



## ACHIEVEMENT STUDENT SUPPORT SYSTEM USING WEIGHTED PRODUCT METHOD

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### Abstract

Constitution of the Republic of Indonesia No 12 of 2012 that higher education in part of the national education system has a strategic role in educating the life of the nation. Students are people who try to develop themselves through the educational process on a particular path, level and type of education. The *Weighted Product* method is chosen because the method of completion uses multiplication to connect the attribute value, where the value must be raised with the value of the attribute weight in question. Criteria that have been determined include average value, discipline, attendance, extracurricular, and Non-Academic. The results of this study there are 6 alternatives, that A2 alternative with the value 0.145790734 as students with the lowest value and alternative A3 0.212196782 as students with the best value.

**Keywords:** Weighted Product Decision Support Systems, Students Achieving

### INTRODUCTION

Everyone has different knowledge, and abilities. This knowledge and ability can develop and evolve, becoming someone who is accomplished is something that is very proud of itself and others. People who excel have a very large development of science and knowledge. (Undang-Undang RI 2012) Constitution of the Republic of Indonesia Number 12 Year 2012 THAT higher education as part of the national education system has a strategic role in the intellectual life of the nation and promote science and technology by observing and applying the value of the humanities as well as the cultivation and empowerment of the nation Indonesia sustained. However, choosing schools also can influence education in exploring achievements. This school gives predicate to student achievement based on academic values obtained and fulfills the criteria determined by the school. In managing data on high achieving students, they still use manual methods, namely using Microsoft Excel, so that it takes a longer time and the results obtained are not maximal.

The study conducted by (Muslihudin et al. 2018), a decision support system for receiving Bidik Misi scholarships in Pringsewu University. It can help and facilitate universities in determining whether or not students are eligible for scholarships based on criteria. -the criteria that have been determined. From the results obtained, alternative 1 gets the greatest value, namely with the highest IPK and is included in the category of students from poor families. Research conducted by (Muhammad Faisal 2017), a decision

support system for outstanding students in PGRI 3 Junior High School uses the method *Weighted Product* (2018), information generated from this system is ranking high achieving students based on criteria data and weighting data. The resulting ranking can be used to assist teachers in making decisions on the determination of high achieving students.

Using the method *Weighted Product* is more efficient because the time needed in the calculation is shorter. This method was chosen because it can determine the weight value for each attribute, then proceed with a ranking process that will determine the students who are performing according to the criteria. Based on the background described above, the problem that will be discussed is how to design a decision-making system in determining achievement students using the method *Weighted Product*.

## RESEARCH METHOD

### Methods *Weighted Product*

(Kusrini 2007) Decision support systems are systems interactive information that provides information, modeling and sweetening of data. This system is used to help decision making in semi-structured situations and unstructured situations, where no one knows for certain how decisions should be made (Turban, Aronson, dan Liang 2005) The purpose of decision support systems is:

- Helping managers in semi-structured decision-making or problems
- Providing support for manager's benefit and not intended to replace manager's functions.
- Increasing the effectiveness of decisions made by managers more than improving efficiency
- Da allows decision makers to do computing quickly and at a low cost.
- Increased productivity.
- Quality support
- Competitiveness
- Overcomes cognitive limitations in processing and storage.

### Fuzzy Multiple Attribute Decision Making

(Kusumadewi et al. 2013) FMADM is a method used to find optimal alternatives from a number of alternatives with certain criteria. The essence of FMADM is to determine the weight values for each attribute, then proceed with a ranking process that will select the alternatives that have been given. Basically, there are 3 approaches to find attribute weight values, namely subjective approaches, objective approaches and integration approaches between subjective and objective. There are several methods that can be used to solve FMADM problems, among others:

- a. Simple Additive Weighting Method
- b. Weighted Product (WP)(WP)
- c. ELECTRE
- d. Technique for Order Preference by Similarity to Ideal Solution (TOPSIS)
- e. Analytic Hierarchy Process (AHP)

(Andino Maselena, K. Shankar, Miftachul Huda, Marini Othman, Prayugo Khoir 2019) *Weighted Product* is one method used to solve the problem of Multi Attribute Decision Making (MADM). Weighted Product Method (WP) uses multiplication to connect attribute values (criteria), where the value of each attribute (criteria) must be raised first with the weight of the attribute (criteria) concerned. Preference for alternative  $A_i$  is given as follows:

$$S_i = \prod_{j=1}^n X_{ij} w_j$$

Where:

S : Alternative preference is analogous as vector S  
X : Criteria Value  
W : Weight Criteria / sub criteria  
I : Alternative  
J : Criteria  
N : Number of Criteria

where  $W_j = 1/W_j$  is a positive value for the profit attribute and is negative for the cost attribute. The relative preference of each alternative is given as:

$$V_{ij} = 1/n \sum_{j=1}^N X_{ij} w_j = 1/n (X_j^*)$$

Where:

V : Alternative preference is analogous as vector V  
X : Criteria Value  
W : Weight Criteria / subcriteria  
I : Alternative  
J : Number of Criteria  
N : Number of Criteria

\*: Number of Criteria that have been assessed in vector S

## Criteria

Required criteria that will be used as material for calculation in determining the achievement at school.

Table 1. Criteria Description

| Criteria | Description       | Range     | Weight |
|----------|-------------------|-----------|--------|
| C1       | The average value | Very Low  | 1      |
| C2       | Discipline        | Low       | 2      |
| C3       | Attendance        | Enough    | 3      |
| C4       | Extra curricular  | Good      | 4      |
| C5       | NonAcademic       | Very Good | 5      |

## DISCUSSION

### Manual Test

To solve the problem with the method *Weighted Product*, determine the criteria that will be used as a reference in decision making criteria used to determine the achievements to be given to students

Table 1: Code and provisions criteria

| Code Criteria | Provisions Criteria | Weight Value |
|---------------|---------------------|--------------|
| C1            | Average Value       | 30%          |
| C2            | Discipline          | 20%          |
| C3            | Attendance          | 20%          |
| C4            | Extracurricular     | 10%          |

Table 2: Criteria for Average Value (C1)

| Criteria Average | Weight    | Value |
|------------------|-----------|-------|
| 90-100           | Very Good | 5     |
| 70-80            | Good      | 4     |
| 50 -60           | Low       | 2     |
| <50 Very         | Low       | 1     |

Table 3: Discipline (C2)

| Criteria Discipline | Weight    | Value |
|---------------------|-----------|-------|
| Duty                | Very Low  | 1     |
| Uniform             | Very Good | 5     |
| Writing Tools       | Low       | 2     |
| Cleanliness         | Good      | 4     |

Table 4: Attendance (C3)

| Attendance Criteria | Weight    | Value |
|---------------------|-----------|-------|
| Alpa > 5            | Low       | 2     |
| Permit < 3          | Very Good | 5     |
| Pain < 5            | Good      | 4     |
| Bolos > 10          | Very Low  | 1     |

Table 5: Extracurricular (C4)

| Extracurricular Kindergarten | Weight    | Values |
|------------------------------|-----------|--------|
| Scout                        | Enough    | 3      |
| Futsal Inter School          | Very Low  | 1      |
| National Volly               | Good      | 4      |
| PASKIBRA Nasional            | Very Good | 5      |
| Drum band Regional           | Low       | 2      |

Table 6: Non-Academic (C5)

| Non-Academic             | Weight    | Value |
|--------------------------|-----------|-------|
| ILC Regional             | Enough    | 3     |
| of the National Robotics | Very Good | 5     |
| Arabic National          | Good      | 4     |
| LKS Regional             | Low       | 2     |

### Determining Suitability Rating

The first step is to determine the alternatives to the value criteria already determined. The alternatives that will be studied are A1 Candra, A2 Agus, A3 Diamond, A4 Salsa, A5 Bella, A6 Nisa.

| Alternative | Criteria |    |    |    |    |
|-------------|----------|----|----|----|----|
|             | C1       | C2 | C3 | C4 | C5 |
| A1          | 5        | 4  | 1  | 3  | 2  |
| A2          | 2        | 5  | 1  | 4  | 3  |
| A3          | 4        | 2  | 4  | 3  | 5  |
| A4          | 4        | 4  | 2  | 4  | 1  |
| A5          | 1        | 2  | 5  | 5  | 4  |
| A6          | 5        | 1  | 5  | 3  | 2  |

The second step is the calculation of the WP method which starts by making improvements to the weight of the criteria where the value of  $w_j = 1$ , and the value of  $W = 0.3 \ 0.2 \ 0 \ 1 \ 0.2$ . Data on manual weight repairs can be seen as follows:

$$W1 = 0.3 \cdot 0.3 + 0.2 + 0.2 + 0.1 = 0.31 = 0.3$$

$$W2 = 0.2 \cdot 0.3 + 0.2 + 0.2 + 0.1 = 0.21 = 0.2$$

$$W3 = 0.2 \cdot 0.3 + 0.2 + 0.2 + 0.1 = 0.21 = 0.2$$

$$W4 = 0.1 \cdot 0.3 + 0.2 + 0.2 + 0.1 + 0.2 = 0.11 = 0.1$$

$$W5 = 0.20.3 + 0.2 + 0, 2 + 0.1 + 0.2 = 0.21 \ 0.2$$

### Determining the Value of Vector S and V

The third step is to determine the value of the vector S first. By way of multiplying the data for each alternative value a match rating that has a positive rating from the results of the weight improvement. The manual calculation data for determining the S vector value of each alternative can be seen as follows:

$$\text{Candra S1} = (50,3) (40,2) (10,2) (30,1) (20,2) = 2,741707526$$

$$\text{Agus S2} = (20,3) (50,2) (10,2) (40,1) (30,2) = 2,430710571$$

$$\text{Intan S3} = (40,3) (20,2) (40,2) (30,1) (50,2) = 3.537872041$$

$$\text{Salsa S4} = (40,3) (40,2) (20,2) (40,1) (10,2) = 2.639015822$$

$$\text{Bella S5} = (10,3) (20,2) (50,2) (50,1) (40,2) = 2,456456052$$

$$\text{Nisa S6} = (50,3) (10,2) (50,2) (30,1) (20,2) = 2.866837831$$

The fourth step is to determine the value of vector V. Value vector V is used to get the highest alternative value from each vector V. The process of manually searching for vector V values can be seen as follows:

$$\text{Candra V1} = 2,74170752616,67259984 = 0.164443911$$

$$\text{Agus V2} = 2,43071057116,67259984 = 0.145790734$$

$$\text{Intan V3} = 3,53787204116,67259984 = 0.212196782$$

$$\text{Salsa V4} = 2,63901582216,67259984 = 0.158284601$$

$$\text{Bella V5} = 2,45645605216,67259984 = 0.147334913$$

$$\text{Nisa V6} = 2.86683783116.67259984 = 0.171949058$$

From the above results it can be concluded that the alternative achievement given is V3 = 0.212196782. The results of manual system calculations above using the WP method can be concluded that the alternative selection of high achieving students is with V6 = 0.171949058 highest on the Intan alternative

### CONCLUSION

The conclusions obtained by the author are as follows method *Weighted product* can help in making decisions to determine the selection of outstanding students. With the existence of a decision-making system for the selection of outstanding students in the processing of teaching and learning. Of the 6 students obtained the value of V3 2 0.1610.212196782 as the student with the lowest score and the value of A6 0.171949058 as the best student.

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