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Decision Support System Determines the Best Employees at PT Mahkota Group Tbk

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ABSTRACT

This research discusses the development and implementation of a decision support system (DSS) to determine the best employees at PT Mahkota Group Tbk. The main objective of this research is to increase efficiency and objectivity in the decision-making process related to employee performance assessment. The research methodology involves collecting employee performance data, analyzing company needs, and implementing appropriate decision-making models. The SPK developed uses artificial intelligence techniques to process and analyze employee performance data, provide scores, and ultimately determine the best employees based on established criteria. The research results show that the implementation of SPK is able to increase objectivity in assessing employee performance and provide effective support for the decision-making process. With this system, it is hoped that the company can identify and utilize employee potential more optimally, increase productivity, and strengthen the competitiveness of PT Mahkota Group Tbk in the market. This data will be processed and assessed by a system developed using the Simple Additive Weighting (SAW) method. The results of the performance assessment will be presented in the form of ratings and grades for each employee, making it easier for related parties to make a more precise and transparent decision-making process. It is hoped that the results of this research can make a positive contribution to the efficiency and effectiveness of human resource management.

1. Introduction

The increasingly rapid development of technology has helped humans complete daily tasks such as working, studying, even shopping and other activities, resulting in human progress from time to time. The role of computers in the development of technology which is used to create various kinds of intelligent system devices which can support effective decision making in order to produce solutions to complex problems which cannot be solved by humans, in other words, is known as a Decision Support System.

PT. Mahkota Group, Tbk, which is located at Jalan Pioneer Independence, Grand Jati Junction complex, is a company engaged in palm oil processing which has branches in several cities. The company, through its subsidiaries, focuses on processing Fresh Fruit Bunches (FFB) into Crude Palm Oil (CPO) and palm kernel as well as bulking tank rental services. The number of employees working in this company reaches 80 employees.

The problem that often occurs is that the monitoring and evaluation process that is carried out is still manual-based, where the Head of the Department has to record the assessment points in writing on a piece of paper, so that every day several pieces of paper will simply be wasted because the daily assessment will be recapped at the end of the month. Apart from that, the factor of forgetting to place written assessment sheets is the main problem that hinders the employee performance assessment process from becoming an evaluation for leadership officials, therefore a decision support system technology solution is needed that can overcome this problem. Many methods are used in building decision support systems, one of which is the Simple Additive Weighting (SAW) method.

Research conducted by Henderi entitled Decision Support System for Employee Performance Assessment by Applying the SAW Method at PT. Gada Agni Indonesia with the results of the system built can make decision making easier for the company and is in accordance with the desired solution achieved and the SAW method used is quite accurate in helping decisions as the desired solution.[1]

Another research conducted by July entitled Decision Support System for Employee Performance Assessment for Promotion at PT. SMS Cengkareng Barat Using the Profile Matching Method with the result that the system can overcome the problem of subjective assessments carried out by decision makers.[2]

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Furthermore, research conducted by Christiana & Mailoa entitled Website-Based Employee Performance Assessment Decision Support System Using the TOPSIS Method produces an assessment process which will produce a ranking where this ranking is the order of employee performance from best to worst. This employee performance appraisal system has a report printing feature. So that the assessment results can be printed and archived.[3]

2. State of the Art

The development of decision support systems (DSS) has become the main focus in increasing the efficiency and objectivity of the employee performance assessment process in various companies. As a first step, previous research has made a significant contribution to understanding and applying the SPK concept in the context of employee performance assessment.

One approach that is widely adopted is the use of artificial intelligence techniques, such as machine learning and data mining, to process and analyze employee performance data efficiently. These studies show great potential in increasing the accuracy and speed of decision making, as well as providing adaptive solutions to the changing dynamics of the work environment.

In addition, several studies place more emphasis on developing a comprehensive performance evaluation model by considering factors such as competency, target achievement, and contribution to the team or project. This approach helps create an assessment framework that is more holistic and tailored to the company's needs.

Some of the challenges faced in developing DSS for employee performance assessment include integrating data from various sources, handling uncertainty, and ethical aspects related to the use of technology in personal decision making. Therefore, current research seeks to overcome these obstacles by developing new methods and proposing more sophisticated frameworks.

Although there has been significant progress in this area, further research is still needed to optimize the implementation of DSS in employee performance assessment, especially in certain industrial contexts. Thus, it is hoped that this research can provide additional contributions in enriching human resource management literature and practice. The Simple Additive Weighting (SAW) method is often also known as the weighted addition method. The basic concept of SAW is to find the weighted sum of the performance of each alternative on all attributes. The SAW method requires a process of normalizing the decision matrix (X) to a scale that can be compared with all existing alternative ratings. This method is the most well-known and most widely used method in dealing with situations. Multiple Attribute Decision Making itself is a method used to find the optimal alternative from a number of alternatives with certain criteria. This SAW method requires decision makers to determine the weight for each attribute. The total score for an alternative is obtained by adding up all the results of multiplying the ratings (which can be compared across attributes) and the weight of each attribute. The rating for each attribute must be dimension-free in the sense that it has gone through a previous matrix normalization process.[6]. Employee performance is the result of good work that a person achieves in completing his responsibilities. A person's performance is a combination of opportunities and business abilities that can be assessed from the results of his work. And the behavior that each person displays in real terms is a form of work performance in accordance with their duties as employees. Employee performance really has a big influence on the development of the company itself because where a company has quality resources, it will create good performance. This is where the company is able to compete with other companies and can even develop to achieve the main goal, namely making the company better. progressing from before, employee performance is more often referred to as a very important aspect used to support the success of a company. In civil service, compensation is a reward given to employees as appreciation for their services to the company. (Mangkunegara, 2001: 83). Basically, compensation is something that an employee receives from a company, where this is a form of company reward to an employee from the results of work that has been completed. The compensation given is usually in physical or non-physical form, such as money, goods or something given directly or indirectly, apart from that, the types of compensation according to company policy include salary, incentives and bonuses. This can motivate employees to work more actively and harder for the benefit of progress within a company. From the statement above, it can be concluded that compensation greatly influences employee performance, the higher or more that is submitted, the more active the workers will be in completing their tasks and this will have an effect on increasing their performance and potentially on the development of the company itself.

Work Motivation is something that makes a person put his or her abilities into skills and expertise, energy and time to carry out activities that are his or her duties and carry out obligations in order to achieve the goals and objectives of the organization that have been determined.[7].

3. Method

In research, analysis is carried out to obtain all system and user requirements which include input, output and other information needed by system users. In applying the Simple Additive Weighting (SAW) method, the aim is to find out the results of the decisions of the best employees at PT Mahkota, Tbk which are assessed based on the criteria that apply to the Service. In the context of decision support, three main variables are needed, namely Alternatives, determining Criteria and determining Weights. Alternative is the term used for the object of research being carried out. Criteria are a form of assessment used including the number of employees' attendance, loyalty, discipline,

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attitude and creativity. The steps for completing SAW (Simple Additive Weighting) start from determining alternatives, criteria and weights.

Table 1. Dataset

Alternative	Name
A1	Rudi
A2	Reza
A3	Sutrisno
A4	Nikki
A5	Suci
A6	Fadia
A7	Cerah
A8	Dwi
A9	Tya
A10	Syamsial

Table 2. Weight Values

Alternative	Name
Not Good (NG)	1
Good (G)	2
Very Good (VG)	3

Table 3. Criteria

No	Criteria	Criteria Code	Values
1	K1	Presence	20
2	K2	Loyalty	10
3	K3	Discipline	25
4	K4	Attitude	30
5	K5	Creativity	15
Total			100

Table 4. Criteria

No	Kode Kriteria	Kriteria	Sub Kriteria	Bobot
1	K1	Presence	Absent > 7 Times (NG)	1
			Absent 3- 5 Times (G)	2
			Attended < 2 Times (VG)	3
2	K2	Loyalty	Not Willing to Accept Additional Work (NG)	1
			Accepting Additional Work with little restrictions(G)	2
			Completing Additional Work on Time (VG)	3
3	K3	Discipline	Late Attendance > 1 Hour (NG)	1
			Late Attendance < 30 Minutes (G)	2
			Timely Attendance (VG)	3
4	K4	Attitude	Disrespectful (NG)	1
			Polite But Indifferent (G)	2
			Polite and Friendly (VG)	3
5	K5	Creativity	Not Creative (NG)	1
			A little creative (G)	2
			Very Creative (VG)	3

Table 5. Example of Alternative Values

Criteria	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
K1	VG	G	VG	NG	VG	G	G	VG	G	G
K2	G	G	VG	G	VG	VG	G	NG	VG	G
K3	VG	VG	VG	G	G	G	G	NG	VG	NG
K4	VG	VG	G	VG	G	NG	G	NG	VG	VG
K5	G	NG	G	G	G	G	NG	G	G	NG

Table 6. Alternative Suitability Rating for each Criteria

No	Alternative	Criteria				
		K1	K2	K3	K4	K5
1	A1	3	2	3	3	2

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No	Alternative	Criteria				
		K1	K2	K3	K4	K5
2	A2	2	2	3	3	1
3	A3	3	3	3	2	2
4	A4	1	2	2	3	2
5	A5	3	3	2	2	2
6	A6	2	3	2	1	2
7	A7	2	2	2	2	1
8	A8	3	3	1	1	2
9	A9	2	3	3	3	2
10	A10	2	2	1	3	1

Process of Determining Normalization The decision matrix (X) becomes a normalized matrix (R) by dividing the attribute value of each criterion (Xij) by the largest value of each criterion (Max Xij).

• For Employee 1 (A1) Assessment

R11 = 3/(Max { 3;2;3;1;3;2;2;3;2;2}) = 3/3 = 1
R12 = 2/(Max { 2;2;3;2;3;3;2;3;3;2}) = 2/3 = 0,67
R13 = 3/(Max { 3;3;3;2;2;2;2;1;3;1}) = 3/3 = 1
R14 = 3/(Max {3;3;2;3;2;1;2;1;3;3}) = 3/3 = 1
R15 = 2/(Max { 2;1;2;2;2;2;1;2;2;1}) = 2/2 = 1

• For Employee 2 (A2) Assessment

R21 = 2/(Max { 3;2;3;1;3;2;2;3;2;2}) = 2/3 = 0,67
R22 = 2/(Max { 2;2;3;2;3;3;2;3;3;2}) = 2/3 = 0,67
R23 = 3/(Max { 3;3;3;2;2;2;2;1;3;1}) = 3/3 = 1
R24 = 3/(Max {3;3;2;3;2;1;2;1;3;3}) = 3/3 = 1
R25 = 1/(Max { 2;1;2;2;2;2;1;2;2;1}) = 1/2 = 0,5

Perform the same calculations for alternative employee assessments A3 to A10 to produce the following table

Table 7. Alternative Normalization Results

	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
K1	1	0.67	1	0.33	1	0.67	0.67	1	0.67	0.67
K2	0.67	0.67	1	0.67	1	1	0.67	1	1	0.67
K3	1	1	1	0.67	0.67	0.67	0.67	0.33	1	0.33
K4	1	1	0.67	1	0.67	0.33	0.67	0.33	1	1
K5	1	0.5	1	1	1	1	0.5	1	1	0.5

Next, a calculation process will be carried out to find the final value (V value) obtained from the total calculation results of the preference weights W multiplied by the normalized matrix R

V1 = (1 *20) + (0,67 *10) + (1*25) + (1*30) + (1*15) = 96,6667
V2 = (0,67 *20) + (0,67 *10) + (1*25) + (1*30) + (0,5*15) = 82,50
V3 = (1 *20) + (1 *10) + (1*25) + (0,67*30) + (1*15) = 90,00
V4 = (0,33 *20) + (0,67 *10) + (0,67*25) + (1*30) + (1*15) = 75,00
V5 = (1 *20) + (1 *10) + (0,67*25) + (0,67 *30) + (1*15) = 81,6667
V6 = (0,67 *20) + (1 *10) + (0,67*25) + (0,67*30) + (1*15) = 65,00
V7 = (0,67 *20) + (0,67 *10) + (0,67*25) + (0,67*30) + (0,5*15) = 64,1667
V8 = (1 *20) + (1 *10) + (0,33*25) + (0,33*30) + (1*15) = 63,3333
V9 = (0,67 *20) + (1 *10) + (1*25) + (1*30) + (1*15) = 93,3333
V10 = (0,67*20) + (0,67 *10) + (0,33*25) + (1*30) + (0,5*15) = 65,8333

Based on the results of calculations carried out on employees, ranking results are obtained as in the following table.

Table 8. Ranking

Alternative	Values	Rank
A1	96,6667	1
A9	93,3333	2
A3	90	3
A2	82,5	4
A5	81,6667	5
A4	75	6

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Alternative	Values	Rank
A10	65,8333	7
A6	65	8
A7	64,1667	9
A8	63,3333	10

Based on the results of the calculations carried out, the alternative with the highest score from rank 1 to rank 3 was found in alternative A1 at 96.6667, A9 at 93.3333 and A3 at 90.00 so it was declared the best employee.

4. Results and Discussion

The following are the results of the research which was built in the form of a decision support system application starting from the display form:

a. Login

The Login page is the first page that appears when the system is started. On this page, the administrator has the right to log in Enter your email and password correctly, and then the admin will immediately go to the home page display. The login page display is as follows :

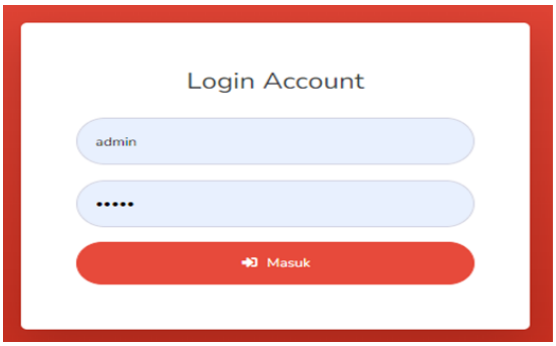

Figure 1. Login Form

b. Home Form

The home page is the display when the administrator successfully logs in. The display starts from criteria data, sub-criteria data, weight data, assessment, calculations and final results.

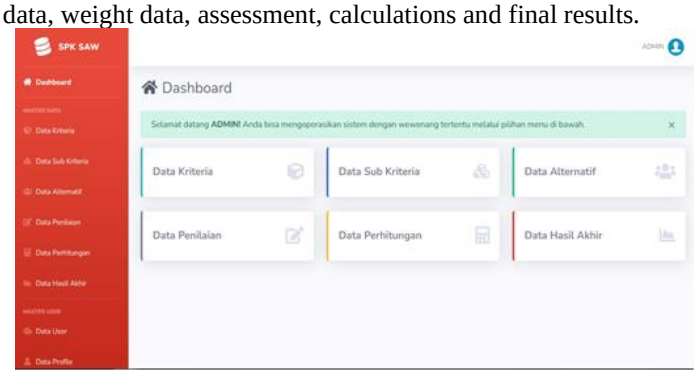

Figure 2. Home Form

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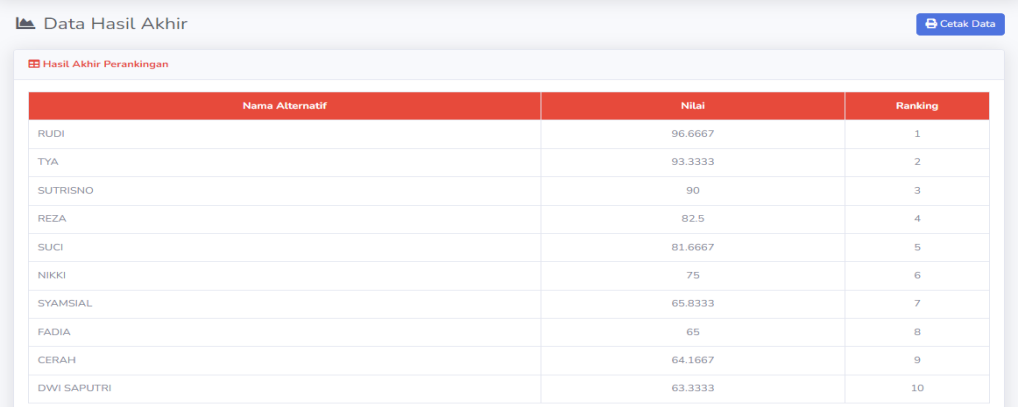
c. Calculation Data Form



Nama Alternatif	Nilai	Ranking
RUDI	96.6667	1
TYA	93.3333	2
SUTRISNO	90	3
REZA	82.5	4
SUCI	81.6667	5
NIKKI	75	6
SYAMSIAL	65.8333	7
FADIA	65	8
CERAH	64.1667	9
DWI SAPUTRI	63.3333	10

Figure 3. Calculation Data Form

5. Conclusions

This research The conclusions obtained in the research entitled "Decision Support System for Determining Performance Evaluation of Honorary Employees Using the SAW Method at the Regional Secretariat of Deli Serdang Regency" are as follows: The system built can make it easier for the Department to determine the best Honorary Employees according to an objective assessment. The variables used in the research included in the Benefit Category do not use the Cost variable. The criteria used are 5 criteria with the frequency of each weight according to the Department's determination during the interview process. Method of providing decision results in accordance with data calculated manually by the relevant department

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