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Decision Support System Determining Salary Increase Using the Sugeno Method at Pt. Sumatra Tobacco Trading Company

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ABSTRACT

PT. STTC is a company engaged in the manufacture of cigarettes. In an effort of improving the performance of employees at PT. STTC giving salary increases to employees who have good performance. In granting salary increases are sometimes not in accordance with the results of its performance. Granting salary increases are often on average, or sometimes the granting of salary increases only with estimate only, without application of the calculation. For that is the need for decision support system of determining salary increases. For that is the need for decision support system of determining salary increases. one of the methods in use are using the method of fuzzy logic sugeno. The method selected for being able to complete the assessment of the performance of employees on the basis of criteria that are already in the set.

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1. INTRODUCTION

In every company, agency, organization or business entity will provide a salary as compensation for the work of an employee, in addition to providing a basic salary to its employees, each agency often provides a salary increase in addition to the basic salary to spur the performance and work productivity of its employees [1] [2]. This STTC company is a company engaged in the production of cigarettes that relies heavily on the employees who work for this company, to produce superior products that do not disappoint. To make this happen, one of the divisions in charge of employees is the Human Resources (Community Resources) division and in general whose task is to handle and monitor employee performance activities and provide the best service to its employees.

Employee performance of PT. Sumatra Tobacco Trading Company will be assessed based on each employee's soft competency, achievement, length of service, strategic position, and education in which these five criteria will indicate the employee's eligibility to receive a salary increase. The increase in employee salaries is carried out by assessing the five criteria by the HR department by inputting value parameter data that has been collected through the existing system after which it is submitted to the manager for consideration. Salary increases have been regulated in company

regulations, namely once a year. Until now PT. Sumatra Tobacco Trading Company makes a salary increase report using Microsoft Excel calculations, so this results in an assessment that will allow for input errors, which interferes with the objectivity of the assessment. Because of the problems above, there needs to be a solution that can overcome these problems and provide recommendations for decisions. In today's development of computer technology, we need to involve computer technology in supporting the decisions of an HRD (Human Resources Department) in recommending employees who deserve a raise.

A Decision Support System is a system intended to support decision makers in semi-structured decision situations. DSS is intended to be a tool for decision makers to expand their capabilities, but not to replace their assessment [3] [4] [5].

The decision-making system is basically choosing an alternative to solve a problem. The problems that often arise are complex with quite a lot of aspects or criteria taken. This complexity is also caused by the structure of the problem that is not yet clear, the certainty of the perception of decision making, as well as the certainty of the availability of accurate statistical data. so based on that the author tries to provide a solution by using the fuzzy Sugeno method as an appraiser to be taken into consideration in decision making by managers will be needed in helping companies in general and specifically the HR department [6] [7] [8].

Reasoning with the Sugeno fuzzy method has an output not in the form of fuzzy sets, but in the form of constants or linear equations so that the level of accuracy is higher than other methods. This method was introduced by Takagi Sugeno Kang in 1985 [9] [10] [11]. The Sugeno fuzzy system fixes the weaknesses of the pure fuzzy system to add a simple mathematical calculation as part of THEN. In this change, the fuzzy system has a weighted average value in the IF-THEN fuzzy rule section. Sugeno's fuzzy system also has weaknesses, especially in the THEN section, namely the existence of mathematical calculations so that it cannot provide a natural framework to represent human knowledge actually [12] [13].

Fuzzy logic with Sugeno reasoning is one method that can be applied to build a system as a solution to the problem of determining salary increases. The reason for choosing the Sugeno method in this study is because this fuzzy system can help make judgments quickly, easy to understand, and the reasoning process does not require complicated mathematical equations [14] [15] [16].

There are three methods in fuzzy inference systems that are often used, namely, the Tsukamoto method, the Mamdani method, and the Takagi Sugeno method. In this study, the steps discussed are determining the decision support system to determine salary increases using the Sugeno method. This system functions to make decisions through a certain process by using inference rules based on fuzzy logic.

Sugeno's reasoning is almost the same as Mamdani's reasoning, only that the output (consequent) of the system is not a fuzzy set, but several constants or linear equations. This method was introduced by Takagi-Sugeno Kang in 1985. So this method is often also called the TSK method.

2. RESEARCH METHODS

2.1 Data analysis

The purpose of the analysis phase is to really understand the needs of the new system and develop a system that meets those needs or decide that the development of a new system is urgently needed.

The stages in the design of the fuzzy system are as follows:

a. Formation of the Escaped Team
b. Fuzzy Rule Creation
c. Defuzzification.

2.2 Analysis of the Sugeno Method

The TSK (Takagi Sugeno) method consists of 2 types, namely:

a. Zero-Order Sugeno Escape Method

In general, the form of the Zero-Order Sugeno fuzzy model is

$$IFx1\ isA1 \cap x2\ isA2 \cap x3\ isA3 \cap \ldots \cap xNisANTHENz = k \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ (1)$$

With AN is the fuzzy set of□as antecedent and□is a constant (firm) as a consequence.

b. First-Order Sugeno Escape Method

In general, the form of the First-Order Sugeno fuzzy model is

$$IFx1\ isA1 \cap \ldots \cap xNisANTHENz = p1 * x1 + \cdots + pN * xN + q \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ (2)$$

With AN is the fuzzy set of□as antecedent and□is a constant (firm) as a consequence. And□is also a constant (firm) as a consequent. If the composition of the rules uses Sugeno, then the confirmation (defuzzification) is done by finding the average value.

2.3 System planning

a. Use Case Diagrams

Use case is a construct to describe how the system looks in the eyes of the user. The target of use case modeling is to define the functional and operational requirements of the system by defining a usage scenario that is agreed upon between the user and the developer (developer).

b. Activity Diagram

Activity diagrams are part of the Unified Modeling Language which is used to describe the stages of each existing business process to make it easier to understand the business processes that occur. In the activity diagram each activity is represented by a rounded rectangle connected by arrows to describe the transition from one activity to another. other.

c. Squence Diagram

Sequence diagrams describe the interaction between objects in and around the system (including users, displays and so on) in the form of messages depicted against time. Sequence diagrams consist of a vertical dimension (time) and a horizontal dimension (related objects). Sequnce diagrams are commonly used to describe scenarios or a series of steps taken in response to an event to produce a certain output.

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

Login form is the entrance for users to be able to access menu facilities in the program system.

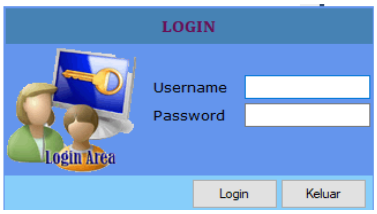

Figure 1. User Login Form Display

b. Main course

The main menu display is active, namely entering and exiting, to be able to access other menus by using the login facility in the entry menu.

Figure 2. Main Menu Display

c. Employee Form

Employee forms are used to manipulate employee data. Such as adding employees, deleting, and changing employee data.

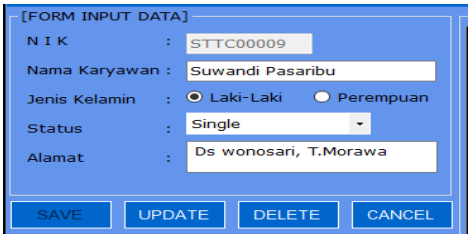

Figure 3. Employee Data Input Page

d. Fuzzy Data Forms

This form is a form used to enter parameter values from fuzzy data for employees.

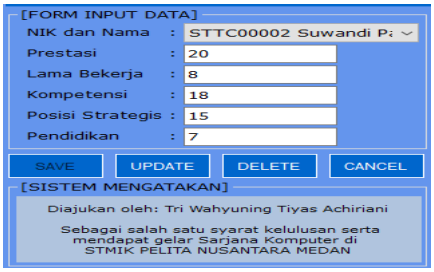

Figure 4. Fuzzy Data Input Page

e. Fuzzyfication Form

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.

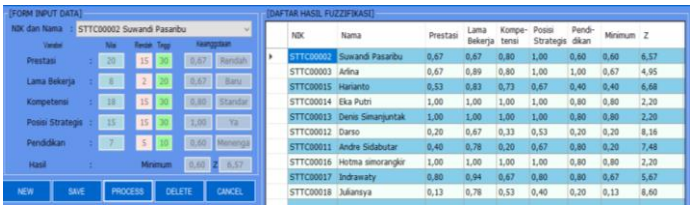

Figure 5. Process Menu Form

f. Sugeno Result Form

The main output of the system, contains the value of each employee. Employees are entitled to a salary increase if the employee's value is above the minimum value of the salary increase.

Figure 6. Process Results Fuzzy Sugeno

4. CONCLUSION

Based on the results of the research discussion in this thesis, it can be concluded that; by building a decision support system application for determining salary increases using the Sugeno method, it can be used as an analysis in determining employee salary increases that are in accordance with the performance of each employee. Fuzzy Inference System (FIS) Sugeno method can be used to provide recommendations in determining salary increases at PT. Sumatra Tobacco Trading Company.

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