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Using The SMART Method For Web-Based Employee Performance Measurement

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Abstract
Employee performance appraisal is one of the important aspects in human resource management that serves to measure individual contributions to the organization. At Matahari Departement Store (MDS) Cileungsi, the performance appraisal process is still done manually which takes time and is often subjective. This research aims to implement the SMART (Simple Multi-Attribute Rating Technique) method in a decision support system (DSS) to improve the efficiency and objectivity of employee performance appraisals using system development in the form of RAD (Rapid Application Development). The SMART method was chosen for its ability to combine various assessment criteria with adjustable weights. The implementation of this method involves several stages, including identification of assessment criteria, determination of weights, data collection, and calculation of final scores. The results show that the developed system can provide a more structured and transparent employee performance appraisal than the manual method. This system is expected to help the management of MDS Cileungsi in making more informed decisions regarding employee development.

Keywords: Decision Support System, Employee Performance Appraisal, Rapid Application Development, Simple Multi-Attribute Rating Technique.

1. Introduction

In a growing business world, companies in various sectors must be able to compete in an increasingly competitive environment. One indicator of competition is the company's ability to provide fast service. This fast service can be achieved through employees who have high quality performance. Where the employee himself is one of the main assets in the company, and the quality of the company will increase along with the improvement of employee performance (Primadasa and Alfiarini 2019). Employee performance can be assessed from various aspects, one of which is seen in work productivity. In line with research from Zebua, et. al. (2022) which states that performance appraisal is very important to do with the aim of increasing the productivity and professionalism of the company, and one of them is to measure the ability of employees and employees. The more productive employees the company has, the higher the operational efficiency and achievement of Company goals. The existence of quality human resources will help the company achieve its goals more efficiently and quickly (Firdias, 2020).

Employee performance appraisal is a written form of ability shown in the form of real work and work results produced by employees when they complete the tasks and responsibilities given by the company or agency (Amida and Kristiana, 2019). Companies need to conduct employee performance appraisals so that the quality of employees continues to be improved. However, in practice, performance appraisal is often a challenge for companies because the process is time consuming and often subjective carried out by managerial parties. For this reason, it is necessary to carry out an assessment systematically, so that it can be more transparent, efficient and objective (Dwita and Suhud, 2022). Along with technological developments, many companies are turning to the use of decision support systems (SKS) to

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overcome this challenge. One method that can be used in DSS is the SMART (Simple Multi-Attribute Rating Technique) method. The SMART method allows employee performance assessment to be carried out in a more structured manner by combining various relevant assessment criteria, as well as providing weights that can be adjusted according to company needs. With this automated and integrated system, management can more easily monitor and evaluate employee performance periodically, so that decisions made regarding employee development and rewards can be more targeted.

MDS Cileungsi is a company engaged in retail. As a growing company, MDS Cileungsi realizes the importance of having an efficient and objective performance appraisal system to support better decision making. However, the performance appraisal process carried out so far is still manual and subjective, so that often the performance measurement is felt less effective and less accurate which can have a negative impact on employee motivation and productivity. So far, the appraisal process has relied more on evaluations based on direct observations and subjective assessments from superiors. While the aim of this approach is to provide relevant and in-depth assessments, sometimes the results can vary due to differences in individual perspectives and interpretations. This may cause some employees to feel that the appraisals they receive do not fully reflect their true contributions and efforts, thus impacting their sense of appreciation and motivation at work. To overcome this challenge, a decision support system is needed that is able to provide employee performance appraisals in a more objective and structured manner. One method that can be adopted to achieve this goal is the SMART (Simple Multi-Attribute Rating Technique) method. The SMART method offers a multi-criteria-based decision-making approach that allows assessments to be carried out in a rational, transparent, and comprehensive manner by considering various aspects of employee performance.

To overcome this challenge, a decision support system is needed that is able to provide employee performance appraisals in a more objective and structured manner. Therefore, this research focuses on the development and implementation of a decision support system for employee performance appraisal using the SMART method at MDS Cileungsi. Hopefully, the results of this research can make a positive contribution in improving the quality of human resource management in the company.

2. Literature Review
System Concept

The system is a collection of components that form a single unit (Setiyanto, et al. 2019). The system is a logical and rational procedure for designing a series of components related to one another with the intention of functioning as a unit in an effort to achieve a specified goal (Saputra and Borman 2020). To design a system, data is needed which will later be processed by the system so that the system can provide useful information to its users (Oktaviani and Ayu 2021).

Information Concept

Information is data that has been processed into a form that is meaningful to the recipient and useful in making current or future decisions (Setiyanto, et al. 2019). Data must be processed first in order to become useful information for information users. What comes from data processing must be information that meets the criteria of being timely, relevant and reliable (Frisdayanti, 2019).

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Basic Concepts of Information Systems

Information systems are organized ways to collect, enter, process, and store data and to store, manage, control, and report information in such a way that an organization can achieve predetermined goals (Triandini et al. 2019). An information system in an organization can meet the needs of managing daily transactions, supporting operational and managerial activities, as well as strategic activities of an organization and providing certain parties with the reports needed (Hidayat and Hati, 2021).

Basic Concepts of Decision Support Systems

Decision Support System is a decision-making process with the help of computer media in the decision-making process using certain data and models to solve several unstructured problems (Mubarok et al. 2019). Basically DSS is a further development of a computerized Management Information System that is designed in such a way that it is interactive with the user (Dasril et al., 2019). In making a decision support system, a method is needed that can provide decision values based on predetermined criteria (Cahyani et al. 2019).

Employee Performance

In terms of human resource management, the performance aspect is an important thing to remember. Improving employee performance is very important for a company (Darwis, 2019). Performance is the result of an employee's work during a certain period compared to various possibilities such as standards, targets / goals or criteria that have been determined in advance and agreed upon (Rivai, 2020). Employee performance is one way to find out how much a company's human resources have contributed to progress or not (Widodo et al., 2022). The existence of performance measurement in companies is expected to work together to establish cooperation to portray human actors as workers who excel in their fields and compete to contribute to organizations or companies (Fahrudin 2020).

Hypothesis Development

Several studies have been conducted related to the development of decision support systems in measuring employee performance, that measurements are made so that the party making the measurements has difficulty and takes a long time in the process. To minimize existing problems, a decision support system is needed that can analyze several employees according to their performance (Aisyah and Purba 2019). The use of methods and criteria used at this time is still considered not ideal. So it is necessary to analyze the need to use ideal criteria for employee performance appraisal (Primadasa and Alfiarini 2019). The problems that often occur in the employee performance appraisal process are (1) the employee performance appraisal process has been carried out every month but the evaluation stage is not carried out until the assessment, (2) measurement is not based on existing assessments but based on close social relations, (3) the indicators used are only related to attendance or attendance. The problems that have been described can reduce the quality of employee performance, this of course will have an impact on company performance (Safrizal Safrizal and Tanti 2021).

With this decision support system in measuring employee performance, it is hoped that it can cut procedures more easily and improve the quality of employee performance. Based on the explanation above, the following hypothesis is formulated:

H1: Decision support system design can assist in measuring employee performance against performance evaluation results.
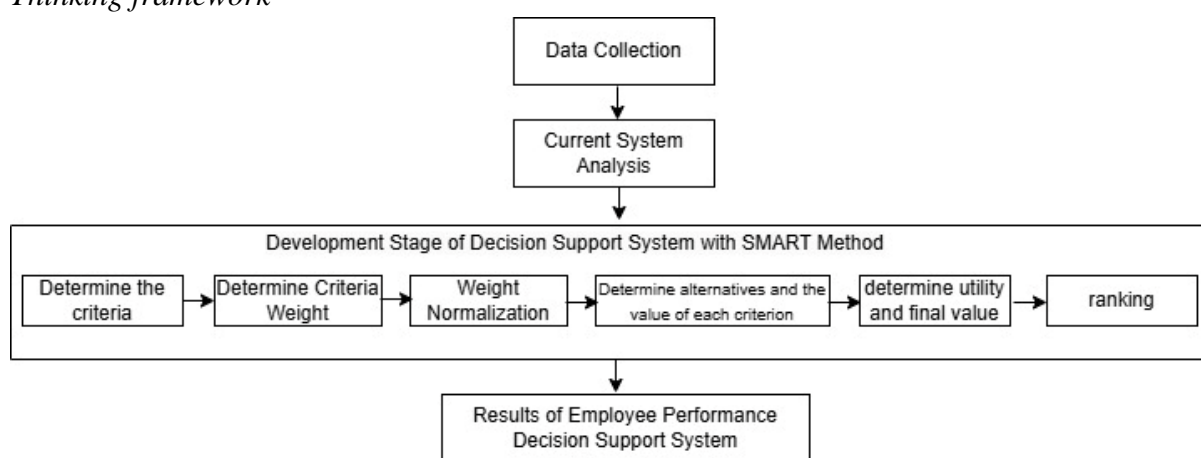
H2: Implementation of the system design helps in making the best employee decisions.

H3: The system can present employee performance report information every period.

H4: Implementation of the system has a positive effect on the ease of the authorized part in measuring employee performance to evaluate performance results.

Figure 1.
Thinking framework

The Figure 1, above shows the flow of developing a Decision Support System (SPK) for employee performance appraisal using the SMART (Simple Multi-Attribute Rating Technique) method. This process begins with data collection obtained from the Human Resure Store (HRS) section, then the researcher analyzes the current system to understand the existing needs and deficiencies. The next stage is the development of a Decision Support System with the SMART method, which involves several steps. First, determine the relevant criteria for performance appraisal consisting of four criteria, namely Attendance, Productivity, Discipline and Loyalty. After that, a weight is determined for each criterion, which reflects the importance of each criterion in the final decision. The weights that have been determined are then normalized to make them easier to compare. After that, the alternatives are assessed based on each predetermined criterion. The value of each alternative is then used to calculate the utility and final value of each alternative. The last step is ranking, which results in a ranking of alternatives based on their performance according to predefined criteria. The end result of this process is a SPK that supports decision making in assessing employee performance in an objective and structured manner.

3. Research Method
**Data Collection Methods**

The method used for data collection in this study includes 2 stages, namely: First, the data collection stage, at this stage it is necessary to develop a decision support system for collecting employee assessment data by conducting observations and literature studies. Second, the analysis stage of the current system, process identification, performance measurement

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procedures from the initial process to completion, the results of the analysis to identify application needs.

System Development Method

The RAD (Rapid Application Development) method is a software development approach that aims to produce software systems quickly and flexibly. This method focuses on developing prototypes that can be tested by end users so that the software can be more easily adapted to the needs and changes that may occur.

Figure 2.
Rapid Application Development (RAD) Method
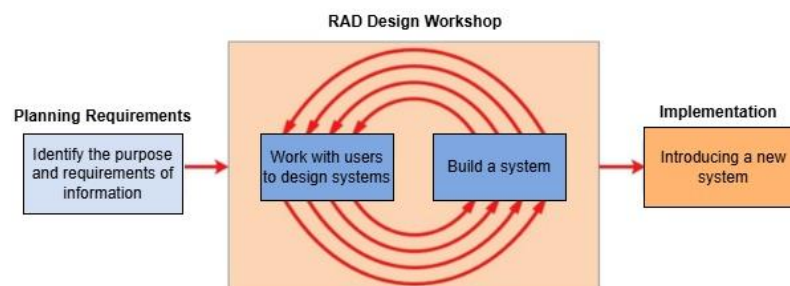
The Figure 2 above shows the system development process using the Rapid Application Development (RAD) method, which begins with identifying objectives and information requirements. At this stage the researcher determines the objectives of the study, namely identifying the employee performance measurement process and identifying the things needed to analyze and develop the decision support system later. After that, the process continues to the RAD Design Workshop which involves iterative interaction between working with users to design the system and build the system. This iterative approach allows for rapid and flexible design and development according to user needs. Finally, the resulting decision support system can be introduced and implemented in the department concerned, ready for use in an operational environment.

Decision Support System Methods

The SMART Method is an approach used to design goals or objectives in the context of a decision support system (DSS). The SMART method is an approach used to design goals or objectives in the context of a decision support system (DSS) (Beby Larasati et al. 2020a). The SMART method is more often used because of its simplicity in responding to the needs of decision makers and analyzing responses. SMART uses a linear additive model to predict the value of each alternative and the decision-making method is flexible. This method provides a high understanding of the problem and is acceptable to decision makers (Andika and Sokibi 2019).

The steps taken in the formulation of the SMART method are (Beby Larasati et al. 2020):

1. Determine the number of criteria used
2. Determining the weight of the criteria on each criterion using the interval 1-100 for each criterion with the most important priority.
3. Calculate the normalization of each criterion by comparing the weight value of the criteria with the total weight of the criteria using the formula:

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Normalisasi :

$$\frac{Wj}{\sum Wj} \tag{1}$$

Where:

Wj is the weight value of a criterion.

$\sum Wj$ is the total sum of the weights of all criteria.

1. Provide the value of the criteria parameters for each criterion for each alternative.
2. Determine the utility value by converting the criterion value for each criterion into a standard data criterion value.

For criteria that are "bigger is better", criteria like this are usually in the form of profits using the equation as below to determine the utility value (Ardana et al. 2022):

$$u_i(a_i) = \frac{C_{out} - C_{min}}{C_{max} - C_{min}} \tag{2}$$

Where:

ui(ai) is the utility value of the i-th criterion for the i-th Alternative

Cmax is the maximum criterion value

Cmin is the minimum criterion value

Couti is the i-th criterion value

Then the value obtained is:

$$C_{out^i} = u_i(a_i), 1 = 0 \; ; 2 = 0,5 : 3 = 1$$

1. Determine the final value of each criterion by transferring the value obtained from normalizing the standard data criteria value with the normalized value of the criteria weight. Then add up the values from the multiplication.

$$u(a_i) = \sum_{j=i}^{m} W_j \, u_i(a_i) \tag{3}$$

Where:

u(ai) is the total value of alternatives

Wj is the result of normalizing the weight of the criteria

ui(ai) is the result of determining the value of utility.

4. Results and Discussion

The results in this study are seen from the stages in the SMART method in the decision support system for employee performance measurement case studies, namely:

1. Criteria Identification

To determine what criteria are used in this decision-making system, data is needed from decision makers or parties who are authorized / competent in the problem to be solved. The criteria used are attendance, productivity, discipline and loyalty.

2. Determining Criteria Weight

Giving weight to the criteria that have been determined based on giving the greatest weight to the smallest weight with an interval of 1-100 and used as the default value in the system which is then summed up, as shown in the table below:

Table 1.
Determining Criteria Weights

No.	Criteria	Criteria Weight
1	Attendance	30
2	Productivity	25
3	Discipline	25
4	Loyalty	20
	Total	100

Source: Research processing data, 2024.

Table 1 above explains the weight of each criteria determined, where the attendance criteria has the largest weight of 30, then the productivity and discipline criteria each have a weight of 25, and loyalty 20, so the overall total is 100.

1. Normalization of Criteria Weight

Calculate the normalized weight of each criterion by comparing the weight value of the criteria with the sum of the criteria weights based on equation 1.

Table 2.
Normalization of criteria weights

No.	Criteria	Criteria Weight	Normalization/Relative Weight
1	Attendance	30	30/100=0.3
2	Productivity	25	25/100=0.25.
3	Discipline	25	25/100=0.25
4	Loyalty	20	20/100=0.20
Total		100	

Source: Research processing data, 2024.

Table 2 above explains the assessment criteria and their weights, as well as the calculation of normalization or relative weight of each criterion. There are four criteria that are evaluated: Attendance, Productivity, Discipline, and Loyalty. Attendance has the largest weight of 30, which after normalization becomes 0.3 (obtained from 30 divided by a total weight of 100). Productivity and Discipline each have a weight of 25, which normalizes to 0.25. Meanwhile, Loyalty has the lowest weight of 20, with a relative weight of 0.20 after normalization.

2. Provide Parameter Values for Each Criterion

Providing criteria values for each alternative, the criteria values for each alternative are given in the form of quantitative data (numbers). Here using a sample of 5 employees as follows:

Table 3.

Provide Criteria Values for Each Alternative

Alternative	Assessment			
	Attendance	Productivity	Discipline	Loyalty
Fauzi	83	87	70	75
Yuda Utama	85	90	85	85
Imam	80	85	80	80
Hindun	90	90	75	85
Ahmad	90	80	90	85

Source: Research processing data, 2024.

Table 3 above explains the assessment of five alternatives consisting of Fauzi, Yuda Utama, Imam, Hindun, and Ahmad, based on four criteria: Attendance, Productivity, Discipline, and Loyalty. Each individual is given a score on each criterion, reflecting their performance in each aspect.

3. Determine the utility value

Next, find the utility value by summing up all the criteria values on one alternative. Below is the utility calculation process for each criterion.

a. Calculate the utility amount for Attendance Criteria:

C_{max}= {83,85,80,90,90}=90
C_{min}= {80,85,80,90,90}=80

$$u1(a1) = \frac{83 - 80}{90 - 80} = \frac{3}{10} = 0,3$$

$$u2(a2) = \frac{85 - 80}{90 - 80} = \frac{5}{10} = 0,5$$

$$u3(a3) = \frac{80 - 80}{90 - 80} = \frac{0}{10} = 0$$

$$u4(a4) = \frac{90 - 80}{90 - 80} = \frac{10}{10} = 1$$

$$u5(a5) = \frac{90 - 80}{90 - 80} = \frac{10}{10} = 1$$

b. Calculate the sum of utility for Productivity Criteria:

C_{max}= {87,90,85,90,80}=90
C_{min}= {87,90,85,90,80}=80

$$u1(a1) = \frac{87 - 80}{90 - 80} = \frac{7}{10} = 0,7$$

$$u2(a2) = \frac{90 - 80}{90 - 80} = \frac{10}{10} = 1$$

$$u3(a3) = \frac{85 - 80}{90 - 80} = \frac{5}{10} = 0,5$$

$$u4(a4) = \frac{90 - 80}{90 - 80} = \frac{10}{10} = 1$$

$$u5(a5) = \frac{80-80}{90-80} = \frac{0}{10} = 0$$

c. Calculate the sum of utility for Discipline Criteria:

C_{max}= {70,85,80,85,90}=90

C_{min}= {70,85,80,85,90}=70

$$u1(a1) = \frac{70-70}{90-70} = \frac{0}{20} = 0$$

$$u2(a2) = \frac{85-70}{90-70} = \frac{15}{20} = 0,75$$

$$u3(a3) = \frac{80-70}{90-70} = \frac{10}{20} = 0,5$$

$$u4(a4) = \frac{75-70}{90-70} = \frac{5}{20} = 0,25$$

$$u5(a5) = \frac{90-70}{90-70} = \frac{20}{20} = 1$$

Calculate the sum of utility for Loyalty Criteria

C_{max}= {75,85,80,85,85}=85

C_{min}= {75,85,80,85,85}=75

$$u1(a1) = \frac{75-75}{85-75} = \frac{0}{10} = 0$$

$$u2(a2) = \frac{85-75}{85-75} = \frac{10}{10} = 1$$

$$u3(a3) = \frac{80-75}{85-75} = \frac{5}{10} = 0,5$$

$$u4(a4) = \frac{85-75}{85-75} = \frac{10}{10} = 1$$

$$u5(a5) = \frac{85-75}{85-75} = \frac{10}{10} = 1$$

The results of utility calculations for each criterion can be seen in the table below:

Table 4.

Utility Calculation Result

Alternative	Assessment			
	Attendance	Produktifitas	Attendance	Loyalitas
Fauzi	0,3	0,7	0	0
Yuda Utama	0,5	1	0,75	1
Imam	0	0,5	0,5	0,5
Hindun	1	1	0,25	1
Ahmad	1	0	1	1

Source: Research processing data, 2024.

Table 4 above explains the utility value for each criterion with values ranging from 0 to 1, where Fauzi gets the highest value on the Productivity criterion of 0.7, Yuda Utama gets the highest value on two criteria, namely productivity and loyalty with a value of 1, Imam gets the highest value on 3 criteria, namely Productivity, attendance and loyalty with a value of 0.5, Hindun gets the highest value on 3 criteria, namely Attendance, Productivity and

Loyalty with a value of 1, and Ahmad gets the highest value on three criteria consisting of Attendance, productivity and loyalty with a value of 1.

4. Determining the Final Grade

Determining the final value of each by multiplying the value obtained from normalizing the value of the standard data criteria by the normalized value of the criteria weight, and ranking.

$A1=(0,3x0,3)+(0,25x0,7)+(0,25x0)+(0,2x0)=0,265$
$A2=(0,3x0,5)+(0,25x1)+(0,25*0,75)+(0,2x1)=0,7875$
$A3=(0,3x0)+(0,25x0,5)+(0,25*0,5)+(0,2*0,5)=0.35$
$A4=(0,3*1)+(0,25*1)+(0,25*0,25)+(0,2*1)= 0,8125$
$A5=(0,3*1)+(0,25*0)+(0,25*1)+(0,2*1)= 0,75$

Table 5.
Determining the Final Grade

No	Name	Attendance	Produktifitas	Attendance	Loyalitas	Final Grade	Ranking
1	Fauzi	0,09	0,175	0	0	0,265	5
2	Yuda Utama	0,15	0,25	0,0625	0,2	0,7875	2
3	Imam	0	0,125	0,125	0,1	0,35	4
4	Hindun	0,3	0,25	0,0625	0,2	0,8125	1
5	Ahmad	0,3	0	0,25	0,2	0,75	3

Source: Research processing data, 2024.

Table 5 above shows the final value of each alternative, where the first rank is hindun with a final value of 0.812, the second rank is Yuda Utama with a final value of 0.7875, the third rank is Ahmad with a final value of 0.75, the fourth rank is Imam with a final value of 0.35, and the last rank is Fauzi with a final value of 0.265.

Application Implementation:

a. Criteria Data Page
    Figure 3.
    Criteria Data Page

Figure 3 above is the Criteria data input page where the sum of the weights of all criteria will total 100, and the normalization value will immediately appear.

b. Alternative/Employee Input Page
Figure 4.
Alternative/Employee Input Page

Figure 4 above is a page for entering alternative employee data to be processed which consists of the employee's personal data.

d. Alternative score filling page
Figure 5.
Alternative score filling page

Figure 5 above is a page for filling in the value of each criterion for each alternative.

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e.   DSS Process Result Page
Figure 6.
Decision Support System Process Result Page
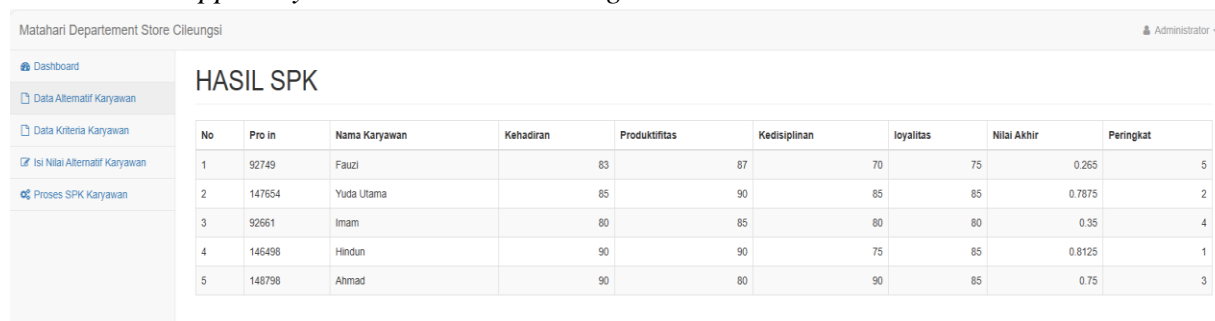
No	Pro in	Nama Karyawan	Kehadiran	Produktifitas	Kedisiplinan	loyalitas	Nilai Akhir	Peringkat
1	92749	Fauzi	83	87	70	75	0.265	5
2	147654	Yuda Utama	85	90	85	85	0.7875	2
3	92661	Imam	80	85	80	80	0.35	4
4	146498	Hindun	90	90	75	85	0.8125	1
5	148798	Ahmad	90	80	90	85	0.75	3

Figure 6 above is a page that displays the final score and ranking of each alternative, where the highest rank is owned by Hindun with a final score of 0.812, and the lowest value is owned by Fauzi with a final score of 0.265.

4.   Conclusion

The conclusion of this research discusses the implementation of the Method (Simple Multi Attribute Rating Technique) in the Decision Support System (DSS) for employee performance appraisal at MDS Cileungsi. This research shows that the application of the SMART Method in the employee performance appraisal process can improve efficiency and accuracy in managerial decision making. Based on the calculation results of 5 sample employees and 4 criteria used, it is obtained that the highest performance is with a value of 0.8125, and the lowest performance is with a value of 0.265. By using the SMART approach, employee performance measurement can be formulated more specifically, clearly measurable, realistically achievable, relevant to the Company's vision and mission. This assists management in setting appropriate performance standards, monitoring employee progress more effectively, and identifying areas for improvement. In addition, the implementation of the SMART Method in the DSS also facilitates a more transparent and fair performance appraisal process for all employees. With clearly defined appraisal criteria, employees have a better understanding of what is expected of them and how their performance will be evaluated.

The suggestions from the Company from this research are as follows: First, it is important to conduct periodic evaluations of the effectiveness of the implementation of the SMART Method in the DSS for employee performance appraisal. This evaluation can help in identifying the strengths and weaknesses of the adopted approach and provide input for further improvement. Second, MDS Cileungsi can consider customizing or further developing the existing decision support system to better support the implementation of the SMART Method according to the needs and characteristics of the company.

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