



Decision Support System for Determining Employee Salary Levels on CV. Rezeky Baru Service Lubuk Pakam using the Simple Additive Weighting (SAW) Method

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ABSTRACT

Employees are viewed as one of the company's important assets and need to be managed and developed to support survival and achieve company goals. One form of employee organization that can be carried out by the company is to provide remuneration or salary payments that are appropriate for employees. Salary increases greatly affect employee motivation and productivity in carrying out and completing their work. To determine the amount of salary increase, a system is needed that can support decision making by managers. The use of decision support systems using simple additive weighting (SAW) method is very helpful for managers in making faster and more accurate decisions. The basic concept of the SAW method is to find the weighted sum of performance ratings in each alternative and on all attributes that require the decision matrix normalization process (X) to a scale that can be compared with all available alternative ratings. This method was chosen because it was able to select the best alternative from a number of alternatives based on the criteria determined by the research conducted by looking for weight values for each configuration and then ranking that will determine the optimal alternative.

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1. INTRODUCTION

CV. REZEKY BARU SERVICE is a company that specializes in car repair services. which is located JL. Medan-Lubuk Pakam km.21.5. CV. Rezeky Baru Service was established in 2001. Consumers CV. Rezeky Baru Service includes individual cars and distributors for the Lubuk Pakam area. The advantages of CV. Rezeky Baru Service Workshop is to receive calls to come to consumers when other repair services around the area are just waiting for the arrival of consumers.

The higher industrial development in the city of Lubuk Pakam resulted in the economy in the city of Lubuk Pakam growing so that people's purchasing power for cars increased [1] [2]. The

increasing number of car users will cause many competitors to emerge from the repair service industry which will become a threat to the company. The company in carrying out the repair service process still adheres to the old system, which only prioritizes the quality of the car repair without paying attention to consumer comfort from other factors [3] [4].

Salaries of workers at CV. Bengkel Rezeky Baru Services are carried out every month and the salary received is also in accordance with the position of each employee. But if the workers are workers, the salary received is in accordance with the performance appraisal of each individual for each salary increase that is carried out once a year.

The salary increase system that is carried out once a year is quite a long time, for a worker the salary increase is regulated by each performance appraisal 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 human and in the data manually.

The development of technology and information that continues to progress rapidly can be used to facilitate all activities within the company [5]. 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 [6] [7] [8]. 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.

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 [9] [10]. The SAW method was chosen because it is able to select the best alternative from a number of alternatives based on the specified criteria.

By using a decision support system, the SAW method is estimated to be able to overcome the problems that arise in the Cv. Rezeky Baru Service. Lubuk Pakam, namely by determining the decision criteria for the rate of increase in employee salaries, collecting employee data based on predetermined criteria so that it can be calculated using the SAW method and an application is built to facilitate the determination of the rate of increase in salary for each employee.

The simple additive weighting method is recommended to solve the selection problem in a multi-process decision-making system [11] [12]. The SAW method requires the process of normalizing the decision matrix (X) to a scale that can be compared with all existing alternative ratings. This method is the most famous and most widely used method in dealing with Multiple Attribute Decision Making (MADM) situations. MADM itself is a method used to find the optimal alternative from a number of alternatives with certain criteria [13] [14] [15]. Several journals are in accordance with the author's guidelines in determining employee shifts using the Simple Additive Weighting (SAW) method.

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].

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.

2.1 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:

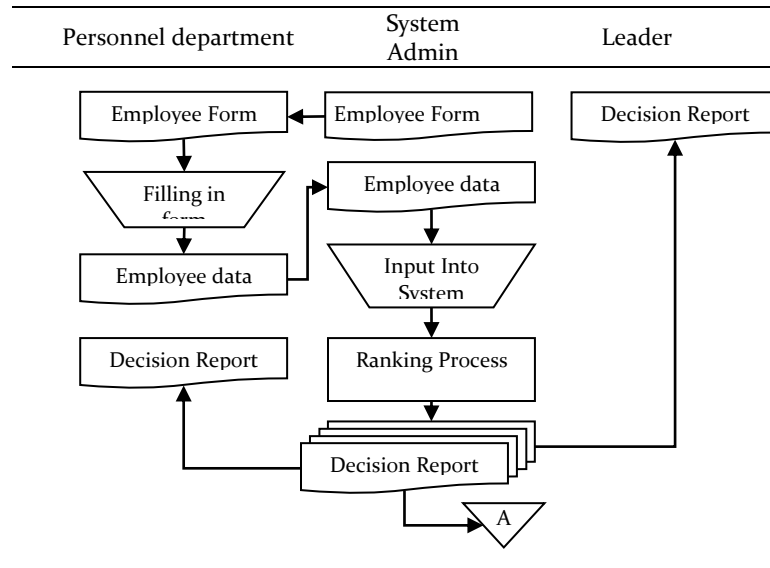


Figure 1. Flow Of Document System Requirements

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.

2.2 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:

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

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 t value 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

W_j = 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):

- Determine the criteria that will be used as a reference in decision making, namely C_i .
- Determine the suitability rating of each alternative on each criterion.
- 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

In this system, the user can enter their own input data for each parameter according to the range provided by the system. The system will process the input data to be grouped according to the membership function and predetermined rules. The output of this system is to determine the salary increase using the Sugeno method.

a. Login Form

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.

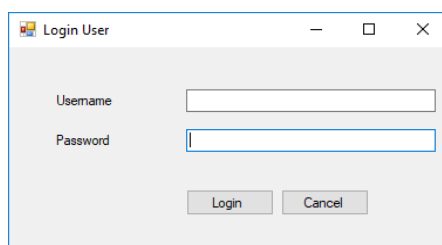


Figure 2. User Login Form Display

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.

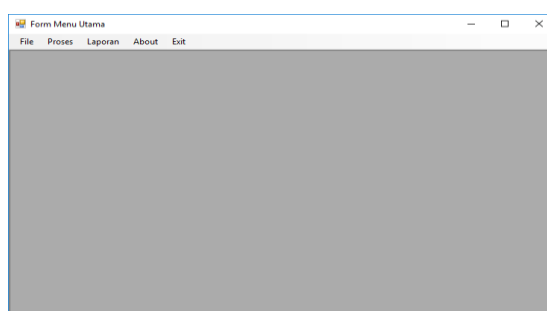


Figure 3. Main Menu Display

c. Employee Data Form

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.

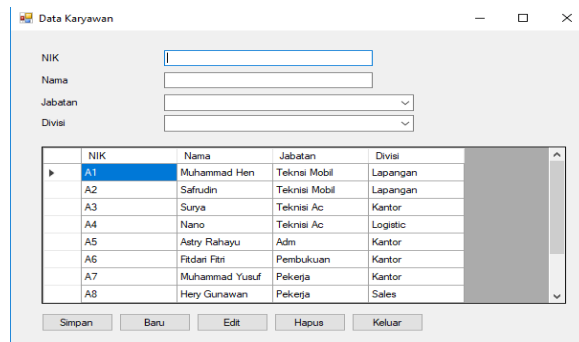


Figure 4. Employee Data Input Page

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. Research 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.

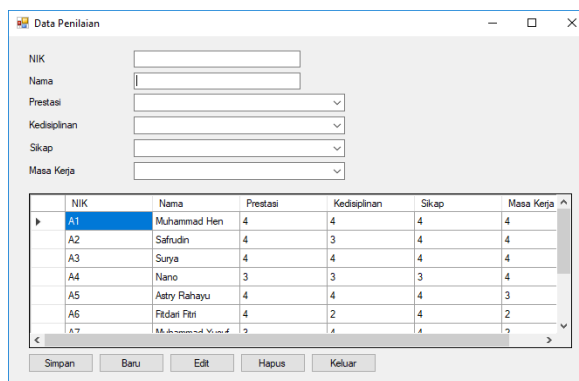


Figure 5. Assessment Data Form

e. Ranking Data

The process form is the main form of the salary increase application using the fuzzy Sugeno method. In this form the user can enter the values of the employee criteria. Then the final result will be obtained after the user presses the process button.

NIK	Nama	Jabatan	Divisi	Kemilikan
A1	Muhammad Hen	Teknisi Mobil	Lapangan	0.15
A2	Safudin	Teknisi Mobil	Lapangan	0.1
A3	Surya	Teknisi Ac	Kantor	0.15
A4	Nano	Teknisi Ac	Logistic	0.05
A5	Asty Rahayu	Adm	Kantor	0.1
A6	Fidari Fit	Pembukuan	Kantor	0.05
A7	Muhammad Yusuf	Pekteja	Kantor	0.05
A8	Hery Gunawan	Pekteja	Sales	0.05
A9	Ngatman	Pekteja	Sales	0.05
A10	Erwin Ramadani ...	Pekteja	Sales	0.1

Figure 6. Employee Form

f. Employee Input Form

This page displays an input form where this input serves to add employee data.

Figure 7. 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 writing this thesis include; 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.

The decision support system for determining the level of salary increase is designed using the Unified Modeling Language (UML) with Microsoft Visual Basic 2008 (VB.Net) programming language and Microsoft Access 2007 database.

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