International Journal of Basic and Applied Science 8 (4) (2020) 132-138

Published by:IOCSCIENCE

International Journal of Basic and Applied Science

Journal homepage:www.ijobas.pelnus.ac.id

Decision Support System for Determining the Level of Employee Salary Increase in CV. Zada Bata Karya, Using the Simple Additive Weighting (SAW) Method

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Article Info

Article history:

Received Jun 11, 2019
Revised Jun 05, 2019
Accepted Jul 16, 2019

***Keywords*:**

Decision Support System;
Salary increases;
Simple Additive Weighting (SAW) method.

ABSTRACT

Employees are seen as one of the important company assets and need to be managed and developed to support the survival and achievement of company goals. One form of organizing employees that can be done by the company is to provide remuneration or appropriate salary payments for employees. Salary increases greatly affect the motivation and productivity of employees in carrying out and completing their work. To determine the amount of salary increase, we need a system that can support decision making by managers. Utilization of a decision support system using the Simple Additive Weighting (SAW) method is very helpful for managers in making decisions that are faster and more accurate. 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 the normalization process of the decision matrix (X) to a scale that can be compared with all existing alternative ratings. This method was chosen because it is able to select the best alternative from a number of alternatives based on the specified criteria. The research was conducted by finding the weight value for each attribute and then ranking it to determine the optimal alternative.

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1. INTRODUCTION

In the Company, each employee has a different salary according to different positions or groups, salaries will be paid in cash at the beginning of each month. Salaries will be paid by the treasurer to employees. The increase in salary for employees will be carried out by the company if the employee whose salary is increased has criteria that have been determined by the company.

Problems that arise when there will be a salary increase for every employee who works in CV.Zada Bata Karya. Not all employees can be raised simultaneously, of course there are several criteria that must be met by each employee, and to determine is also still constrained because it is still using the manual method and it takes a long time to make the right decision.

The development of technology and information that continues to progress rapidly can be used to facilitate all activities within the company. Decision support systems (Decision Support Systems) are part of a computer-based information system that is included in a knowledge-based system or knowledge management that can be used to support decision making in an organization or company [1] [2] [3]. Decision support systems can help decision makers with data information that has been processed relevantly and needed to make decisions about a problem more quickly and accurately [4] [5] [6].

Beginning in October 1994, Booch, Rumbaugh and Jacobson, three of the most widely used methodological figures, pioneered efforts to unify object-oriented design methodologies. In 1995 released the first draft of UML (version 0.8). Since 1996 the development has been coordinated by the Object Management Group (OMG) [7] [8] [9]. 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 [10] [11] [12].

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 [13] [14] [15].

By using a decision support system the SAW method is estimated to be able to overcome the problems that arise in CV.Zada Bata Karya, 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 SAW method and an application was built to make it easier to determine the level of salary increase decisions for each employee.

According to Kusumadewi (2006:74) in his book entitled "Fuzzy Multi Attribute Decision Making", 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 [16] [17].

2. RESEARCH METHODS

2.1 Data analysis

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.

2.2 System Requirements Analysis

Based on the results of observations that the authors did on the case study company data, the authors described the system requirements in the form of a flow of document, as shown in the table below:

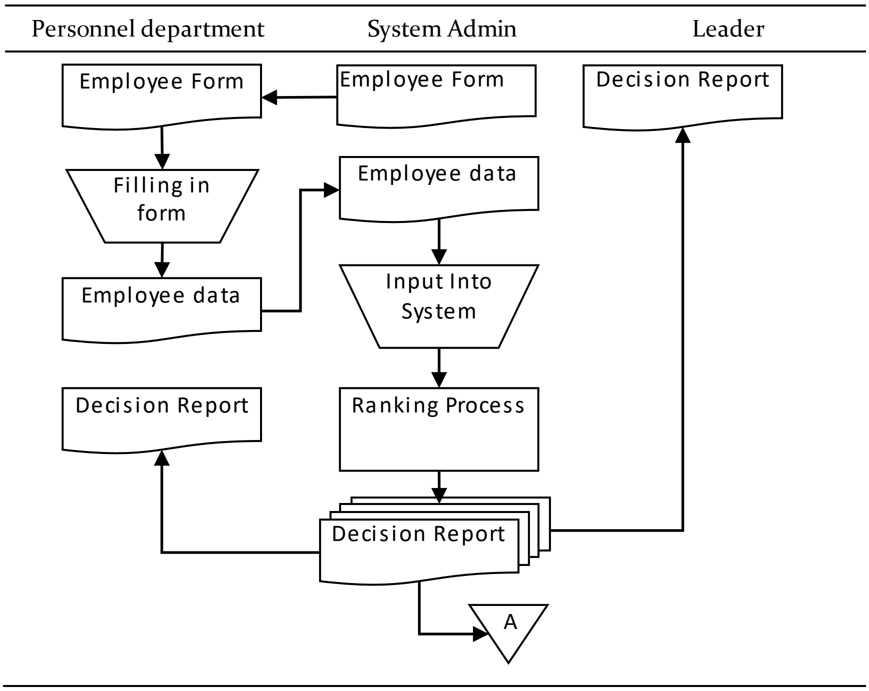


Figure 1. Flow Of Document System Requirements

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:

$$r_{ij} = \left\{ \begin{array}{ll} \frac{x_{ij}}{\underset{i}{Max}\, x_{ij}} & Jika\ j\ adalah\ attribut\ keuntungan\ (benefit) \\ \frac{\underset{i}{Min}\, x_{ij}}{x_{ij}} & jika\ j\ adalah\ attribut\ biaya\ (cost) \end{array} \right\}$$

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:

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

Description:

Vi = ranking for each alternative
Wj = weight value of each criterion
rij = normalized performance rating value

A larger Vi value indicates that alternative Ai is preferred.

2.4 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 Ci.
b. Determine the suitability rating of each alternative on each criterion.
c. Make a decision matrix based on the criteria (Ci), 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.
d. 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 (Ai) as the solution.

3. RESULTS AND DISCUSSION

3.1 System Implementation

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.

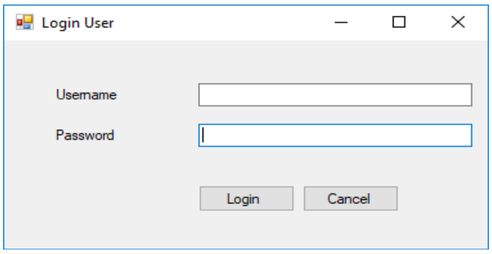


Figure 2. Login Form

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.

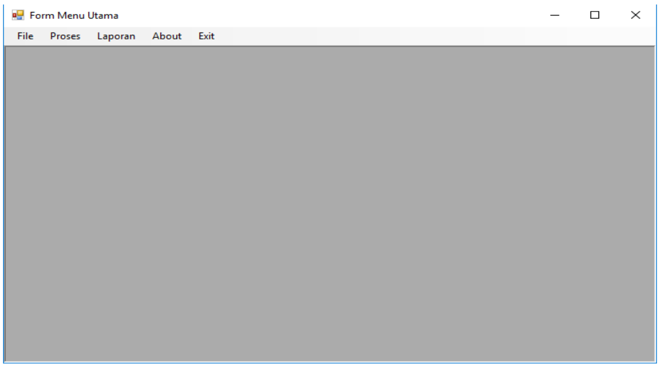
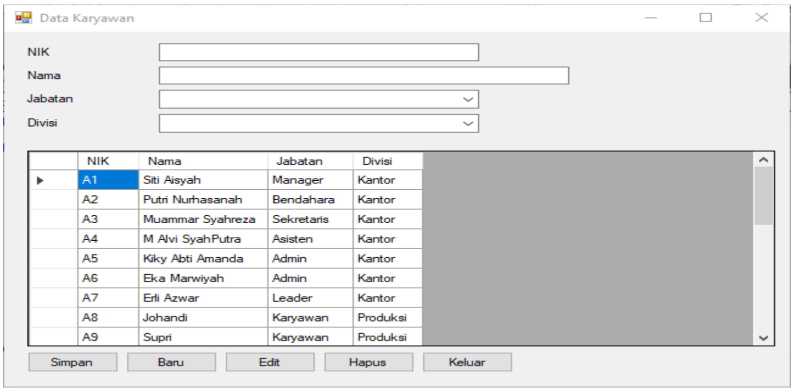


Figure 3. Main Menu Form

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.



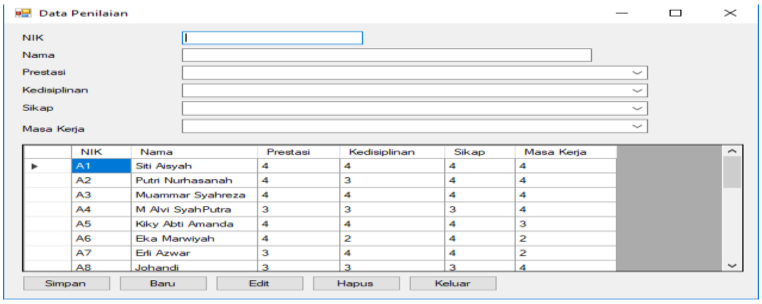
NIK	Nama	Jabatan	Divisi
A1	Siti Aisyah	Manager	Kantor
A2	Putri Nurhasanah	Bendahara	Kantor
A3	Muammar Syahreza	Sekretaris	Kantor
A4	M Alvi SyahPutra	Asisten	Kantor
A5	Kiky Abti Amanda	Admin	Kantor
A6	Eka Marwiyah	Admin	Kantor
A7	Erli Azwar	Leader	Kantor
A8	Johandi	Karyawan	Produksi
A9	Supri	Karyawan	Produksi

Figure 4. 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. Valuation 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.

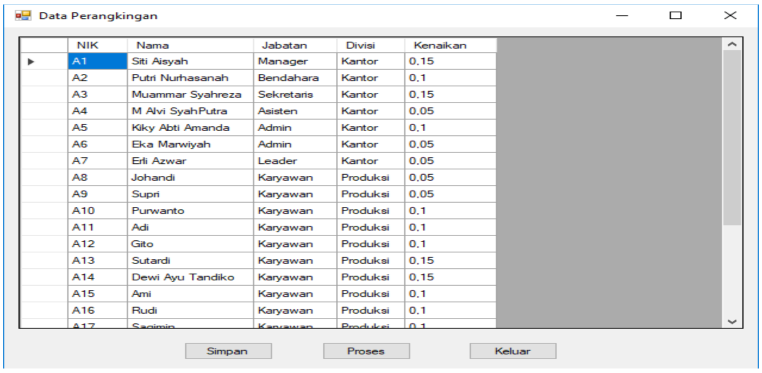


NIK	Nama	Prestasi	Kedisiplinan	Sikap	Masa Kerja
A1	Siti Aisyah	4	4	4	4
A2	Putri Nurhasanah	4	3	4	4
A3	Muammar Syahreza	4	4	4	4
A4	M Alvi SyahPutra	3	3	3	4
A5	Kiky Abti Amanda	4	4	4	3
A6	Eka Marwiyah	4	2	4	2
A7	Erli Azwar	3	4	4	2
A8	Johandi	3	3	3	4

Figure 5. 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	Kenaikan
A1	Siti Aisyah	Manager	Kantor	0,15
A2	Putri Nurhasanah	Bendahara	Kantor	0,1
A3	Muammar Syahreza	Sekretaris	Kantor	0,15
A4	M Alvi SyahPutra	Asisten	Kantor	0,05
A5	Kiky Abti Amanda	Admin	Kantor	0,1
A6	Eka Marwiyah	Admin	Kantor	0,05
A7	Erli Azwar	Leader	Kantor	0,05
A8	Johandi	Karyawan	Produksi	0,05
A9	Supri	Karyawan	Produksi	0,05
A10	Purwanto	Karyawan	Produksi	0,1
A11	Adi	Karyawan	Produksi	0,1
A12	Gito	Karyawan	Produksi	0,1
A13	Sutardi	Karyawan	Produksi	0,15
A14	Dewi Ayu Tandiko	Karyawan	Produksi	0,15
A15	Ami	Karyawan	Produksi	0,1
A16	Rudi	Karyawan	Produksi	0,1
A17	Sagimin	Karyawan	Produksi	0,1

Figure 6. 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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