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Grouping Student Achievement Data In A Decision Making System Using The Weight Product Method

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Abstract

Information, modeling, and data manipulation systems are called decision support systems (DSS). When there is uncertainty about the best course of action in semi-structured or unstructured situations, the system is utilized to support decision-making. There are various approaches available for producing decision support systems, one of which is the Weighted Product (WP) Method. With the Weighted Product (WP) approach, attribute ratings are connected by multiplication; however, each attribute's rating must first be increased to the power of the attribute's weight. The normalizing process is same to this one. SPK procedure to choose the winners of the scholarships. Scholarship information from MTS Swasta Alwasliyah Simpang Merbau can be saved in the Decision Support System using this method. This way, in the event that an error arises when entering grades or scholarship information, the wrong information can be fixed without requiring the scholarship information to be re-input. Scholarships are presents to individuals in the form of financial aid intended to be utilized toward their ongoing educational pursuits.

Keywords : *Students; Weighted Product Method; Decision Support Systems*

I. Introduction

Student achievement is measured on a scale that is too narrow, limited to students' cognitive (intellectual) skills. The word pupil comes from Arabic , which means the person who wants (the willer). The student defined as a person who desires to gain knowledge, skills, experience and good personality as provisions for his life happiness in this world and the hereafter by studying seriously. A student is considered extraordinary if they demonstrate the best learning outcomes. However, there is no guarantee that extraordinary children will become role models in their schools. Additionally it may be found that children who do well usually emphasize academic success. The same thing happened at Al-Wasliyah Private MTS Simpang Merbau is that determination recipient scholarship only based on mark academic, so sometimes receiving students scholarship No be an example to other students. This will be used to assess student achievement, namely academic achievement which includes mathematics, Indonesian, English, ICT and not only eye Academic lessons include religious subjects, cleanliness and

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politeness indicator evaluation For determine the recipient scholarship. Scholarships are presents to individuals in the form of financial aid intended to be utilized toward their ongoing educational pursuits.

Information, modeling, and data manipulation systems are called decision support systems. When there is uncertainty about the best course of action in semi-structured or unstructured situations, the system is utilized to support decision-making. There are various approaches available for producing decision support systems, one of which is the Weighted Product (WP) Method. With the Weighted Product (WP) approach, attribute ratings are connected by multiplication; however, each attribute's rating must first be increased to the power of the attribute's weight. Each criterion has a different weight or value.

Study This choose Weight Product method because as described previously that Weight Product method own simple concept For determine weighting to criteria that have valuealmost The same so that in recipient determination scholarship can easy done although with lots of data[6]. Goddess that method Product Weight used For resolve cases where the data consists on Lots attribute interests. This matter in accordance with the article entitled "System Evaluation Employee Using the *Fuzzy Multiple Attribute Decision Making* (FMADM) and *Weighted Product* (WP). This research uses 4 criteria as assessment parameters, in order to make the right decisions in this research, the Fuzzy Multiple Attribute Decision Making (FMADM) and Weighted Product (WP) methods are used by finding the weighted sum of the performance ratings for each alternative on all attributes. The assessment of the best employees is carried out using four criteria, namely, attendance, work speed, responsibility and cooperation.

Study This choose Weight Product method because as described in the study related that method Product Weight own simple concept For determine weighting to criteria that have mark hamper The same.

II. Method
A. Decision Support System

When choosing amongst several possible courses of action to address an issue, a decision support system is a collection of linked components that work together to create a cohesive whole that facilitates effective and efficient problem-solving. That the Decision Support System's goals are:

1. Assist managers in making decisions on semistructured problems.
2. Provides support for the manager's judgment and is not intended to replace the manager's function.
3. Increased productivity.
4. Competitive.

Something working system to do something action in taking something decision Where the object own the criteria that will be processed into the method. *Weighted Product* Method is part from the concept of *Multi Attribute Decision Making* (MADM) where required normalization on the calculations, because agency Enough choose a number of items that will become alternatives selection and giving mark weight on comparison alternatives and criteria.

System Decision Support is

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system information interactive that provides information, modeling, and data manipulation. SPK is designed to support all over stage decision-making start from identify problem, select relevant data, and determine approach used in the retrieval process decision, arrived evacuate election alternative. System That used For help taking decision in semi-structured situations and structured situations, where not no one knows Certain How decision should created.

Required steps in the retrieval process decision is:

a. Intelligence
   1. Forming a perception of the situation at hand is recognizing the decision situation and defining the main characteristics that exist in that situation
   2. Building a model that represents the situation A model is a vehicle that assists in estimating the likely outcomes of a decision situation
   3. Determination of quantitative measures of costs (disbenefits) and benefits that are most appropriate for the situation faced. Uniform measure system that will be used in comparing alternative steps to the delegation
b. Design: Determining specific alternatives by identifying and clearly formulating possible steps.
c. Choice
   1. Evaluate the benefits and costs (disbenefits) of all alternative steps. Is an assessment of the consequences of implementing each alternative step using cost and benefit measures.

2. Setting criteria for choosing the best steps is establishing rules by linking results to the goals of decision making.
3. Resolution of the situation The decision is to take a step based on acceptable criteria. The steps above can be done repeatedly, either in whole or in part. This is carried out continuously until the decision situation is correct resolved.

The Weighted Product method uses multiplication to connect attribute ratings, where the rating of each attribute must first be raised to the power of the weight of the attribute in question. This process is the same as the normalization process.

Weighted Product method is calculated based on the Preference Value level.

The process of normalizing the criteria weight (W), $\Sigma W = 1$ is:

$$W_j = W_j / \Sigma W_j \quad \dots\dots\dots\dots\dots\dots(1)$$

Information :
W_j: Attribute weight
ΣW_j: Sum of attribute weights
Calculating Vector S
Or
$$S = S_1{}^{w_j} * S_2{}^{w_j} * \dots S_i$$
Information :
S : states the alternative
analogous to vector S
x : states the criterion value
w : states the weight of the criteria
i : states an alternative
j : states the criteria
n : states the number of criteria
W_j is a power with a positive value for the profit attribute, and a negative value for the cost attribute.
Calculating Vector V:

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$$Vi = \frac{\prod_{k=1}^{n} X\,ijwj}{\prod_{k=1}^{n}(X\,jn)}$$

Or

$$Vi = \frac{S1}{S1 + S2 + S3}$$

Information :

V : states an alternative which is analogous to a vector V

x : states the criterion value

w : states the weight of the criteria

i : states an alternative

j : states the criteria

n : states the number of criteria

The suitability of each alternative for each criterion is assessed by 1 to 5, namely:

    1 = Very bad

    2 = bad

    3 = sufficient

    4 = good

    5 = very good

The importance rating for each criterion is assessed from 1 to 5, namely:

    1 = Very low

    2 = low

    3 = sufficient

    4 = high

    5 = very high

Table 1. Instrument Table

No	Code	Criteria	Scale	Mark	Weight
1	C1	Academic Value	100-91	5	50
			90-81	4	
			80-71	3	
			70-61	2	
			60-51	1	
2	C2	Attitude	Very dilligent	5	40
			Diligent	4	
				3	
			Not Diligen	2	
				1	
			t Seldom Not at all		
3	C3	Responsibility	Very active	5	30
			Active	4	
			Currently	3	
				2	
			Less active	1	
			Not active		

Research Instruments

    This research uses secondary data from 30 outstanding students at school and criteria data is used as instrumentation to obtain data in the process of selecting outstanding students.

III.   Results And Discussion

    The Weighted Product approach connects attribute ratings by multiplication; however, each attribute's rating must first be increased to the power of the attribute's weight. The normalizing process is same to this one. In favor of AI substitutes (Lestari, 2013): Product Weighed (WP) One technique for completing Multi Attribute Decision Making (MADM) is the weighted product method. In order to connect attribute ratings using the Weighted Product technique, each attribute's rating must first be raised to the power of the relevant weight attribute. The criteria used in the decision support system for selecting outstanding students are:

    C1= Academic

    C2= Attitude

    C3= Responsibility

There are 3 prospective students who will be alternatives, namely:

    A1 = Bella Syahfitri

A2 = Naila Firda Sari
A3 = Pandu Mulia

Tables of criteria with their respective weights can be seen in the following table:

Table 2. Academic score table

Academic Value	Mark	Weight
100-91	50	50
90-81	40	
80-71	30	
70-61	20	
60-51	11	

Table 3. Attitude value table

Attitude Value	Mark	Weight
Very dilligent	50	40
Diligent	40	
Not Diligent	30	
Seldom	20	
Not at all	10	

Table 4. Of Responsibility Values

Attitude Value	Mark	Weight
Very dilligent	50	40
Diligent	40	
Not Diligent	30	
Seldom	20	
Not at all	10	

The following is a table of matches for each alternative on each criterion, namely the suitability rating of each alternative on each criterion.

Table 5. Matching Table

Alternative (student)	Criteria		
	C1	C2	C3
Bella Syahfitri	5	4	3
Naila Firda Sari	4	5	2
Pandu Mulia	1	4	5

With preference weight values as follows: W = 50, 40, 30

$$W1 = \frac{50}{50+40+30} = \frac{50}{120} = 0.41$$

$$W2 = \frac{40}{50+40+30} = \frac{40}{120} = 0.33$$

$$W3 = \frac{30}{50+40+30} = \frac{30}{120} = 0.25$$

$$S_1 = (5^{0.41})(4^{0.33})(3^{0.25}) = 4.12$$

$$S_2 = (4^{0.41})(5^{0.33})(2^{0.25}) = 3.79$$

$$S_3 = (1^{0.41})(4^{0.33})(5^{0.25}) = 2.98$$

$$S_4 = (3^{0.41})(5^{0.33})(4^{0.25}) = 3.88$$

After each S vector gets its value, the next step is to add up the S vectors to calculate the V vector which will be used for ranking. Simply put:

$$V_i = \frac{\prod_{j=1}^{n} X_{ij\,wj}}{\prod_{j=1}^{n} (X_j^*)_{wj}}$$

$$V_1 = \frac{S_i}{S_1+S_2+S_3+S_4}$$

$$V_1 = \frac{4.12}{14.77} = 0.27$$

$$V_2 = \frac{3.79}{14.77} = 0.25$$

$$V_3 = \frac{2.98}{14.77} = 0.20$$

So the final value obtained by each alternative in the ranking is as follows:

Table 6. Ranking (Output)

Alternative (Vector)	Mark	Rank
Alternative 1 (V1)	0.27	1
Alternative 2 (V2)	0.25	2
Alternative 3 (V3)	0.20	3

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Then from the calculation results it was concluded that the order of outstanding students was first Bella Syahfitri with a final score of 0.27, second Naila Firda Sari with a final score of 0.25 and third Pandu Mulia with a final score of 0.20.

IV. Conclusion

Conclusion After analysis and testing, a conclusion can be obtained regarding the Decision Support System for scholarship recipients at the Alwashliyah Simpang Marbau Private

MTS, in this study using the Weighted Product (WP) Method with academic assessment criteria, attitudes and responsibilities and the highest calculation results using the system, namely 0.27. So it can be applied to select outstanding students and to implement online selection of outstanding students by distributing them to the class.

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