (TOPSIS) method that will help and facilitate the assessment of lecturer performance. In the study examined the performance of 5 lecturers, at AMIK Mitra Gama, data collection and information used a descriptive or survey approach, namely collecting data from several AMIK Mitra Gama lecturers who were used as a reference for assessing lecturer performance. The conclusion is that the TOPSIS method can provide recommendations in evaluating lecturers, where the final result is calculated based on the highest preference value of each alternative. The highest value is the first priority as the lecturer who has the highest performance (Surya, 2018).

Another research is, the Decision Support System for Clean Water Distribution Using Tank Cars at PDAM Makassar City Using the TOPSIS Method. The research objective is to facilitate the priority of clean water delivery, the application of the TOPSIS method in this study makes it easier for PDAM Makassar City to distribute clean water using tank cars. Because the TOPSIS method is able to prioritize ideal alternatives. The results obtained manually and the results of the system obtained the same results and have been validated (Asrul & Zuhriyah, 2021).

Another study was conducted using a decision support system and using the TOPSIS method, to find preferences related to the effect of the company's employee turnover rate and the results are one of the strongest preferences to reduce employee turnover rates by increasing CSR programs for company employees themselves (Dobrosavljević & Urošević, 2022). Then other research measures individual organizational performance based on criteria and ranks individuals based on measurements. The technique used is one of them using the TOPSIS method. The process by looking at the significance of indicators or alternatives by providing a final human capital ranking that produces several Multi-Criteria Decision Making (MCDM) approaches "which are effective, compatible and reliable given the research objectives (Masum et al., 2019).

There is also another study that aims to determine the determinants of employee retention of South Korean construction employees. It was identified that eight significant determinants

affect employee retention in South Korean construction companies. The TOPSIS method technique was used to prioritize the identified determinants. TOPSIS analysis shows that personal characteristics, personal development, promotion opportunities, and work-life balance are the four most important determinants. Construction companies are advised to focus on these determinants to increase employee retention rates in their companies and achieve sustainable development (Park et al., 2021). Based on the description above and the absence of a system that can help make decisions on the placement of garden managers, especially at PT XYZ, it is necessary to build a decision support system using the Technique For Others Reference by Similarity to Ideal Solution (TOPSIS) method that will help and facilitate decision making on the placement of garden managers.

METHOD RESEARCH

The research was conducted at PT XYZ, and data collection and information were obtained from secondary data in the company, as a trial in this study, filling tests were carried out on 7 people who had the potential to fill one of the class A gardens. The data is then analyzed and used as a reference in making decisions on the selection of garden managers who will be placed in one of the class A gardens. In decision-making, the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method is used (Guswandi et al., 2021). At this stage, we will explain how the test works using the TOPSIS method. The testing mechanism can be seen in Figure 1.

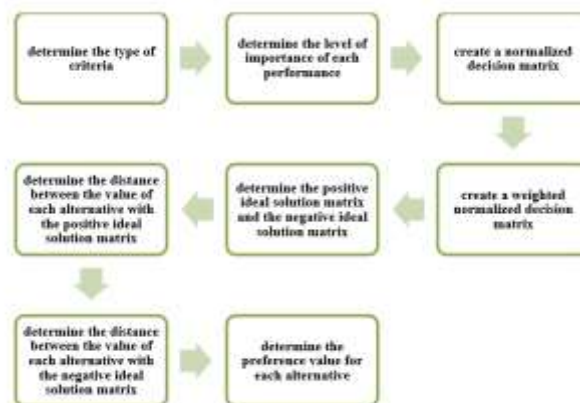


Figure 1
TOPSIS Mechanism

RESULTS AND DISCUSSION

Based on the testing mechanism above, it takes 8 stages to analyze who is the most suitable employee to be placed in the class A garden. The following discussion is to analyze employee preferences to fill the position of class A garden manager. The following data are 7 employees who are used as tests and will be assessed based on the level of importance of existing criteria.

Table 1
Alternatives

| Alternative | Description |
|-------------|-------------|
| A1 | Employee 1 |
| A2 | Employee 2 |
| A3 | Employee 3 |
| A4 | Employee 4 |
| A5 | Employee 5 |
| A6 | Employee 6 |
| A7 | Employee 7 |

After the alternative data is determined, testing is then carried out, namely:

- a. Determine the criteria that will be used as a reference in the assessment.

Table 2
Criteria

| Criteria Code | Criteria | Cluster Criteria |
|---------------|---|------------------------|
| K1 | Teneur (Professional Tenure) | |
| K2 | Variance (Variation of Work Experience) | Experience |
| K3 | Managerial Competence | Knowledge & Competency |
| K4 | Technical Competence | |
| K5 | Education Strata | |
| K6 | Performance Appraisal Results | Personal |
| K7 | Level of Punishment ever received | Attribute |

Table 2 describes the criteria that will be used to assess lecturer performance, the criteria start from K1 to K8.

- a. Determine the level of importance of each criterion, with a value of 1 to 5, namely :

Table 3
Level of Importance

| Level of Importance | Value |
|---------------------|-------|
| Very High | 5 |
| High | 4 |
| Middle | 3 |
| Low | 2 |
| Very Low | 1 |

After the criteria are determined (Table 3), then the level of importance of each criterion is determined, the level of importance of the criteria can be seen in Table 4.

Table 4
Level of Importance of Each Criterion

| Criteria | Description | Value |
|----------|------------------------------|-------|
| K1 | Teneur (Professional Tenure) | 0,1 |

| | | |
|----|---|------|
| K2 | Variance (Variation of Work Experience) | 0,1 |
| K3 | Managerial Competence | 0,15 |
| K4 | Technical Competence | 0,15 |
| K5 | Education Strata | 0,1 |
| K6 | Performance Appraisal Results | 0,3 |
| K7 | Level of Punishment ever received | 0,1 |

Based on Table 4, the preference weight (W) is obtained:

Table 5
Importance of weight value of employees

| Alternatives | K1 | K2 | K3 | K4 | K5 | K6 | K7 |
|--------------|----|----|----|----|----|----|----|
| A1 | 2 | 4 | 1 | 1 | 3 | 1 | 2 |
| A2 | 1 | 4 | 2 | 2 | 3 | 2 | 2 |
| A3 | 2 | 3 | 3 | 3 | 3 | 2 | 3 |
| A4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 |
| A5 | 4 | 4 | 3 | 3 | 4 | 2 | 3 |
| A6 | 5 | 2 | 2 | 2 | 5 | 2 | 2 |
| A7 | 3 | 2 | 2 | 2 | 2 | 3 | 3 |

In Table 5, all alternative data is input according to the data obtained in the data collection process, namely 7 employees as a test sample.

- a. Creating a normalized decision matrix In this section, the value of each criterion will be sought using the formula (1).

K1 = Finding the Teneur Of Experience Value

$$|X_1| = \sqrt{2^2 + 1^2 + 2^2 + 3^2 + 4^2 + 5^2 + 3^2} = 8,25$$

$$r_{11} = \frac{X_{11}}{|X_1|} = \frac{2}{8,25} = 0,24$$

$$r_{21} = \frac{X_{21}}{|X_1|} = \frac{1}{8,25} = 0,12$$

$$r_{31} = \frac{X_{31}}{|X_1|} = \frac{2}{8,25} = 0,24$$

$$r_{41} = \frac{X_{41}}{|X_1|} = \frac{3}{8,25} = 0,36$$

$$r_{51} = \frac{X_{51}}{|X_1|} = \frac{4}{8,25} = 0,48$$

$$r_{61} = \frac{X_{61}}{|X_1|} = \frac{5}{8,25} = 0,61$$

$$r_{71} = \frac{X_{71}}{|X_1|} = \frac{3}{8,25} = 0,36$$

K2: Find the Variance of Experience value

$$|X_2| = \sqrt{4^2 + 4^2 + 3^2 + 3^2 + 4^2 + 2^2 + 2^2} = 8,60$$

$$r_{12} = \frac{X_{12}}{|X_2|} = \frac{4}{8,60} = 0,46$$

$$r_{22} = \frac{X_{22}}{|X_2|} = \frac{4}{8,60} = 0,46$$

$$r_{32} = \frac{X_{32}}{|X_2|} = \frac{3}{8,60} = 0,35$$

$$r_{42} = \frac{X_{42}}{|X_2|} = \frac{3}{8,60} = 0,35$$

$$r_{52} = \frac{X_{52}}{|X_2|} = \frac{4}{8,60} = 0,46$$

$$r_{62} = \frac{X_{62}}{|X_2|} = \frac{2}{8,60} = 0,23$$

$$r_{72} = \frac{X_{72}}{|X_2|} = \frac{2}{8,60} = 0,23$$

K3: Find the value of Managerial Competence

$$|X_3| = \sqrt{1^2 + 2^2 + 3^2 + 2^2 + 3^2 + 2^2 + 2^2} = 5,92$$

$$r_{13} = \frac{X_{13}}{|X_3|} = \frac{4}{8,60} = 0,17$$

$$r_{23} = \frac{X_{23}}{|X_3|} = \frac{4}{8,60} = 0,34$$

$$r_{33} = \frac{X_{33}}{|X_3|} = \frac{3}{8,60} = 0,51$$

$$r_{43} = \frac{X_{43}}{|X_3|} = \frac{3}{8,60} = 0,34$$

$$r_{53} = \frac{X_{53}}{|X_3|} = \frac{4}{8,60} = 0,51$$

$$r_{63} = \frac{X_{63}}{|X_3|} = \frac{2}{8,60} = 0,34$$

$$r_{73} = \frac{X_{73}}{|X_3|} = \frac{2}{8,60} = 0,34$$

K4: Find the value of Technical Competency

$$|x_4| = \sqrt{1^2 + 2^2 + 3^2 + 2^2 + 3^2 + 2^2 + 2^2} = 5,92$$

$$r_{14} = \frac{X_{14}}{|x_4|} = \frac{4}{8,60} = 0,17$$

$$r_{24} = \frac{X_{24}}{|x_4|} = \frac{4}{8,60} = 0,34$$

$$r_{34} = \frac{X_{24}}{|x_4|} = \frac{3}{8,60} = 0,51$$

$$r_{44} = \frac{X_{44}}{|x_4|} = \frac{3}{8,60} = 0,34$$

$$r_{54} = \frac{X_{54}}{|x_4|} = \frac{4}{8,60} = 0,51$$

$$r_{64} = \frac{X_{64}}{|x_4|} = \frac{2}{8,60} = 0,34$$

$$r_{74} = \frac{X_{74}}{|x_4|} = \frac{2}{8,60} = 0,34$$

K5: Find the value of Strata Education

$$|x_5| = \sqrt{3^2 + 3^2 + 3^2 + 2^2 + 4^2 + 5^2 + 2^2} = 8,72$$

$$r_{14} = \frac{X_{11}}{|x_5|} = \frac{3}{8,72} = 0,34$$

$$r_{24} = \frac{X_{11}}{|x_5|} = \frac{3}{8,72} = 0,34$$

$$r_{34} = \frac{X_{11}}{|x_5|} = \frac{3}{8,72} = 0,34$$

$$r_{44} = \frac{X_{11}}{|x_5|} = \frac{2}{8,72} = 0,23$$

$$r_{54} = \frac{X_{11}}{|x_5|} = \frac{4}{8,72} = 0,46$$

$$r_{64} = \frac{X_{11}}{|x_5|} = \frac{5}{8,72} = 0,57$$

$$r_{74} = \frac{X_{11}}{|x_5|} = \frac{2}{8,72} = 0,23$$

K6: Find the Work performance value

$$|x_6| = \sqrt{1^2 + 2^2 + 2^2 + 2^2 + 2^2 + 2^2 + 3^2} = 5,48$$

$$r_{16} = \frac{X_{16}}{|x_6|} = \frac{1}{8,72} = 0,18$$

$$r_{26} = \frac{X_{26}}{|x_6|} = \frac{2}{8,72} = 0,37$$

$$r_{36} = \frac{X_{36}}{|x_6|} = \frac{2}{8,72} = 0,37$$

$$r_{46} = \frac{X_{46}}{|x_6|} = \frac{2}{8,72} = 0,37$$

$$r_{56} = \frac{X_{56}}{|x_6|} = \frac{2}{8,72} = 0,37$$

$$r_{66} = \frac{X_{66}}{|x_6|} = \frac{2}{8,72} = 0,37$$

$$r_{76} = \frac{X_{76}}{|x_6|} = \frac{3}{8,72} = 0,55$$

K7: Find the Work performance value

$$|x_7| = \sqrt{2^2 + 2^2 + 3^2 + 2^2 + 3^2 + 2^2 + 3^2} = 6,56$$

$$r_{17} = \frac{X_{17}}{|x_7|} = \frac{2}{6,56} = 0,30$$

$$r_{27} = \frac{X_{27}}{|x_7|} = \frac{2}{6,56} = 0,30$$

$$r_{37} = \frac{X_{37}}{|x_7|} = \frac{3}{6,56} = 0,46$$

$$r_{47} = \frac{X_{47}}{|x_7|} = \frac{2}{6,56} = 0,30$$

$$r_{57} = \frac{X_{57}}{|x_7|} = \frac{3}{6,56} = 0,46$$

$$r_{67} = \frac{X_{67}}{|x_7|} = \frac{2}{6,56} = 0,30$$

$$r_{77} = \frac{X_{77}}{|x_7|} = \frac{3}{6,56} = 0,46$$

And so on so as to obtain the following R matrix:

$$R = \begin{bmatrix} 0,24 & 0,46 & 0,17 & 0,17 & 0,34 & 0,18 & 0,30 \\ 0,12 & 0,46 & 0,34 & 0,34 & 0,34 & 0,37 & 0,30 \\ 0,24 & 0,35 & 0,51 & 0,51 & 0,34 & 0,37 & 0,46 \\ 0,36 & 0,35 & 0,34 & 0,34 & 0,23 & 0,37 & 0,30 \\ 0,49 & 0,46 & 0,51 & 0,51 & 0,46 & 0,37 & 0,46 \\ 0,61 & 0,23 & 0,34 & 0,34 & 0,57 & 0,37 & 0,30 \\ 0,36 & 0,23 & 0,34 & 0,34 & 0,23 & 0,55 & 0,46 \end{bmatrix}$$

b. Determining the weighted normalized decision matrix using formula (2)

$$\begin{aligned} Y_1 &= 0,24 \times 0,1 & 0,46 \times 0,1 & 0,17 \times 0,15 & 0,17 \times 0,15 & 0,34 \times 0,1 & 0,18 \times 0,3 & 0,30 \times 0,1 \\ Y_2 &= 0,12 \times 0,1 & 0,46 \times 0,1 & 0,34 \times 0,15 & 0,34 \times 0,15 & 0,34 \times 0,1 & 0,37 \times 0,3 & 0,30 \times 0,1 \\ Y_3 &= 0,24 \times 0,1 & 0,35 \times 0,1 & 0,51 \times 0,15 & 0,51 \times 0,15 & 0,34 \times 0,1 & 0,37 \times 0,3 & 0,46 \times 0,1 \end{aligned}$$

And so on so as to obtain the matrix Y

$$Y = \begin{bmatrix} 0,02 & 0,05 & 0,03 & 0,03 & 0,03 & 0,05 & 0,03 \\ 0,01 & 0,05 & 0,05 & 0,05 & 0,03 & 0,11 & 0,03 \\ 0,02 & 0,03 & 0,08 & 0,08 & 0,03 & 0,11 & 0,05 \\ 0,04 & 0,03 & 0,05 & 0,05 & 0,02 & 0,11 & 0,03 \\ 0,05 & 0,05 & 0,08 & 0,08 & 0,05 & 0,11 & 0,05 \\ 0,06 & 0,02 & 0,05 & 0,05 & 0,06 & 0,11 & 0,03 \\ 0,04 & 0,02 & 0,05 & 0,05 & 0,02 & 0,16 & 0,05 \end{bmatrix}$$

c. Determine the positive ideal solution (Y Max) and negative ideal solution (Y Min) Positive ideal solution (Y Max) using formula (3)

$$y_1^+ = \text{Max} \left\{ \begin{array}{l} 0,02; 0,01; 0,02; \\ 0,04; 0,05; 0,06; 0,04 \end{array} \right\} = 0,06$$

$$y_2^+ = \text{Max} \left\{ \begin{array}{l} 0,05; 0,05; 0,03; \\ 0,03; 0,05; 0,2; 0,02 \end{array} \right\} = 0,05$$

$$y_3^+ = \text{Max} \left\{ \begin{array}{l} 0,03; 0,05; 0,08; \\ 0,05; 0,08; 0,05; 0,05 \end{array} \right\} = 0,08$$

$$y_4^+ = \text{Max} \left\{ \begin{array}{l} 0,03; 0,05; 0,08; \\ 0,05; 0,08; 0,05; 0,05 \end{array} \right\} = 0,08$$

$$y_5^+ = \text{Max} \left\{ \begin{array}{l} 0,03; 0,03; 0,03; \\ 0,02; 0,05; 0,06; 0,02 \end{array} \right\} = 0,06$$

$$y_6^+ = \text{Max} \left\{ \begin{array}{l} 0,05; 0,11; 0,11; \\ 0,11; 0,11; 0,11; 0,16 \end{array} \right\} = 0,16$$

$$y_7^+ = \text{Max} \left\{ \begin{array}{l} 0,03; 0,03; 0,05; \\ 0,03; 0,05; 0,03; 0,05 \end{array} \right\} = 0,05$$

$$A_{\text{max}}^+ = \{0,06; 0,05; 0,08; 0,08; 0,06; 0,16; 0,05\}$$

Negative ideal solution (Y Min) using formula (3)

$$y_1^- = \text{Max} \left\{ \begin{array}{l} 0,02; 0,01; 0,02; \\ 0,04; 0,05; 0,06; 0,04 \end{array} \right\} = 0,01$$

$$y_2^- = \text{Max} \left\{ \begin{array}{l} 0,05; 0,05; 0,03; \\ 0,03; 0,05; 0,2; 0,02 \end{array} \right\} = 0,02$$

$$y_3^- = \text{Max} \left\{ \begin{array}{l} 0,03; 0,05; 0,08; \\ 0,05; 0,08; 0,05; 0,05 \end{array} \right\} = 0,03$$

$$y_4^- = \text{Max} \left\{ \begin{array}{l} 0,03; 0,05; 0,08; \\ 0,05; 0,08; 0,05; 0,05 \end{array} \right\} = 0,03$$

$$y_5^- = \text{Max} \left\{ \begin{array}{l} 0,03; 0,03; 0,03; \\ 0,02; 0,05; 0,06; 0,02 \end{array} \right\} = 0,02$$

$$y_6^- = \text{Max} \left\{ \begin{array}{l} 0,05; 0,11; 0,11; \\ 0,11; 0,11; 0,11; 0,16 \end{array} \right\} = 0,05$$

$$y_7^- = \text{Max} \left\{ \begin{array}{l} 0,03; 0,03; 0,05; \\ 0,03; 0,05; 0,03; 0,05 \end{array} \right\} = 0,03$$

$$A_{\square}^- = \{0,01; 0,02; 0,03; 0,03; 0,02; 0,05; 0,03\}$$

d. Determining the distance between the weighted values of each alternative Positive ideal solution using formula (4)

$$D_1^+ = \sqrt{\begin{array}{l} (0,06-0,2)^2+(0,05-0,05)^2+ (0,08-0,03)^2+ (0,08-0,03)^2 \\ +(0,06-0,03)^2+(0,16-0,05)^2+(0,05-0,03)^2 \\ +(0,45-0,24)^2 \end{array}}$$

$$= 0,25$$

$$D_2^+ = \sqrt{\begin{array}{l} (0,06-0,1)^2+(0,05-0,05)^2+ (0,08-0,05)^2+ (0,08-0,05)^2 \\ +(0,06-0,03)^2+(0,16-0,11)^2+(0,05-0,03)^2 \\ +(0,45-0,33)^2 \end{array}}$$

$$= 0,14$$

$$D_3^+ = \sqrt{\begin{array}{l} (0,06-0,2)^2+(0,05-0,03)^2+ (0,08-0,08)^2+ (0,08-0,08)^2 \\ +(0,06-0,03)^2+(0,16-0,11)^2+(0,05-0,05)^2 \\ +(0,45-0,40)^2 \end{array}}$$

$$= 0,09$$

$$D_4^+ = \sqrt{\begin{aligned} &(0,06-0,04)^2+(0,05-0,03)^2+ (0,08-0,05)^2+ (0,08-0,05)^2 \\ &+(0,06-0,02)^2+(0,16-0,11)^2+(0,05-0,03)^2 \\ &+(0,45-0,34)^2 \end{aligned}}$$

$$= 0,14$$

$$D_5^+ = \sqrt{\begin{aligned} &(0,06-0,05)^2+(0,05-0,05)^2+ (0,08-0,08)^2+ (0,08-0,08)^2 \\ &+(0,06-0,05)^2+(0,16-0,11)^2+(0,05-0,05)^2 \\ &+(0,45-0,45)^2 \end{aligned}}$$

$$= 0,06$$

$$D_6^+ = \sqrt{\begin{aligned} &(0,06-0,06)^2+(0,05-0,02)^2+ (0,08-0,05)^2+ (0,08-0,05)^2 \\ &+(0,06-0,06)^2+(0,16-0,11)^2+(0,05-0,03)^2 \\ &+(0,45-0,38)^2 \end{aligned}}$$

$$= 0,10$$

$$D_7^+ = \sqrt{\begin{aligned} &(0,06-0,04)^2+(0,05-0,02)^2+ (0,08-0,05)^2+ (0,08-0,05)^2 \\ &+(0,06-0,02)^2+(0,16-0,16)^2+(0,05-0,05)^2 \\ &+(0,45-0,39)^2 \end{aligned}}$$

$$= 0,08$$

- e. Determining the distance between the weighted values of each alternative Positive ideal solution using formula (5)

$$D_1^- = \sqrt{\begin{aligned} &(0,01-0,2)^2+(0,02-0,05)^2+ (0,03-0,03)^2+ (0,03-0,03)^2 \\ &+(0,02-0,03)^2+(0,05-0,05)^2+(0,03-0,03)^2 \\ &+(0,24-0,24)^2 \end{aligned}}$$

$$= 0,03$$

$$D_2^- = \sqrt{\begin{aligned} &(0,01-0,1)^2+(0,02-0,05)^2+ (0,03-0,05)^2+ (0,03-0,05)^2 \\ &+(0,02-0,03)^2+(0,05-0,11)^2+(0,03-0,03)^2 \\ &+(0,24-0,33)^2 \end{aligned}}$$

$$= 0,12$$

$$D_3^- = \sqrt{\begin{aligned} &(0,01-0,02)^2 + (0,02-0,05)^2 + (0,03-0,05)^2 + (0,03-0,05)^2 \\ &+ (0,02-0,03)^2 + (0,05-0,11)^2 + (0,03-0,05)^2 \\ &+ (0,24-0,40)^2 \end{aligned}}$$

$$= 0,19$$

$$D_4^- = \sqrt{\begin{aligned} &(0,01-0,04)^2 + (0,02-0,03)^2 + (0,03-0,05)^2 + (0,03-0,05)^2 \\ &+ (0,02-0,02)^2 + (0,05-0,11)^2 + (0,03-0,03)^2 \\ &+ (0,24-0,34)^2 \end{aligned}}$$

$$= 0,12$$

$$D_5^- = \sqrt{\begin{aligned} &(0,01-0,05)^2 + (0,02-0,05)^2 + (0,03-0,08)^2 + (0,03-0,08)^2 \\ &+ (0,02-0,05)^2 + (0,05-0,11)^2 + (0,03-0,05)^2 \\ &+ (0,24-0,45)^2 \end{aligned}}$$

$$= 0,23$$

$$D_6^- = \sqrt{\begin{aligned} &(0,01-0,06)^2 + (0,02-0,02)^2 + (0,03-0,05)^2 + (0,03-0,05)^2 \\ &+ (0,02-0,06)^2 + (0,05-0,11)^2 + (0,03-0,03)^2 \\ &+ (0,24-0,38)^2 \end{aligned}}$$

$$= 0,17$$

$$D_7^- = \sqrt{\begin{aligned} &(0,01-0,04)^2 + (0,02-0,02)^2 + (0,03-0,05)^2 + (0,03-0,05)^2 \\ &+ (0,02-0,02)^2 + (0,05-0,11)^2 + (0,03-0,05)^2 \\ &+ (0,24-0,39)^2 \end{aligned}}$$

$$= 0,19$$

a. Determining the preference value of each alternative (V_i) using formula (6)

$$V_1 = \frac{0,03}{0,03 + 0,25} = 0,10$$

$$V_2 = \frac{0,12}{0,12 + 0,14} = 0,45$$

$$V_3 = \frac{0,19}{0,19 + 0,09} = 0,69$$

$$V_4 = \frac{0,12}{0,12 + 0,14} = 0,46$$

$$V_5 = \frac{0,23}{0,23 + 0,06} = 0,80$$

$$V_6 = \frac{0,17}{0,17 + 0,10} = 0,63$$

$$V_7 = \frac{0,19}{0,19 + 0,08} = 0,71$$

Table 6
Preference values for alternatives

| Alternative | Description | Preference value |
|-------------|-------------------|------------------|
| A1 | Employee 1 | 0,10 |
| A2 | Employee 2 | 0,45 |
| A3 | Employee 3 | 0,69 |
| A4 | Employee 4 | 0,46 |
| A5 | Employee 5 | 0,80 |
| A6 | Employee 6 | 0,63 |
| A7 | Employee 7 | 0,71 |

Table 6 explains the preference value for each alternative and the results of the calculation of the preference value for each alternative, the highest value is in V₂ so alternative A5 (Employee 5) is the alternative chosen as the employee who has the highest value in this TOPSIS calculation so that alternative A5 (Employee 5) preference will be recommended to occupy class A garden.

The results of the study were ultimately able to draw objective conclusions based on preference results using the TOPSIS method with A5 (Employee 5) as the alternative chosen as the employee who has the highest value. The results of this study are in line with research conducted by Surya (2018), Asrul & Zuhriyah (2021), Dobrosavljević & Urošević (2022), Masum et al., (2019), Park et al., (2021) which all of these studies use the topsis method in determining individuals to occupy certain positions. In addition, the results of these studies are able to provide more objective preferences in determining these individuals. Likewise, what happened in this study was that the topsis method was able to provide preferences for selecting managers at PT. XYZ. This means, TOPSIS (Technique for Order of Preference by Similarity to an Ideal Solution) is a multi-criteria decision-making method used to evaluate alternatives based on multiple criteria (Jin et al., 2024). TOPSIS can also provide more objective preferences.

CONCLUSION

In the test conducted, there were 7 employees who were assessed based on the level of importance of the criteria which were generally taken based on the criteria for SOE talent management based on the policy of the Ministry of SOEs in the Regulation of the Minister of SOEs Number PER-3/MBU/03/2023 concerning SOE Organs and HR. These criteria include

Professional Work Period, Variety of Work Experience, Managerial Competence, Technical Competence, Educational Level, Performance Assessment Results, and Level of Punishment that has been received.

After the criteria and their level of importance are determined, the preference weight (W) for each employee is calculated based on the level of importance of the criteria given. A weighted normalized decision matrix is also created using a predetermined formula.

Furthermore, the calculation of the Positive Ideal Solution (Y Max) and Negative Ideal Solution (Y Min) is carried out to determine the preference value of each alternative. The calculation results show that the highest preference value is for Employee 5 (Alternative A5), with a preference value of 0.80.

Based on the preference value, it can be concluded that Employee 5 is the best alternative that has the highest value in employee performance assessment to be placed as a class A garden manager.

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Teguh Widodo¹, Nur Wening², Rianto³ (2024)

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