Decision Support System of Teacher Performance Assessment with Smart Method

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Abstract. In general, the teacher assessment process in Indonesia is still carried out conventionally (this results in the length of time needed for decision making). The criteria used inthesestudy are pedagogic, personality, social, professional. In this research, web-based decision support system application with SMART method will be built. Based on the research conducted, there were significant differences before and after using this application.

Introduction

The development of information technology today is inseparable from the rapid development of computer technology, because computers are media that can provide convenience for humans to complete a job.This is inseparable from human activities which are often supported by information technology it self which is able to answer the demands of work that is easier and saves time. Information technology is very helpful for companies or agencies in processing work data so that they get accurate information to determine decisions. Decision Support System (DSS) began to be developed in 1965 until the mid-1990s. The use of technology encourages the development of technology in various fields, one of which is in the field of education.The quality of human resources is one of the factors needed to improve the productivity of an educational institution's performance. (Law number 14 of 2005 concerning teachers and lecturers) [1-3]. In recent years, more research related to DSS with SMART methods have been carried out, including: Mesdina Situmeang (2015), FM Kasie (2013), Dodi Siregar, et al (2015), Ardi Kurniawan, Kusrini (2016) the number of studies caused by the increasing need to overcome the limitations of conventional decision-making systems those are still widely used in schools. In general, the teacher assessment process in Indonesia is still carried out conventionally (this results in the length of time needed for decision making). The criteria used in these study are pedagogic, personality, social, professional. In this research, web-based decision support system application with SMART method will be built. Based on the research conducted, there were significant differences before and after using this application.

Methods

There are several steps in solving the SMART method, namely: Identifying decision problems Definition of problems must be done to find the root of the problem and the limitations that exist. Decisions like what will be taken must be defined first, so that the decision-making process can be directed and not deviate from the objectives to be achieved. The definition of the decision maker is

done so that the gift will be the value of the criteria can be in accordance with the importance of these criteria for alternatives. Identify the criteria used in making decisions. Identify alternatives to be evaluated. At this stage the data collection process will carried out. Identify relevant criteria for alternative assessments. Need to limit values This can be achieved by eliminating less important goals. Edwards believes that there is no need to have a complete list of goals. Fifteen are considered too many and eight are considered large enough. Ranks on the position of importance of criteria In this case it is considered quite easy compared to the development of weight.

This needs to be done to be able to give weight to each criterion. Because the weight is given to the criteria will depend on ranking criteria. Giving weight to each criterion Giving weight is given with a value that can be determined by the user himself. In this case the weighting will be done twice based on the criteria that is considered the most important and based on the criteria that is considered the least important. The criteria that is considered most important are given a value of 100. The next important criterion is given a value that describes the comparison of relative importance to the least important dimension. This process will be continued until the weighting is given to the criteria that is considered least important to be obtained. The same step will also be done by comparing the least important criteria given a value of 10. The next most important criterion is given a value that describes the comparison of interests relative to the most important dimensions. This process will be continued until the granting of weight to the criteria that is considered most important is obtained. Calculate normalization of the weight of the criteria The weight obtained will be normalized where the weight of each criterion obtained will be shared with the result of the sum of each criteria weight. Normalization will also be carried out based on the most important criteria and the least important criteria. The value of the two normalizations obtained will find the average value.

3. Results and Discussion
Based on the current system analysis, it can be described the Use Case of the proposed system as shown in Figure 1.
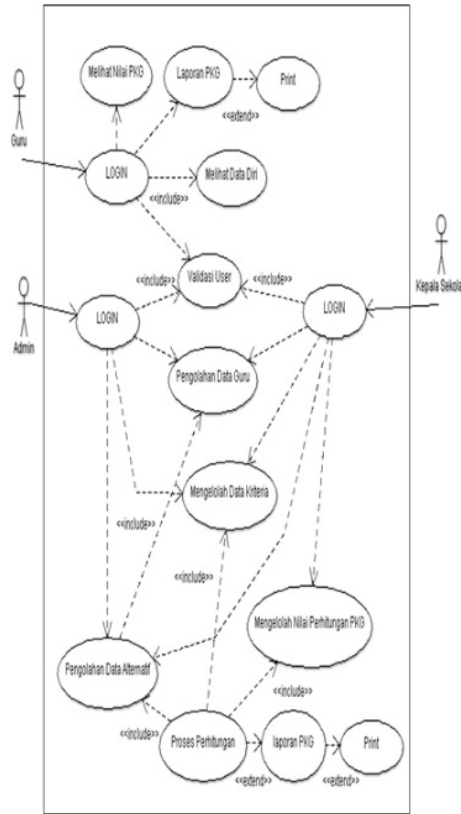
Figure 1. Use Case Diagram of Proposed System.

Class Diagrams describe the structure of an object system. This diagram shows the class of Objects that make up the system and also the relationship between the Object classes.
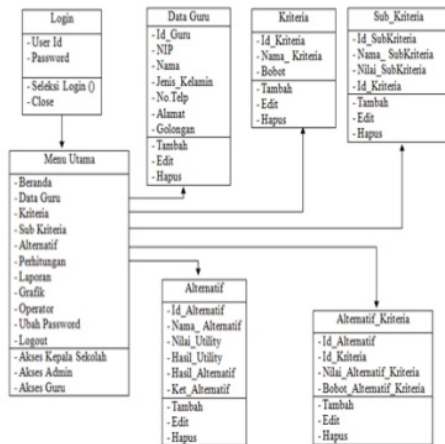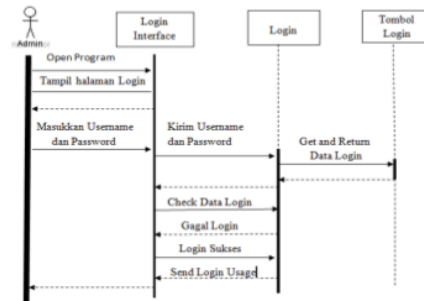
Figure 2. Class Diagram of Proposed System.

The following is the proposed Sequence Diagram, which is as follows:

Figure 3. Sequence Diagram Login Form.

The application user opens the login form then the user enters the application according to the type of user. If the application user is logged in as a teacher, the application will open the teacher performance evaluation form. If the application user is logged in as admin then the application opens the admin form and if the application user is logged in as the principal then the application opens the principal form.
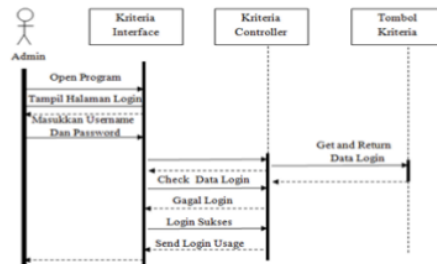
Figure 4. Sequence of Teacher Data Registration System Diagram.

Application users open the teacher data form. If the User or here admin adds data then the data will be saved. If the user changes the data, the teacher data will be changed. If the user deletes the data, the data will be deleted.
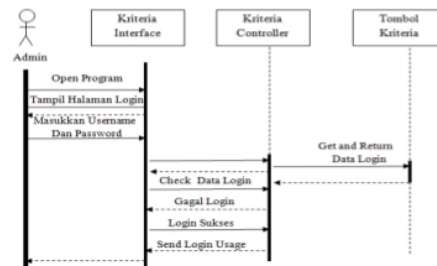
Figure 5. Sequence PKG Criteria Value System Diagram.

Application users open the criteria form. Then process the data as needed, example if the user adds criteria, it will be saved. If the user changes the criteria, the criteria will be changed and if the user deletes the criteria, the criteria will be deleted.
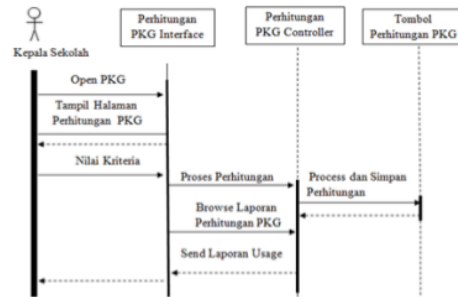
Figure 6. Sequence System Diagram for PKG Calculation.

Application users open the criteria form. Then process the data as needed, example if the user adds a calculation, it will be saved. If the user changes the calculation, the calculation will be changed and if the user deletes the calculation, the calculation will be deleted. Application users can produce decisions based on criteria that are in the database of their respective criteria.

Figure 7. Report Sequence Diagram.

Application users open the Report form. Then process the data according to need, example if the user enters from the report, then the result 8 the overall value of the calculation. If the user prints a report, the report will be printed. Activity Diagram describes the functional flow 8 of the system. In the modeling stage, Activity diagram can be used to show the work flow and can be used to model actions that will be performed when an operation is executed, and model the results of the action that. Following are the proposed Activity Diagrams, which are as follows:
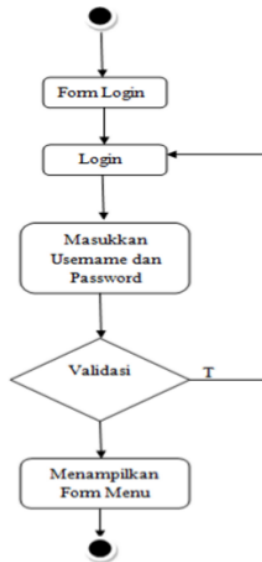
Figure 8. Login Activity Diagram.

The application user opens the login form then the user enters the application according to the type of user. If the application user is logged in as a teacher, the application will open the teacher performance evaluation form. If the application user is logged in as admin then the application opens the admin form and if the application user is logged in as the principal then the application opens the principal form.

Figure 9. PKG Calculation Activity Diagram.

Application users open the criteria form. Then process the data as needed, example if the user adds a calculation, it will be saved. If the user changes the calculation, the calculation will be changed and if the user deletes the calculation, the calculation will be deleted. Application users can produce decisions based on criteria that are in the database of their respective criteria.
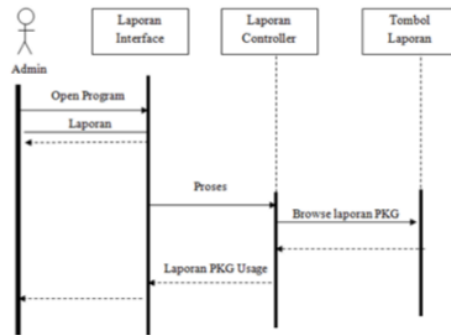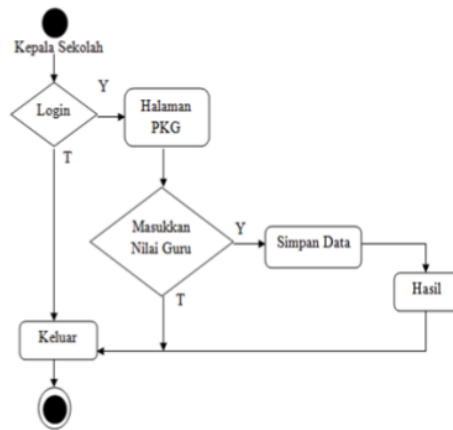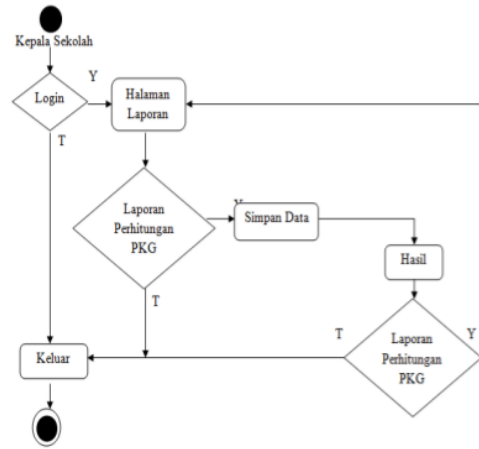
Figure 10. Report Activity Diagram.

Application users open the Report form. Then process the data according to need, ie if the user enters from the report, then the result of the overall value of the calculation. If the user prints a report, the report will be printed.

The decision support system application made was implemented in Binjai 7 Public High School. Steps for making decisions using the SMART method:

- criteria used in assessing teacher performance (pedagogic, personality, social, professional)
- the alternative is a high school teacher criteria ranking and weighting based on the most important criteria and least important criteria. The most important criteria are set with a weight of 100 and the least important criteria is set with a value of 10.
- From the average weighting criteria based on the most important and least important.
- Calculating utility values for all alternatives based on each criterion using the SMART formula. The formula used in SMART is equation 1. The Wj value is obtained from step 4 and the value of Uij is obtained from step 5.
- Obtain an alternative order of importance based on the highest score, a minimum range of 50 and a maximum of 90.

The following is an example of calculating a case using an SMART method. Suppose that 6 alternatives are used with the following values:

Table 1. Teacher assessment.

Criteria	Teacher 1	Teacher 2	Teacher 3	Teacher 4	Teacher 5	Teacher 6
C1	100	60	40	40	60	40
C2	75	75	50	0	50	75
C3	100	50	50	50	50	100
C4	50	100	50	0	50	0

In this table there are 6 alternatives for Teacher 1 - Teacher 6. Assessed based on the principal's assessment of the teachers. Where C1: Pedagogic, C2: Personality, C3: Social, C4: Professional.

Table 2. Evaluation of Teacher's criteria.

Alternative	C1	C2	C3	C4	Result
Weight	0.4	0.3	0.2	0.1	
Teacher 1	100	75	100	50	87.5
Teacher 2	60	75	50	100	66,5

10					
Teacher 3	40	50	50	50	46
Teacher 4	40	0	50	0	26
Teacher 5	60	50	50	50	54
Teacher 6	40	75	100	0	58.5

In this table there are alternatives. Assessed based on the assessment of the principal. Where Ai is an alternative and Wj is normalizing the weight. To get the evaluation weight, the meal is obtained from the multiplication results from Ai and Wj. For example an alternative value of 1: 100 multiplied by the normalization of weight C1: Then 100 x 0.4 = 40. And the result is the total number of multiplication weights.

Table 3. Decision results.

No	Alternative	Value	Decision
1	Teacher 1	87.5	Very Worthy
2	Teacher 2	66.5	Worthy
3	Teacher 3	58,5	Worthy
4	Teacher 4	54	Considered
5	Teacher 5	46	Considered
6	Teacher 6	26	Not worthy

From the value range table above, it can be seen that the teacher performance evaluation with alternative teacher 1 is better than teacher 2 - teacher 6 so that teacher 1 can be stated as the best alternative.

4. Conclusions
The final result of this study is that there are significant differences before and after using this application.

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