Decision Support System for Performance Assessment in Raising Teacher Salaries Using the SAW Method at MA'ARIF Vocational School

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Abstract

The Decision Support System is a specialized information system designed to aid management in making effective and efficient decisions on semi-structured problems; it does not replace conventional decision-making procedures. The system that is currently running at the Cicalengka Integrated Ma’arif Vocational School has deficiencies: The process of determining teacher salary increases at the Cicalengka Integrated Ma’arif Vocational School takes more time due to the difficulty of finding data; It’s easy to make mistakes because the salary increase process is done manually; It’s easy to lose the raise process file. The decision-making function increase in teacher salaries at SMK Ma’arif Terpadu Cicalengka. This thesis uses a Decision Support System with the SAW (Simple Additive Weighting) method then the system development method uses OOAD (object-oriented analysis and design) with the RUP (Rational Unified Process) model. Rational Unified Process (RUP) is a software engineering technique created by compiling the software development industry’s best practices. RUP is object-oriented, with activities centered on model development utilizing the Unified Modeling Language (UML). The final result of the Thesis and the making of applications and Decision Support Systems Assessing Performance for Salary Increases/Teachers at SMK Ma’arif Terpadu Cicalengka is a website-based application that can facilitate the process of evaluating performance for salary increases at SMK Ma’ Arif Integrated Cicalengka. The Decision Support System built using the SAW method is expected to make it easier for schools to evaluate performance for teacher/manager salary increases; The Decision Support System that is built can minimize errors that occur from the performance appraisal process for teacher/manager salary increases; Can reduce the loss of archives at Integrated Cicalengka Ma’arif Vocational High School.

Keywords: Decision Support System, Simple Addictive, Use Case Diagrams, Activity Diagrams, Class Diagram

Highlights:

• The Decision Support System is a special information system intended to assist management in making effective and efficient decision making on semi-structured problems and does not replace the decision-making function.

• The Decision Support System built using the SAW method is expected to make it easier for schools to evaluate performance for teacher/manager salary increases.
1. Introduction

With recent technological developments, especially from the field of computers that can make it easier for humans to complete all aspects of life, especially in the field of technology. Technology helps people solve various problems. Technological developments with the many problems and difficulties encountered so that they can be solved more quickly and efficiently [1]. The Decision Support System is a specialized information system designed to help management make effective and efficient decisions on semi-structured problems; it does not replace the decision-making function [2] [3] [4].

Salary is an amount of money given to a teacher or employee as a reward for the hard work he has done for the company/school [5]. In providing salaries, each school/company has a different system. Where the salary given differs according to the position and level of the class. The difficulties experienced by companies are the same as determining salary increases for teachers [6].

Cicalengka Integrated Maarif Vocational School is a vocational school with a private educational institution which is located at Jl, Dewi Sartika, Cicalengka Kulon Kec. Cicalengka Regency, Bandung West Java. Which was founded in 1985 which has 3 majors, namely Computer and Network Engineering, Multimedia and Hospitality. The number of teachers at SMK Ma’arif is 47 teachers. At present the process of determining salary increases is still using Microsoft Office by entering teacher data and during the salary increase process collecting the required data one by one. In the salary increase process, several criteria must be met including tenure, work discipline, teacher loyalty, and level of education. Therefore, the system that is currently running at the Cicalengka Integrated Ma’arif Vocational School has deficiencies: The process of determining teacher salary increases at the Cicalengka Integrated Ma’arif Vocational School takes more time due to the difficulty of finding data; It’s easy to make mistakes because the salary increase process is done manually; It’s easy to lose the raise process file.

2. Methods

2.1. Collecting Data

The following data collection method was used for this study: Observation, that is the author directly observes data collection activities by conducting direct research on the conditions of the research environment which can assist research activities and get a clear picture of research conditions; Interview, is the practice of gathering data for purposes via question and answer sessions with the respondent in person; Literarur study, is a collection of information related to theories related to the problem under study. Study of literature from various sources including: books, journals, internet media. Writer collects journals, books on salary increases as well as on decision support systems and methods [7] [8].

2.2. Data Processing Methods

At the data processing stage, the data is processed using the Simple Additive Weighting method, first determining alternatives, in accordance with the objectives of the decision support system for determining salary increases, then determining the criteria for each alternative to be calculated by entering a weight value for each criterion, so obtain the final value in the form of normalized values and

Figure 1.
Rational Unified Process (RUP) is a software engineering technique created by compiling the software development industry’s best practices [9]. This method is distinguished by its use-case-driven and iterative approach to the software development life cycle. The Figure 1 below demonstrates the RUP’s overall architecture. RUP is object-oriented, with activities centered on model development using the Unified Modeling Language (UML) [10], [11].
preferences so as to obtain the final value as a solution to determine salary increases [12]. According to marpaung (2018) the steps for calculating the Simple Additive Weighting method are [13]: First determine the criteria that will be used as a basis for decision making, such as C; Determine the rating of suitability for each available alternative based on each predetermined criterion. Create a decision matrix based on the criteria, then normalize the matrix using the attribute-type-adjusted equation to yield a normalized matrix R. The normalization can be seen in Equation (1) below[14].

$$R_{ij} = \begin{cases} \frac{X_{ij}}{\text{Max } i X_{ij}} & \text{If } j \text{ attribute gain (Benefit)} \\ \frac{X_{ij}}{\text{Min } i X_{ij}} & \text{If } j \text{ attribute (Cost)} \end{cases}$$ (1)

$R_{ij}$ = Normalized performance rating value  
$X_{ij}$ = Attribute worth for every criterion  
Max $i X_{ij}$ = The maximum value for every criterion  
Min $i X_{ij}$ = The minimum value for every criterion  
Benefit = If the utmost worth is the finest,  
Cost = If the lowest price is the finest.

The ranking procedure yields the final result, which is the sum of the multiplication of the normalized matrix $R$ by the weight vector, with the largest value chosen as the optimal solution (A) [14].

$$V_i = \sum_j^n w_i X_{rij}$$ (2)

$V_i$ = Rank for each alternative  
$w_i$ = The weight value of each criterion  
$rij$ = Normalized performance rating value.

### 3. Results and Discussion

#### 3.1. System Requirements Analysis

Decision Support System (DSS) is an activity that is formulated using a particular method to select the optimal alternative from among several available alternatives. In principle, all DSS methods are based on certain criteria and or sub-criteria [15] [16]. System analysis is a problem solving technique by breaking down problems in a system into smaller components to make it easier for us to understand the problem [17] [18]. As well as identifying and evaluating problems and obstacles that occur to obtain the expected requirements of a system so that improvements can be proposed. System requirements analysis is an analysis needed to determine system requirements specifications. This specification also includes the elements or components required to build the system prior to its implementation. This requirements analysis also determines the input specifications required by the system, the output that will be generated by the system, and the input processing procedure required to generate the desired output. In creating a system for assessing performance in salary increases, the author needs some information from the Cicalengka Integrated Ma’arif Vocational School so that the Decision Support System for assessing performance or increasing the salaries of teachers and administrators produced can be in accordance with the performance appraisal system that runs at the Integrated Ma’arif Vocational High School. Cicalengka. Table 1 is the following information from Ma’arif Vocational School is needed in this system:

<table>
<thead>
<tr>
<th>No</th>
<th>Required Information</th>
<th>Source</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Teacher Information</td>
<td>Deputy Head of Curriculum</td>
<td>Head of School and Curriculum</td>
</tr>
<tr>
<td>2</td>
<td>Staff Information</td>
<td>Deputy Head of Curriculum</td>
<td>Head of School and Curriculum</td>
</tr>
<tr>
<td>3</td>
<td>Curriculum Information</td>
<td>Deputy Head of Curriculum</td>
<td>Head of School and Curriculum</td>
</tr>
<tr>
<td>4</td>
<td>Salary Information</td>
<td>Treasurer</td>
<td>Principal, Curriculum and teachers</td>
</tr>
</tbody>
</table>

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**Table 1. Information Needs**
In this case, a needs analysis is carried out in accordance with the needs of the system being built, analysis of system requirements related to what is needed. In addition to analyzing system requirements, this analysis will also analyze software and hardware requirements. Application requirements in designing a Decision Support System for Assessing Performance in Increasing the Salary of Teachers and Managers at the Cicalengka Integrated Ma‘arif Vocational School are as follows: Admin fill in teacher data; Admin fills in each criterion for performance appraisal; The system processes performance calculations to determine salary increases; The admin sees the calculation results of the decision support system for salary increases and generates a report. The minimum hardware used to build this Salary Increase Information System is: 1 Unit PC / Laptop; 1 Printer Units; 1 Internet Connection Units; 1 Unit Flashdisk

3.2. Software Analysis

Software requirements analysis is an initial activity of the software development life cycle, for medium to large scale software projects [19]. This software requirements analysis is beneficial for determining the design of the to-be-built system based on problems discovered in the operating system. The old one, in order to improve the system or replace it with a new system. The description of functional requirements is a form of requirement that specifies the system’s intended procedures [20]. Functional requirements also contain any information that must exist and be generated by the system. Description of Functional Requirements shown in Table 2.

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Description of Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ADM-1</td>
<td>Login Admin</td>
</tr>
<tr>
<td>2</td>
<td>ADM-2</td>
<td>Manage Users</td>
</tr>
<tr>
<td>3</td>
<td>ADM-3</td>
<td>Manage Teachers/Managers</td>
</tr>
<tr>
<td>4</td>
<td>ADM-4</td>
<td>Manage Criteria</td>
</tr>
<tr>
<td>5</td>
<td>ADM-5</td>
<td>Manage Wight</td>
</tr>
<tr>
<td>6</td>
<td>ADM-6</td>
<td>Manage Performance</td>
</tr>
<tr>
<td>7</td>
<td>ADM-7</td>
<td>Manage Reports</td>
</tr>
</tbody>
</table>

3.3. System Planning

Use case Diagram shown in Figure 2.
Activity Diagram Manage Login shown in Figure 3.

Activity Diagram Manage User shown in Figure 4.
Activity Diagram Manage Performance shown in Figure 5.

Class Diagram shown in Figure 6.
### 3.4. System Implementation

In the admin login form, you must enter your username and password so you can enter the admin page after logging in. Login Page shown in Figure 7.

![Login Page](image)

In the admin teacher performance form, you can see teachers who have filled in their personal data for the performance appraisal process which contains NIP, name and grade. Teacher Performance form Page shown in Figure 8.

![Teacher Performance Form](image)

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![Teacher Performance Form](image)
4. Conclusion

Based on the results obtained from the discussion of the Decision Support System for Assessing Performance to Increase the Salary of Teachers/Managers Using the Saw Method at Integrated Ma‘arif Vocational High School Cicalengka, several conclusions can be drawn as follows: The Decision Support System built using the SAW method is expected to make it easier for schools to evaluate performance for teacher/manager salary increases. The Decision Support System that is built can minimize errors that occur from the performance appraisal process for teacher/manager salary increases. Can reduce the loss of archives at Integrated Cicalengka Ma‘arif Vocational High School.

Authors' Declaration

Authors’ contributions and responsibilities – The authors made substantial contributions to the conception and design of the study. The authors took responsibility for data analysis, interpretation, and discussion of results. The authors read and approved the final manuscript.

Funding – No funding information from the authors.

Availability of data and materials – All data are available from the authors.

Competing interests – The authors declare no competing interest.

Additional information – No additional information from the authors.

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