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Employee Performance Assessment System of PT. Graha Prima Mentari Medan by Using Simple Additive Weighting

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Article Info	ABSTRACT
	Employee performance appraisal system is a system used to assess the best performance of employees. PT Graha Prima Medan performs the best performance assessment of employees to evaluate, verify and improve their performance. The results of this performance become a decision-making tool such as promotion, dismissal, transfer, intensive giving or providing feedback for employees. However, the large number of employees who will be selected becomes an obstacle in assessing employee performance, because it is expected that an automation process uses technology to evaluate the performance of these employees. The purpose of this study is to design an employee performance appraisal system at PT Graha Prima Mentari Medan. The method used is the SAW method, the basic concept of the SAW method is to find the weighted sum of the performance ratings for each alternative on all attributes. The SAW method can help decision making to form the largest value as the best alternative. The assessment in the research that has been carried out uses 5 criteria including: Attendance, Attitude, Time Discipline, Working Period and Quantity using the SAW method. In this study, testing was carried out on 36 respondent data. The employee performance appraisal system was developed using the PHP (Pre-Hypertext Processor) programming language, and the MySQL database as the database server.

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1.   INTRODUCTION

Motorcycle is one of the two-wheeled transportation that is widely used and needed by the majority of people in Indonesia. Motorcycles can facilitate us in our daily activities and are also considered by many people to be more practical and easy to carry anywhere. This has an impact on the increasing demand for motorcycles and many motorcycle manufacturers are competing to increase the advantages and advantages of their respective products. One type of motorcycle that is currently popular with the public is the Honda matic motorcycle.

In Indonesia, there are several types of Honda matic motorbikes, including Vario motorbikes, beat motorbikes and Scoppy motorbikes. Many people choose to use automatic motorcycles because they are easier and more practical to use.

In the selection of this Honda matic motorcycle, of course, every consumer wants to get the best results and according to their needs. So a decision support system is needed to support decisions as well as various alternatives and solutions offered. The need for a decision support system is very necessary to assist consumers in selecting Honda matic motorcycles.

Based on the background of the problem above, the researcher is interested in conducting research at PT Rosella persadaMandiri III with the title: factors for selecting Honda matic motorcycles in the city of Medan using the AHP method.

2.   RESEARCH METHODE

Performance assessment

According to [2], the process of maintaining achievement includes how to design work standards, provide feedback to employees, assess actual performance to motivate employees, aim to minimize lack of performance or performance above standards. As for another opinion about the notion of performance appraisal put forward by [7], which is as follows: "Performance appraisal is how well employees do their jobs when compared to a set of standards, and then communicates that information to employees".

Decision support systems are designed to support all stages of decision-making, from identifying problems, selecting relevant data and determining the approach used in the decision-making process to evaluating the selection of existing alternatives. Performance appraisal is one of the basic functions of personnel, sometimes also called performance review, employee appraisal, performance evaluation, employee evaluation, or personal appraisal. In general, performance appraisal is the process of comparing employee performance with the standards set by the organization [6].

Decision Support System

The decision-making system was first introduced by Michael S. Scott Morton in the 1970s with the term Management Decision System. The Decision-Making System is designed to support all stages of decision-making, from selecting relevant data, then identifying problems, and determining the approach used in the decision-making process, to evaluating alternative options using logical concepts. A decision support system is a computer-based information system that is usually used to support problem solving that provides information, modeling, and manipulating the concept of a decision-making system, which was first introduced by Michael S. Scoott Morton in the 1970s with the term Management. Decision System.

According to [1] "Decision support system is a set of integrated computer tools that allow a person to make decisions that interact directly with computers in order to create useful information". The information system is intended to assist management in the decision-making process in making the right decisions. This system is useful for assisting decision making in semi-structured and unstructured situations, where no one knows for sure how decisions should be made. According to [11] Decision Support System (DSS) is an interactive computer-based system, which helps decision makers to use data and various models to solve unstructured problems. Decision support systems integrate individual intellectual resources with computer capacity to improve decision quality.

Simple Additive Weighting (SAW)

The SAW method was first used by Churchman and Ackoff to solve the selection problem [9]. According to [4] the SAW method is dynamic, both criteria and alternatives so that later it can be used in various alternative selection assessment needs which are not only for employee recruitment, but also can manage data on majors selection, selection of the best. employees, selection of scholarship recipients. , etc. The SAW method is often also known as the weighted addition method or the assessment method. The basic concept of the SAW method is to find the weighted sum of the performance ratings for each alternative on all attributes.

SAW Method StepThe following are the calculation steps using the Simple Additive Weighting (SAW) method as follows [14]:

1. Determine Alternative $\left(A_i \right)$

2. Determine the criteria that will be used as a reference in making decisions (C_j).

3. Determine the Match Value of each criterion.

4. Determine the preference weight or importance (W) of each criterion.

$$W = \begin{bmatrix} W_1 & W_2 & W_3 & \ldots & W_j \end{bmatrix}$$

(2.1)

5. Create a match rating table for each alternative on each criterion.

6. Create a decision matrix (X) which is formed from the conformity assessment table for each alternative (A_i) with every criteria (C_j) which has been determined, where: $i = 1, 2, 3, \ldots, m$ and $j = 1, 2, 3, \ldots, n$

$$X = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1j} \\ \vdots & & & \vdots \\ x_{i1} & x_{i2} & \cdots & x_{ij} \end{bmatrix}$$

(2.2)

7. Perform the steps of normalizing the decision matrix (X) by calculating the normalized value of performance ratings (r_{ij}) from alternative (A_i) on criteria (C_j) with the formula:

$$r_{ij} = \begin{cases} \dfrac{x_{ij}}{Max_i(x_{ij})} & \text{If j is profit (benefit)} \\ \dfrac{Min_i(x_{ij})}{x_{ij}} & \text{If j is the cost criterion} \end{cases}$$

(2.3)

The profit criterion, is if the value of x_{ij} provide benefits for every decision maker, on the contrary if it is said to be a cost criterion if x_{ij} incur costs for each decision maker. If it is a profit criterion, then the value of x_{ij} divided by value $Max_i(x_{ij})$ from each column, while for the cost criteria, $Min_i(x_{ij})$ of each column divided by the value of x_{ij}.

8. Result of normalization (r_{ij}) form a normalized matrix (R).

$$R = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1j} \\ \vdots & & & \vdots \\ r_{i1} & r_{i2} & \cdots & r_{ij} \end{bmatrix}$$

(2.4)

9. Final result preference value V_i obtained from the sum of the row elements of the normalized matrix (R) with preference weight (W) the corresponding elements of the matrix column (W).

$$V_i = \sum_{j=1}^{n} W_j r_{ij}$$

(2.5)

Information:

- V_i = ranking for each alternative

- W_j = the weight value of each criterion

- r_{ij} = normalized performance rating value

Value calculation result V_i a larger one indicates that the alternative A_i is the best alternative.

PHP

PHP stands for Hypertext Preprocessor, which is a code-based programming language (script) used to process data and send it back to a web browser into HTML code.PHP was first created by RasmusLerdorf. In 1995 RasmusLerdorf first wrote a parsing engine in PHP as a CGI program, which he called "Personal Home Page", or PHP for short. PHP is a web-based programming language that has many advantages compared to other web-based programming languages. The most superior and most powerful characteristic in PHP is the database integration layer.

3. RESULT AND ANALYSIS

SAW Method Criteria Determination System
To make this decision, there are objects to be discussed, namely criteria and alternatives. Determination of the weight of interest by conducting a questionnaire to the Management of PT. Graha Prima Mentari Medan about the importance of each criterion. In this study, the weighting uses a modified Likert scale that contains four levels of answers to measure employee performance appraisals, with the following details:

Table 3.1 Weighting Interest CriteriaSystemPenentuanKriteriaMetode SAW

Interest	Weight
Very good	4
Good	3
Enough	2
Not good	1

The following are the criteria needed to assess employee performance, including:
1. Presence

The indicators used in determining employee performance are based on the percentage of attendance taken from the fingerprint recapitulation results as shown in Table 3.2.

Table 3.2. Attendance Criteria

Criteria	Range	Weight
Presence	$< 70\%$	1
	$71\% - 80\%$	2
	$81\% - 90\%$	3
	91% - 100%	4

1. Attitude

The indicators used in determining attitudes/ethics based on warning letters received by employees are as shown in Table 3.3.

Table 3.3. Attitude Criteria

Criteria	Range	Weight
Attitude	Warning letter 3	1
	Warning letter 2	2
	Warning letter 1	3
	No Warning Letter	4

2. Time Discipline

The indicators used in determining employee performance are based on time discipline criteria based on late hours of entering and leaving work earlier than the predetermined hours based on the absent machine summary as shown in Table 3.4.

Table 3.4. Time Discipline Criteria

Criteria	Range	Weight
Time Discipline	$<70\%$	1
	$71\%-80\%$	2
	$81\%-90\%$	3
	$91\%-100\%$	4

3. Working Period

The indicators used in determining employee performance are based on the criteria for years of service which are assessed based on how long an employee has worked in the company as shown in Table 3.5.

Table 3.5. Working Period Criteria

Criteria	Range	Weight
Years of service	0-1 Years	1
	1 Years	2
	2 Years	3
	3 Years	4

4. Working Quantity

The indicators used in determining employee performance are based on the quantity of work criteria which are assessed based on the work results of the employee's work targets as shown in Table 3.6.

Table 3.6. Work Quantity Criteria

Criteria	Range	Weight
Years of service	Not good($<85\%$)	1
	Enought($86\%-90\%$)	2
	Good ($91\%-95\%$)	3
	Very Good (96% - 100%)	4

Determining the Suitability Value of Each Alternative

The next step in determining employee performance is the Simple Additive Weighting method based on predetermined criteria.

Determining the Weight Value (W)

In the Simple Additive Weighting method, we must provide a weight value (W). In assessing the weight of a criterion in the simple additive weighting method, the manager of PT. Graha Prima Mentari Medan. The weight value obtained from PT. Graha Prima Mentari Medan is formed in Table 3.7 below:

Table 3.7. Interest Weight Criteria

No	Criteria Code	Criteria	Weight
1	C1	Presence	0,3
2	C2	Attitude/Ethics	0,3
3	C3	Time Discipline	0,1
4	C4	Years of service	0,1
5	C5	Quantity	0,2

Ranking the Suitability of Each Alternative With Each Criterion

The next step is to determine the suitability rating, the suitability rating value is adjusted to the weight value from the table for each criterion of attendance, attitude, discipline, service time, and quantity of work. In determining the level of suitability of each alternative can be seen in Table 3.8.

Table 3.8. Each Alternative's Compatibility Rating

Alternatif	Criteria				
	Presence	Attitude	Time Discipline	Years of service	Working Quantity
Idham A	4	4	4	4	4
Murni S	4	4	4	4	3
Marioto	2	4	4	4	4
Dani H	2	4	4	4	3
Heru S	3	4	4	4	4
Suwanto	3	4	4	4	4
Chairul H	2	4	4	4	4
Fajar S	3	4	4	4	3
Wenda N	2	4	4	4	4
Irwandi	2	4	4	4	4
Hari R	2	4	4	4	3
Efi R	4	4	4	4	4
Andi S	2	4	4	4	4
Sugeng H	4	4	4	4	3
Handrian	3	4	4	4	4
Junaidi	4	4	4	4	4
Risnu W	4	4	4	4	4
Roy N	3	4	4	4	4
Dani S	2	4	4	4	3
Sulaiman A	2	4	4	4	3
Rio F	4	4	4	4	4
Andika S	2	4	4	4	4
Soleh	2	4	4	4	4
Dendi M	2	4	4	4	3
Afrialdi	4	4	4	4	4
Anwar S	2	4	4	3	4
Suhardian	2	4	4	2	4
Suriyadi	3	4	4	2	4
Doli P	3	4	4	2	3
AgusSalim	2	4	4	2	4
Dedek A	2	4	4	2	4
Relli D	4	4	4	1	3
EkoWinata	4	4	4	1	4
Dimas A	2	4	4	1	3
Dimas F	3	4	4	1	3
RiskiAulia	4	4	4	1	3

Matrix Normalization

To normalize a matrix, first define the criteria for benefits or costs. To determine the criteria for benefits or costs that need to be considered is value. If the highest value is the best then the attribute is said to be useful, but if the lowest value is the best then the attribute is said to be cost. From the criteria for Attendance (C1), Attitude (C2), Time Discipline (C3), Working Period (C4), Number of Work (C5), the determination of benefits or costs can be seen in Table 3.9.

Table 3.9. Interest Weight Criteria

No	Criteria	Information	Criteria Type
1	C1	Presence	Benefit
2	C2	Attitude/Ethics	Cost
3	C3	Time Discipline	Cost
4	C4	Years of service	Benefit
5	C5	Quantity	Benefit

The next step is to normalize the X matrix into an R matrix based on an equation that is adjusted to the type of attribute (profit attribute and cost attribute) in order to obtain a normalized matrix R.

$$r_{ij} = \begin{cases} \dfrac{x_{ij}}{Max_i(x_{ij})} & \text{If j is profit (benefit)} \\[2mm] \dfrac{Min_i(x_{ij})}{x_{ij}} & \text{If j is the cost criterion} \end{cases} \qquad (4.1)$$

Then the calculation results from the above normalization are made in a normalized matrix (R) which can be seen as follows:

$$R = \begin{pmatrix}
1 & 1 & 1 & 1 & 1 \\
1 & 1 & 1 & 1 & 0,75 \\
0,5 & 1 & 1 & 1 & 1 \\
0,5 & 1 & 1 & 1 & 0,75 \\
0,75 & 1 & 1 & 1 & 1 \\
0,75 & 1 & 1 & 1 & 0,75 \\
0,5 & 1 & 1 & 1 & 1 \\
0,75 & 1 & 1 & 1 & 0,75 \\
0,5 & 1 & 1 & 1 & 1 \\
0,5 & 1 & 1 & 1 & 1 \\
0,5 & 1 & 1 & 1 & 0,75 \\
1 & 1 & 1 & 1 & 1 \\
0,5 & 1 & 1 & 1 & 1 \\
1 & 1 & 1 & 1 & 0,75 \\
0,75 & 1 & 1 & 1 & 1 \\
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1 & 1 & 1 & 1 & 1 \\
0,5 & 1 & 1 & 0,75 & 1 \\
0,5 & 1 & 1 & 0,5 & 1 \\
0,75 & 1 & 1 & 0,5 & 1 \\
0,75 & 1 & 1 & 0,5 & 0,75 \\
0,5 & 1 & 1 & 0,5 & 1 \\
0,5 & 1 & 1 & 0,5 & 1 \\
1 & 1 & 1 & 0,25 & 0,75 \\
1 & 1 & 1 & 0,25 & 1 \\
0,5 & 1 & 1 & 0,25 & 0,75 \\
0,75 & 1 & 1 & 0,25 & 0,75 \\
1 & 1 & 1 & 0,25 & 0,75
\end{pmatrix}$$

Doing the Ranking Process

After normalization, then the preference value is calculated where later this value will be the final value to provide recommendations for employee performance appraisal decisions. To find the value of each employee whose performance will be assessed, the following is the calculation process to get the

preference value that will be ranked based on the preference value of each alternative by using the weight of the ranking criteria by calculating using the equation

$$V_i = \sum_{j=1}^{n} W_j r_{ij}$$

(4.2)

Determining the value V_1 untill V_{36}:

$V_1 = (1 \times 0,3) + (1 \times 0,3) + (1 \times 0,1) + (1 \times 0,1) + (1 \times 0,2) = 1$

$V_2 = (1 \times 0,3) + (1 \times 0,3) + (1 \times 0,1) + (1 \times 0,1) + (0,75 \times 0,2) = 0,95$

$V_3 = (0,5 \times 0,3) + (1 \times 0,3) + (1 \times 0,1) + (1 \times 0,1) + (1 \times 0,2) = 0,85$

$\vdots$
$\vdots$
$\vdots$

$V_{34} = (0,5 \times 0,3) + (1 \times 0,3) + (1 \times 0,1) + (0,25 \times 0,1) + (0,75 \times 0,2) = 0,72$

$V_{35} = (0,75 \times 0,3) + (1 \times 0,3) + (1 \times 0,1) + (0,25 \times 0,1) + (0,75 \times 0,2) = 0,80$

$V_{36} = (1 \times 0,3) + (1 \times 0,3) + (1 \times 0,1) + (0,25 \times 0,1) + (0,75 \times 0,2) = 0,87$

From the results of the calculation of the value of V_i of each employee, a table is made according to Table 3.10.

Table 3.10 Rank

Alternative	Value	Persentase (%)	Rank
Idham A	1	100	1
Efi R	1	100	2
Junaidi	1	100	3
Risnu W	1	100	4
Rio F	1	100	5
Afrialdi	1	100	6
Murni S	0,95	95	7
Sugeng H	0,95	95	8
Eko W	0,92	92	9
Heru S	0,92	92	10
Suwanto	0,92	92	11
Handrian	0,92	92	12
Roy Naldo A	0,92	92	13
Suriyadi	0,87	87	14
Relli D	0,87	87	15
RiskiAulia	0,87	87	16
FajarSaputra	0,87	87	17
Marioto	0,85	85	18
ChairulHusna	0,85	85	19
Wenda N	0,85	85	20
Irwandi	0,85	85	21
AndiSetiawan	0,85	85	22
Andika S	0,85	85	23
Soleh	0,85	85	24
Anwar S	0,82	82	25
Doli P	0,82	82	26
Suhardian	0,82	82	27
AgusSalim	0,82	82	28
Dedek A	0,82	82	29
Dani H	0,80	80	30
HariRahyan	0,80	80	31

S			
DaniSyahputra	0,80	80	32
Sulaiman A	0,80	80	33
Dimas Frayogy	0,80	80	34
Dendi M	0,80	80	35
Dimas Aranda	0,72	72	36

Desain *User Interface*

User Interface Design on the Employee Performance Assessment System of PT. Graha Prima Mentari Medan using the Simple Additive Weighting method. The following is a User Interface Design for evaluating employee performance using PHP programming and MySQL database.

1. Login Page

   When the application is first run it will be displayed as follows:Halaman *Login*

   Picture 4.1 Login Page Display

   Picture 4.1 is a user interface design for the login page of the Employee Performance Assessment System of PT. GRAHA PRIMA MENTARI MEDAN.

2. Main Page

   This main page is in the form of a display after the user logs in, on this page there is an image of the logo of PT. Graha Prima Mentari Medan on the top left and a description of the system in the contents section. The main page design can be seen in Picture 4.2.
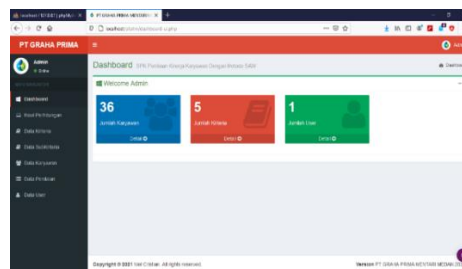
   Picture 4.2 Main Page Display

3. Criteria Menu Page

   The criteria menu displays the criteria used, the attributes of each criterion and the weight of each criterionand is equipped with search, add, print, edit and delete facilities. The design criteria page is shown in Picture 4.3

Picture 4.3 Criteria Page View

4. Sub Criteria

Menu Page The Sub-criteria menu displays the criteria values, ranges and weights and is equipped with search, add, print, edit and delete facilities. The design criteria page is shown Picture 4.4.

Picture 4.4 Sub-Criteria Page Views

5. Alternative Menu Page

The alternative menu displays data from alternatives in the form of No, NIK, Alternative Name, Gender, and Position and is equipped with search, add, print, edit and delete facilities. The alternative menu page design is shown in Picture 4.5

Picture 4.5 Alternative Page Views

6. Ranking Pages

On the Assessment Page displays the number, name of the employee, the weight value of each alternative for each criterion and is equipped with search, print and delete facilities. Ranking Page Design will be displayed

Picture 4.6: Rating Page Display

7. Calculation Page

On the Calculations page displays the results of alternative analysis for each criterion, normalization and ranking which are the results of calculations using the simple additive weighting method, this pagealso equipped with printing facilities. The design calculation page will be shown in Picture 4.6, Picture 4.7, Picture 4.8.

Matrix Ternormalisasi					
Alternatif / Kriteria	Kehadiran	Sikap	Kedisiplinan Waktu	Masa Kerja	Kuantitas Kerja
Idham Arief NST	1	1	1	1	1
Murni Syahputri	1	1	1	1	0.75
Marioto	0.5	1	1	1	1
Dani Hendrawan	0.5	1	1	1	0.75
Heru Setiawan	0.75	1	1	1	1
Suwanto	0.75	1	1	1	1
Chairul Husna	0.5	1	1	1	1
Fajar Saputra	0.75	1	1	1	0.75
Wenda Nugraha	0.5	1	1	1	1
Irwandi	0.5	1	1	1	1
Hari Rahyan Syahputra	0.5	1	1	1	0.75
Efi Rahmayani	1	1	1	1	1
Andi Setiawan	0.5	1	1	1	1
Sugeng Haryanto	1	1	1	1	0.75
Handrian	0.75	1	1	1	1
Junaidi	1	1	1	1	1

Picture 4.7: Calculation Normalization Display

Hasil Analisa
Hasil analisa diurutkan berdasarkan hasil nilai tertinggi.
Dapat disimpulkan bahwa Alternatif penilaian kinerja Karyawan terbaik adalah **Risnu Wahyudi Saragih** dengan nilai **100**.

Rank	Alternatif	Hasil Akhir
1.	Risnu Wahyudi Saragih	100
2.	Rio Ferdian	100
3.	Junaidi	100
4.	Idham Arief NST	100
5.	Efi Rahmayani	100
6.	Sugeng Haryanto	95
7.	Murni Syahputri	95
8.	Suwanto	92.5
9.	Roy Naldo Aulia Rimba Saragih	92.5
10.	Heru Setiawan	92.5
11.	Handrian	92.5
12.	Eko Winata	92.5
13.	Afrialdi	92.5
14.	Suriyadi	87.5
15.	Riski Aulia	87.5

Picture 4.8: Rating Display

CONCLUSION

Based on the results of the discussion in the previous chapter, several conclusions can be drawn, namely as follows:

1. A Web-Based Employee Performance Assessment System has been successfully designed using the PHP programming language and MySQL database.
2. The process of evaluating employee performance is carried out through calculations using the SAW method, starting with the provision of criteria values, weighting, conformity assessment, normalization and ranking so as to produce a value for each criterion.
3. The system built is able to sort employees according to the calculation of the SAW method. The results of the application of the SAW method are expected to assist companies in making decisions for employee performance appraisals easily and precisely.

SUGGESTION

Suggestions that can be given for the development of further research are:

1. Implementation by applying different methods or combining methods so that the expected results are better.

2. The Employee Performance Assessment System needs to be developed further which can add special variables and the samples used are more complex to improve the quality and performance of the system so that the interaction between users and the system becomes better.

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