



# Decision Support System for Determining the Level of Employee Salary Increase Based on Performance at PT. Mark Dynamics Indonesia.tbk by Using the Simple Additive Weighting (SAW) Method

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## ABSTRACT

Employees viewed as by one of important company assets and require to be managed is and also developed to support the continuity of life and attainment of company target. One of form of employees organizing which can be done by company is give the recompensation or appropriate salary payment for employees. Increase employ very influencing of motivation and employees productivity in executing and finishing its work. To determine big of increase employ, needed by a system which can support the decision making conducted by manager. Exploiting of System of decision supporter by using method of Simple additive Weighting ( SAW) very assistive manager in conducting accurate and quicker decision making. Elementary concept of method SAW is look for the wight quantifying from rating performance in each alternative and at all of attribute requiring process of normalization of decision matrix ( X) to an scale which can be compared to by all existing rating alternative. This method is selected by because it is able to select the best alternative from a number of existing alternative pursuant to determined criterion. Research conducted with searching wight value to each; every attribute is later; then conducted by ranking to determine the optimal alternative.

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## 1. INTRODUCTION

PT.Mark Dynamics Indonesia.Tbk is a company engaged in the ceramics/former and is the only company in Indonesia. PT.Mark Dynamics Indonesia.Tbk has a large number of employees to carry out each of its operational areas because there is still a lot of work to be done manually without the help of machines. The number of employees of PT.Mark Dynamics Indonesia.Tbk is about 1200 people who every month must receive wages that are in accordance with the minimum wage.

Payroll carried out by PT.Mark Dynamics Indonesia.Tbk is carried out every month and the salary received is also in accordance with the position of each employee if the operator is the salary received in accordance with the UMK. But if the supervisor and manager are the salary receive in accordance with the performance appraisal of each individual respectively. Salary increase is carried out once a year.

The salary increase system that is carried out once a year is quite a long time, for the position of supervisor and manager the salary increase is regulated by their respective performance appraisals and the data obtained is also still using manual data which can lead to mistakes and injustices for each individual. , because the assessment is done by humans and also recorded manually.

The development of technology and information that continuously experiences rapid progress can be utilized to facilitate all activities within the company [1]. Decision support systems are part of computer-based information systems that are included in knowledge-based systems or knowledge management that can be used to support decision making in an organization or company. Decision support systems can help decision makers with data information that has been processed relevant and necessary to make decisions about a problem more quickly and accurately [2] [3] [4].

Simple Additive Weighting (SAW) is a method for making decisions using various criteria and assessments for each criterion, so the basic concept of the SAW method is to find the weighted sum of the performance ratings on each alternative and on all attributes that require a normalization process. decision matrix (X) to a scale that can be compared with all available alternative ratings. The SAW method was chosen because it is able to select the best alternative from a number of alternatives based on the specified criteria [5] [6] [7].

By using a decision support system, the SAW method is estimated to be able to overcome the problems that arise in PT.Mark Dynamics Indonesia.Tbk, namely by determining the decision criteria for the level of employee salary increases, collecting employee data based on predetermined criteria so that it can be calculated using the method SAW and an application was built to make it easier to determine the level of salary increase decisions for each employee.

SAW method is often also known as the weighted addition 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 requires the process of normalizing the decision matrix (X) to a scale that can be compared with all existing alternative ratings [8] [9] [10].

Unified Modeling Language (UML) is a language based on graphics or images for visualizing, specifying, building and documenting an Object Oriented-based software development system [11] [12] [13].

## 2. RESEARCH METHODS

Several research methods were carried out by the author in order to collect the data needed for research needs. Among them is by way of observations made by the author directly at the research site. For more details below, the authors explain the research methods that the authors use, namely: correlational; evaluation; survey; case study; basic theory.

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### 2.2 System Requirements Analysis

Based on the results of observations that the author made on the case study company, the author described the system requirements in the form of a flow of document, as shown in the image below:

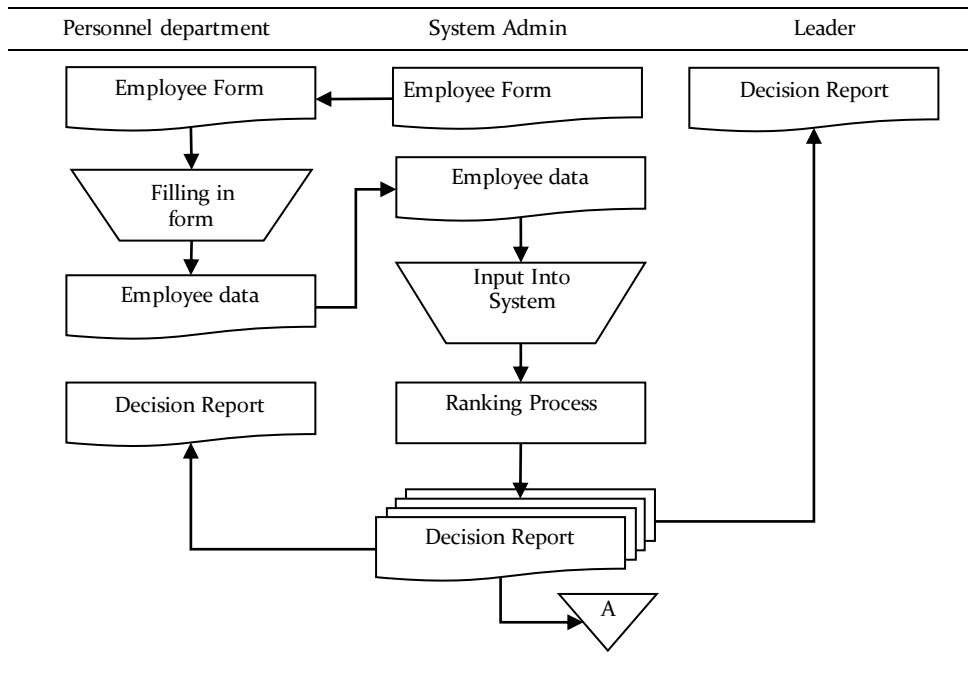


Figure 1. Flow Of Document System Requirements

Based on observations, the analysis of system requirements can be seen from the flow of document table above, the system requires employee data form documents as input data so that the system can perform the ranking calculation process using the SAW method.

**2.3 Description of the Simple Additive Weighting (SAW) Method**

The SAW method is often also known as the weighted addition 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 requires the process of normalizing the decision matrix (X) to a scale that can be compared with all existing alternative ratings. The formula for the Simple Additive Weighting (SAW) method can be seen below [14] [15]:

$$r_{ij} = \left\{ \begin{array}{l} \frac{x_{ij}}{\text{Max } x_{ij}} \text{ jika } j \text{ adalah atribut keuntungan (benefit)} \\ \frac{i}{\text{Min } x_{ij}} \\ \frac{i}{x_{ij}} \text{ jika } j \text{ adalah atribut biaya (cost)} \end{array} \right\} \dots\dots\dots(1)$$

Description:

- rij = normalized performance rating value
- xij = attribute value owned by each criterion
- Max xij = the largest value of each criterion
- Min xij = the smallest value of each criterion
- benefits = if the largest value is the best
- cost = if the smallest value of t is the best

Where rij as the normalized performance rating of alternative Ai on attribute Cj ; i=1,2,...,m and j=1,2,...,n . The preference values for each alternative (Vi) can be seen below:

$$V_i = \sum_{j=1}^n W_j r_{ij} \dots\dots\dots(2)$$

Description:

- Vi = ranking for each alternative
- Wj = weight value of each criterion

$r_{ij}$  = normalized performance rating value

A larger  $V_i$  value indicates that alternative  $A_i$  is preferred.

### 2.3 Steps to Solve Using the SAW Method

The steps for solving problems using the Simple Additive Weighting (SAW) method according to Kusumadewi (2006:74):

- a. Determine the criteria that will be used as a reference in decision making, namely  $C_i$ .
- b. Determine the suitability rating of each alternative on each criterion.
- c. Make a decision matrix based on the criteria ( $C_i$ ), then normalize the matrix based on the equation that is adjusted to the type of attribute (profit attribute or cost attribute) in order to obtain a normalized matrix  $R$ .

The final result is obtained from the ranking process, namely the addition of the normalized matrix multiplication  $R$  with the weight vector so that the largest value is chosen as the best alternative ( $A_i$ ) as the solution.

## 3. RESULTS AND DISCUSSION

### 3.1 System Implementation

Before implementing the system created, it is necessary to first consider the software requirements and hardware requirements to maintain the stability and smoothness of the system when it is run.

#### 2.4 System Implementation Stages

To implement the system, it is necessary to carry out the stages of implementation, namely as follows:

- a. Login

The login form is required for authentication of users who may and may not use the system, the system that is allowed to access the system is a user who has a username and password obtained from the administration system.

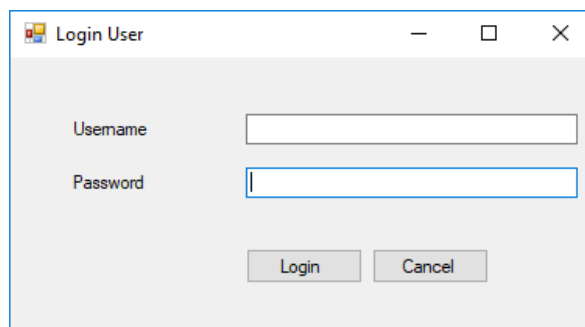


Figure 1. Login Form

- b. Main Menu Form

The main menu form will open after the user who has logged in successfully, while the function of the main page is to contain menus that can call each page needed for system purposes.



Figure 2. Main Menu Form

c. Employee data

Employee data forms are required to fill out and add employees who will be ranked in the system, additional employees can be accessed by filling out the form and clicking the save button, then changes to employee data can be made by clicking the edit, delete or new button.

NIK	Nama	Jabatan	Divisi
A1	Marlina	Accounting	Kantor
A2	Ahmad Syafruddin	Analisis Data	Kantor
A3	Nurhayati	Acc.Receivable	Kantor
A4	Novi Lolita Sari	Adm.Gudang	Logistic
A5	Lide Kristanti Silal	Acc.Receivable	Kantor
A6	Saedah Maerli H...	Bag.Klaim	Kantor
A7	Rasyid Habibi Sa	Sales Admin	Kantor
A8	Muri Handayani	Sales Force	Sales

Figure 3. Employee Data Form

Meanwhile, to exit the employee data form page, the user can click the exit button. The employee data form above will be directly connected to the database, so by making changes to employee data, other data related to employee data such as ranking data will also automatically change.

d. Rating Data

The assessment data form can be accessed from the main menu form by clicking on the file menu and the assessment data. While the function of the assessment data is to conduct an assessment of each criterion for each employee, the assessment is carried out by filling in the criteria numbers which can be seen in the fuzzy table in the previous chapter. The numbers in the criteria column will directly affect the ranking results resulting from calculations using the SAW method.

NIK	Nama	Prestasi	Kedisiplinan	Sikap	Masa Kerja
A1	Marlina	4	4	4	4
A10	Erwin Ramadani ...	4	3	4	4
A11	Kiki Rezeki Silto...	4	4	4	4
A12	M. Agus SaleH N...	3	3	3	4
A13	Erik Suganda Lase	4	4	4	3
A14	Taufik Hidayat	4	2	4	2
A15	David Burhan Sat	3	4	4	2

Figure 4. Assessment Data Form

e. Ranking Data

The ranking data form can be accessed from the main menu form by clicking on the process menu and ranking data. While the function of the ranking data form is to calculate and see the highest ranking data as indicated by the percentage increase in salary, the largest salary increase is 0.15 or equal to 15%, while a 0.1 increase in line is the same as a 10% increase in salary.

NIK	Nama	Jabatan	Divisi	Kenalkan
A1	Marlina	Jabatan	Divisi	0.15
A11	Kiki Rezeki Silto...	Sales Force	Sales	0.15
A20	Janty Kustio	Analisa Data	Kantor	0.15
A21	Timbul JNP Tam...	Head Logistic	Logistic	0.15
A29	M. Reza Palawa...	Delivery	Logistic	0.15
A10	Erwin Ramadani ...	Accounting	Kantor	0.1
A13	Erik Suganda Lase	Sales Force	Sales	0.1
A18	Endang Tria Marisa	Collector	Sales	0.1
A19	Rika Tirana	Sales Force	Sales	0.1
A2	Ahmad Syafuruddin	Sales Force	Sales	0.1
A22	Ilyas	Bag Umum	Logistic	0.1
A23	Miftah Fikri Sihom...	Delivery	Logistic	0.1
A24	Elhanus Zalukhu	Helper	Logistic	0.1
A28	Rahmat	Delivery	Logistic	0.1
A32	Muhammad Fadli ...	Delivery	Logistic	0.1
A34	Weni Apilyanti	Delivery	Logistic	0.1

Figure 5. Ranking Data Form

From the results of tests carried out on the system and comparing it with the results of manual calculations, it can be seen that the results of the two calculations are the same and there is no difference at all, it can be concluded that the system built is running as expected or in accordance with the specified goals.

For the ability of the system to rank, it depends on how much alternative data is to be calculated, the more alternative data that is calculated, it is natural that the slower the system works, but as far as the authors carry out the test, there are no significant obstacles that can hinder the running of the system.

4. CONCLUSION

The conclusions obtained from the writing of this thesis are; The process of determining the level of salary increases begins with inputting employee data, inputting assessment data then processing by ranking until results are obtained and then the rate of increase is determined, after which the increase (output) is processed in the form of a report. The application of the Simple Additive Weighting (SAW) method in making decisions to determine the level of salary increases is done by

finding the weighted sum of the criteria for each alternative and on the attributes that require normalization of the decision matrix, then a ranking process is carried out to the preference value to determine the alternative that gets an increase. salary between 5% - 15% or not getting a raise at all.

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