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Design the Best Student Selection Decision Support System With Simple Addictive Weighting (SAW) Method

Kiki Hariani Manurung*[1], Aldo Eko Syaputra [2], Yofhanda Septi Eirlangga [3]
[123] Universitas Adzkia
Jalan Taratak Paneh No.07 kuranji, Padang, Indonesia

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*Correspondence should be addressed to kikimanurung199@gmail.com

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Abstract

The process of manually selecting the best students often encounters problems such as slowing down the processed data so that the data is inaccurate and causes the institution difficulty in determining the best students. Therefore, a system is needed to deal with the problem to determine the best students in the institution. In this research method used is simple addictive weighting (SAW) method, this system is expected to help the institution in determining the best students so as to minimize the occurrence of mistakes that occur in the institution.

Keywords: Best Student Selection, Decision Support System, Simple Addicitve Weighting, PHP, MySQL.

INTRODUCTION

Education is very important for everyone, one of the most basic azazi rights is to obtain a decent education whether a person is capable or poor, when a person obtains a good education it will be open to him to get a better life[1]. One of these educational facilities is LPK, where this institution is one of the educational facilities that does not discriminate between age and education so that everyone can freely study in this place[2].

The decision is a huge influence in the process of dealing with the chosen alternatives, as well as to select outstanding students at this sewing khurus institution. But it is not easy to decide and select outstanding students because of the many criteria required[3]. The design of this decision support system is to help institutions choose what criteria are appropriate to determine outstanding students in the institution[4].

In the current decision support system there is a method called Simple Addictive Weighting (SAW)[5] or better known as the weighted summation method[6]. The basic concept of the SAW method is to look for weighted summation of performance ratings on alternatives to all attributes[7]. In this case, it is hoped that the method can process the data validly and precisely[8].

RESEARCH METHODS

The research framework is the stages that will be carried out through a certain way with a systematic procedure. So that the steps taken by the author in this design do not deviate from the topic of discussion and are easy to understand. The

research framework that the author did below:

1. *Field Research*
   Field research is carried out directly with the object of research to collect primary data, namely to determine the criteria for selecting the best students, namely by means of
1. Observation
   Observation is a way of collecting data that is carried out by observing directly the object of research related to the value of students in the institution.
2. Interview
   An interview is a question and answer process carried out to the head of the institution to obtain data that will later become a support in planning a system.
3. *Library Research*
   This library research is carried out by reading and summarizing from books, theories in libraries and journals related to research.
4. Laboratory Research (*Laborratory Research*)
   This laboratory research is carried out to directly practice the application of computer programs in the design of the system being worked on.

RESULT

Based on the analysis of the ongoing system, a decision support system will be built regarding the selection of the best students at the Layla Collection sewing institute. thus making it easier for the Layla Collection Sewing Khursus Institute to select the best students. The new system was built to facilitate the data processing process so that it no longer takes a long time to get results[9]. In making decisions using the *Simple Additive Weighting* method, there are several stages as follows:

Determining Criteria and Types of Criteria C_j*(Benefit / Cost)* The initial stage in the *Simple Additive Weighting* method is to determine the criteria and types of criteria[10]. The criteria and types of criteria in Determining the Best Pupils In The Layla Collection Sewing Khursus Institute can be seen in Table 1 below:

No	Name Criteria	Criterion C_j	Types of Criteria
	Theoretical Value	C_1	Benefit
1.	Traditional Dress Practic	C_2	Benefit
2.	Party Dress Practice	C_3	Benefit
3.	Institutional Exam Practi	C_4	Benefit
4.	Trouser Practice	C_5	Benefit
5.	The Practice of Parenthet Clothes	C_6	Benefit
6.	Skirt Practice	C_7	Benefit

Table 1 Criteria and Types of Criteria

Each criterion must be determined by its weight value[11]. The determination of the weight value is carried out to determine the degree of importance of each kritria[12]. The criteria that have the highest importance will get a high weight score[13]. The weight values of each criterion can be seen in Table 2 below :

No	Criteria C_j	Weight W_j	Weight
7.	C_1	In_1	10%
8.	C_2	In_2	20%
9.	C_3	In_3	20%
10.	C_4	In_4	15%
11.	C_5	In_5	10%
12.	C_6	In_6	15%
13.	C_7	In_7	10%

Table 2 Importance of Weights

The best at the institution was taken 5 students as an example in the selection of the best students using the SAW method. Where the data obtained is data from the results of the recap of grades, from each

existing criteria and then calculated the average score [14] of each student, data has been obtained such as Table 3:

No	Alternative A_j	Criterion						
		C1	C2	C3	C4	C5	C6	C7
1.	Yossi Yolanda	2	3	3	4	5	3	3
2.	Salmi Mulyani	5	4	5	5	5	4	5
3.	Dara Triani Y.	5	4	4	4	4	3	3
4.	Wahyuni Putri	3	4	4	5	5	3	5
5.	April Yona	3	4	4	4	4	4	5
	Weight	**10**	**20**	**20**	**15**	**10**	**15**	**10**

Table 3. Levels of Importance of Weights

Where the conversion of scale values for a theory or exam is as follows:

100Very Good = 5
90 Good = 4
80Good Enough = 3
70 Good Less = 2
Not Good = 1

After the alternate rating values on each criterion are determined the fourth step (4) is the formation of a decision matrix (X) which is formed from the matching rating table of each alternative on each criterion.

$$\begin{bmatrix} 2 & 3 & 3 & 4 & 5 & 3 & 3 \\ 5 & 4 & 5 & 5 & 5 & 4 & 5 \\ 5 & 4 & 4 & 4 & 4 & 3 & 3 \\ 3 & 4 & 4 & 5 & 5 & 3 & 5 \\ 3 & 4 & 4 & 4 & 4 & 4 & 5 \end{bmatrix}$$

After the decision matrix is formed, the next step is to normalize the decision matrix with the calculation formula[15] as follows:

$$\boldsymbol{r_{ij}} = \begin{cases} \dfrac{\boldsymbol{x_{ij}}}{\boldsymbol{Max\ x_{ij}}} \\ \dfrac{\boldsymbol{Min\ x_{ij}}}{\boldsymbol{x_{ij}}} \end{cases} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

a. Alternative A1 (Yossi Yolanda)

$$r_{11} = \frac{2}{\max\{2;5;5;3;3\}} = \frac{2}{5} = 0{,}4$$
$$r_{21} = \frac{3}{\max\{3;4;4;4;4\}} = \frac{3}{4} = 0{,}75$$
$$r_{31} = \frac{3}{\max\{3;5;4;4;4\}} = \frac{3}{5} = 0{,}6$$
$$r_{41} = \frac{4}{\max\{4;5;4;5;4\}} = \frac{4}{5} = 0{,}8$$
$$r_{51} = \frac{5}{\max\{5;5;4;5;4\}} = \frac{5}{5} = 1$$
$$r_{61} = \frac{3}{\max\{3;4;3;3;4\}} = \frac{3}{4} = 0{,}75$$
$$r_{71} = \frac{3}{\max\{3;5;3;5;5\}} = \frac{3}{5} = 0{,}6$$

b. Alternative A2 (Salmi Mulyani)

$$r_{12} = \frac{5}{\max\{2;5;5;3;3\}} = \frac{5}{5} = 1$$
$$r_{22} = \frac{4}{\max\{3;4;4;4;4\}} = \frac{4}{4} = 1$$
$$r_{32} = \frac{5}{\max\{3;5;4;4;4\}} = \frac{5}{5} = 1$$
$$r_{42} = \frac{5}{\max\{4;5;4;5;4\}} = \frac{5}{5} = 1$$
$$r_{52} = \frac{5}{\max\{5;5;4;5;4\}} = \frac{5}{5} = 1$$
$$r_{62} = \frac{4}{\max\{3;4;3;3;4\}} = \frac{4}{4} = 1$$
$$r_{72} = \frac{5}{\max\{3;5;3;5;5\}} = \frac{5}{5} = 1$$

c. Alternative A3 (Dara Triani)

$$r_{13} = \frac{5}{\max\{2;5;5;3;3\}} = \frac{5}{5} = 1$$
$$r_{23} = \frac{4}{\max\{3;4;4;4;4\}} = \frac{4}{4} = 1$$
$$r_{33} = \frac{4}{\max\{3;5;4;4;4\}} = \frac{4}{5} = 0.8$$
$$r_{43} = \frac{4}{\max\{4;5;4;5;4\}} = \frac{4}{5} = 0.8$$
$$r_{53} = \frac{4}{\max\{5;5;4;5;4\}} = \frac{4}{5} = 0.8$$

$$r_{63} = \frac{3}{\max\{3;4;3;3;4\}} = \frac{3}{4} = 0.75$$
$$r_{73} = \frac{3}{\max\{3;5;3;5;5\}} = \frac{3}{5} = 0{,}6$$

d. Alternative A4 (Wahyuni Putri)

$$r_{14} = \frac{3}{\max\{2;5;5;3;3\}} = \frac{3}{5} = 0.6$$
$$r_{24} = \frac{4}{\max\{3;4;4;4;4\}} = \frac{4}{4} = 1$$
$$r_{34} = \frac{4}{\max\{3;5;4;4;4\}} = \frac{4}{5} = 0.8$$
$$r_{44} = \frac{5}{\max\{4;5;4;5;4\}} = \frac{5}{5} = 1$$
$$r_{54} = \frac{5}{\max\{5;5;4;5;4\}} = \frac{5}{5} = 1$$
$$r_{64} = \frac{3}{\max\{3;4;3;3;4\}} = \frac{3}{4} = 0.75$$
$$r_{74} = \frac{5}{\max\{3;5;3;5;5\}} = \frac{5}{5} = 1$$

e. Alternative A5 (April Yona)

$$r_{15} = \frac{3}{\max\{2;5;5;3;3\}} = \frac{3}{5} = 0.6$$
$$r_{25} = \frac{4}{\max\{3;4;4;4;4\}} = \frac{4}{4} = 1$$
$$r_{35} = \frac{4}{\max\{3;5;4;4;4\}} = \frac{4}{5} = 0.8$$
$$r_{45} = \frac{4}{\max\{4;5;4;5;4\}} = \frac{4}{5} = 0.8$$
$$r_{55} = \frac{4}{\max\{5;5;4;5;4\}} = \frac{4}{5} = 0.8$$
$$r_{65} = \frac{4}{\max\{3;4;3;3;4\}} = \frac{4}{4} = 1$$
$$r_{75} = \frac{5}{\max\{3;5;3;5;5\}} = \frac{5}{5} = 1$$

$$\begin{bmatrix} 0{,}4 & 0{,}75 & 0{,}6 & 0{,}8 & 1 & 0{,}75 & 0{,}6 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 0{,}8 & 0{,}8 & 0{,}8 & 0{,}75 & 0{,}6 \\ 0{,}6 & 1 & 0{,}8 & 1 & 1 & 0{,}75 & 1 \\ 0{,}6 & 1 & 0{,}8 & 0{,}8 & 0{,}8 & 1 & 1 \end{bmatrix}$$

From the result of the normalized matrix R is then calculated the summation of the multiplication of the normalized matrix R with the weight vector so that the largest value is obtained as a solution. The result can be seen in the following calculations:

The calculation of ranking values in each alternative with the provisions of the agency is 10% theory score, 20% traditional dress practice, 20% party dress practice, 15% institutional examination practice, 10% trouser practice, and 15% parenthetical dress practice, 10% skirt practice. Then the values of each of these aspects are summed and the results can be seen in table. Is the description of the workmanship:

$$Yossi\ Yolanda = \{(10)x(0{,}4)\} + \{(20)x(0{,}75)\} + \{(20)x(0{,}6)\} + \{(15)x(0{,}8)\} + \{(10)x(1)\} + \{(15)x(0{,}75)\} + \{(10)x(0{,}6)\}$$
= 70.25

$$Salmi\ Mulyani = \{(10)x(1)\} + \{(20)x(1)\} + \{(20)x(1)\} + \{(15)x(1)\} + \{(10)x(1)\} + \{(15)x(1)\} + \{(10)x(1)\}$$
= 100

$$Dara\ Triani\ Y = \{(10)x(1)\} + \{(20)x(1)\} + \{(20)x(0{,}8)\} + \{(15)x(0{,}8)\} + \{(10)x(0{,}8)\} + \{(15)x(0{,}75)\} + \{(10)x(1)\}$$
= 87.25

$$Wahyuni\ Putri = \{(10)x(0{,}6)\} + \{(20)x(1)\} + \{(20)x(0{,}8)\} + \{(15)x(1)\} + \{(10)x(1)\} + \{(15)x(0{,}75)\} + \{(10)x(1)\}$$
= 88.25

$$April\ Yona = \{(10)x(0{,}6)\} + \{(20)x(1)\} + \{(20)x(0{,}8)\} + \{(15)x(0{,}8)\} + \{(10)x(0{,}8)\} + \{(15)x(1)\} + \{(10)x(1)\}$$
= 87

No	Alternative	Result
	Salmi Mulyani	100
	Wahyuni Putri	88.25
	Dara Triani Y	87.25
	April Yona	87
	Yossi Yolanda	70.25

Table 4. Calculation Result Data *(Preference)*

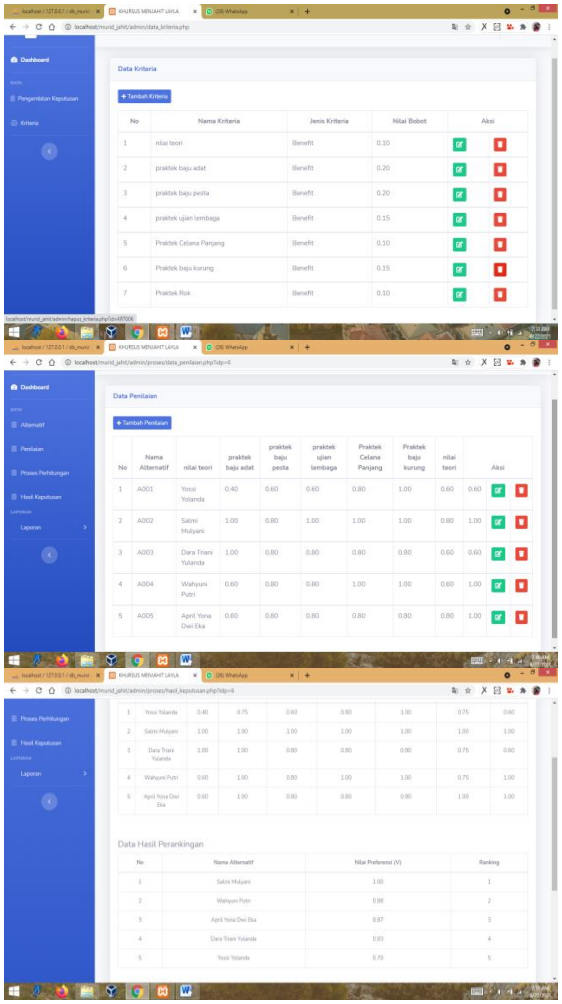

Figure 1. Program Sample Display

CONCLUSION

Based on the analysis that has been carried out in this study, the author concludes that the existence of a Decision Support System and the Simple Addictive Weighting method as an assessment process, can reduce the occurrence of errors or human errors in data processing both when entering data from various different criteria so as to facilitate or assist in the calculation of the assessment of the best students in the institution

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