DECISION SUPPORT SYSTEM OF ACHIEVED STUDENTS USING WEIGHTED PRODUCT METHOD

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Abstract

Constitution of the Republic of Indonesia No. 12 of 2012 that part of the national education system has a strategic role in educating the life of the nation. Students are people who are trying to develop themselves through the process of education on the path, level and type of education. The *Weighted Product* method is chosen because the method is solved by using multiplication to connect the value of the attribute, where the value must be raised with the attribute weight value 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, obtained the value of Agus = 0.1618 as the student with the lowest value and the value of Intan = 0.1748 as the best student.

Keywords: Decision Support System, Weighted Product, Student Achievement

1.0 INTRODUCTION

Everyone has different knowledge and abilities. These knowledge and abilities can develop and evolve, becoming someone who achieves is something that is very proud of themselves and others. People who excel have a very large development of knowledge and knowledge. 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[1]

However, choosing schools also can affect education in exploring the achievements. This school gives a predicate to achievement students based on the academic value obtained and fulfills the criteria determined by the school. In the application of data on high-achieving students still use the manual method, namely using Microsoft Excel, so that it requires a longer time and the results obtained are not maximized.

The research conducted by Muhamad Muslihudin et al. The implementation of method *Weighted Product* determines the bidik scholarship STMIK Pringsewu mission (2018), the decision support system for the acceptance of the Bidik Misi scholarship at STMIK Pringsewu can help and facilitate universities in determining eligible students or not to get scholarships based on criteria -determined criteria. From the results obtained, alternative 1 obtained the highest score with the highest IPK and included in the category of students from underprivileged families[2].

Research conducted by Muhammad Faisal, the selection decision support system of outstanding students in Malang 3 poor at using the method *Weighted Product* (2018), the information generated from this system is the ranking of outstanding students based on criteria data and weight data. The resulting ranking can be used to assist the teacher in making decisions about achieving students[3]. 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 the ranking process that will determine the outstanding students according to the criteria

2.0 THEORETICAL

2.1 Students

Student means people, children who were studied (learning, schooling). While under article 1, paragraph 4 of Law No. 20 of 2013. Regarding the national education system, where

students are people who try to develop themselves through the educational process on the path and level and certain types of education[4].

2.2 Decision Support System

Kusrini, (2007) Decision support systems are systems interactive information that provides information, modeling and data recovery. This system is used to assist decision making in semi-structured situations and unstructured situations, where one does not know exactly how the decision should be made (Alter, 2002)[5] The purpose of the decision support system is: (Turban, 2005).

- Helping management in decision making or semi-structured problems
- Supporting manager's concerns and not intended to replace manager functions.
- Increasing the effectiveness of decisions taken by managers more than improving their efficiency,
- Da allows decision makers to do computing a lot at a low cost.
- Increased productivity.
- Quality support
- Competitive
- Overcoming cognitive limitations in processing and storage[6]–[8].

2.3 Fuzzy Multiple Attribute Decision Making

Sri Kusumadewi (2013) FMADM is a method used to find an optimal alternative to a number of alternatives with certain criteria. The core of FMADM is to determine the weight value for each attribute, then proceed with the ranking process that will select the alternatives that have been given. Basically, there are 3 approaches to finding 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[9] Simple Additive Weighting Methods (SAW), Weighted Products (WP), ELECTRE, Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), Analytic Hierarchy Process (AHP)[10], [11]

2.4   Achievement

According to the KBBI, achievement is an important indicator of the results obtained during education. According to Magfiroh (2011: 24) The achievement of a task-oriented behavior according to internal and external criteria, involves individuals to compete with others [8]. A student who meets the educational requirements within the scope of the school. Characteristics of Students Achievement with Learning diligently, dare to try new things, never will it be wrong, as long as he is on the right path, not easily affected by new things that are not clear either or wrong

3.0 METHODOLOGY

Weighted Product (WP) 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 (criterion) must be raised first with the corresponding attribute weight (criteria)Preferences for alternative Ai are given as follows [2], [12]–[15]:

$$S_i = \prod_{j=1}^{n} X_{ij}^{wj} \qquad (1)$$

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

Where $\sum W_j = 1$. W_j is the rank is positive for profits and negative attributes to attribute cost.

The relative preferences of each alternative are given as:

$$V_i = \frac{\prod_{j=1}^{n} X_{ij}^{wj}}{\prod_{j=1}^{n} (X_j^*)} \qquad (2)$$

Where:
V   : Alternative preference is analogous to vector V
X   : Criteria Value
W   : Weight of Criteria / sub criteria
I   : Alternative
J   : Number of Criteria
N   : Number of Criteria
*   : Number of Criteria that have been assessed on vector S

Criteria and Weight In the process of method *weighted product* Required criteria that will be used as calculation material in calculating the achievement in school.

Table 1. Descriptions of Criteria

Criteria	Description
C1	Average value of
C2	Discipline
C3	Attendance
C4	Extracurricular
C4	Non-Academic

Decision making gives preference weight for each W criteria (initial weight) can be seen in table 2.

Table 2. Information on

Criteria	Range	Weight
C1	Very Low	1
C2	Low	2
C3	Enough	3
C4	Good	4
C5	Very Good	5

4.0 RESULANTS AND DISCUSSION

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

Table 3. Code and provisions

Code criteria	Criteria Criteria	Weight Value
C1	Average Value	30%
C2	Discipline	20%
C3	Presence	20%
C4	Extracurricular	10%

Table 4. Criteria Average Score (C1)

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

Table 5. Discipline (C2)

Disciplinary Criteria	Weight	Value
Task	Very Low	1
Uniforms	Very Good	5

Stationary	Low	2
Cleanliness	Good	4

Table 6. Attendance (C3)

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

Table 7. Extracurricular (C4)

Extracurricular	Weight	Score
Scout	Enough	3
Futsal Between Schools	Very Low	1
Volley Ball National	Good	4
National Paskibraka	Excellent	5
Drum band Kindergarten	Low	2

Table 8. Non-Academic (C5)

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

The first step is to determine the alternatives to the value criteria already determined. The alternatives to be examined are:

A1 = Candra
A2 = Agus
A3 = Diamond
A4 = Salsa
A5 = Bella
A6 = Nisa

Table 9. Weight Criteria for Each Criteria Tested

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 criteria weight where the value of $\sum w_j = 1$, and the value of W = 0.3 0.2 0, 2 0.2. Manual weight repair data can be seen as follows:

$$W_1 = \frac{0.3}{0.3 + 0.2 + 0.2 + 0.1} = \frac{0.3}{1} = 0.3$$

$$W_2 = \frac{0.2}{0.3 + 0.2 + 0.2 + 0.1} = \frac{0.2}{1} = 0.2$$

$$W_3 = \frac{0.2}{0.3 + 0.2 + 0.2 + 0.1} = \frac{0.2}{1} = 0.2$$

$$W_4 = \frac{0.1}{0.3 + 0.2 + 0.2 + 0.1 + 0.2} = \frac{0.1}{1} = 0.1$$
$$W_5 = \frac{0.2}{0.3 + 0.2 + 0.2 + 0.1 + 0.2} = \frac{0.2}{1}\, 0.2$$

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

Candra S_1 = $(5^{0.3})\ (4^{0.2})\ (1^{0.2})\ (3^{0.1})\ (2^{0.2})$ = 6.204986036
Agus S_2 = $(2^{0.3})\ (5^{0.2})\ (1^{0.2})\ (4^{0.1})\ (3^{0.2})$ = 6.005303369
Diamond S_3 = $(4^{0.3})\ (2^{0,2})\ (4^{0.2})\ (3^{0.1})\ (5^{0.2})$ = 6.479775668
Salsa S_4 = $(4^{03})\ (4^{0.2})\ (2^{0.2})\ (4^{0.1})\ (1^{0.2})$ = 6.132621187
Bella S_5 = $(1^{0.3})\ (2^{0.2})\ (5^{0.2})\ (5^{0.1})\ (4^{0.2})$ = 6.02255487
Nisa S_6 = $(5^{0,3})\ (1^{0.2})\ (5^{0.2})\ (3^{0.1})\ (2^{0.2})$ = 6.265207787

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

1. Candra
$$V_1 = \frac{6.204986036}{37,11044892} = 0.167203205$$
2. Agus
$$V_2 = \frac{6.005303369}{37,11044892} = 0.161822429$$
3. Diamond
$$V_3 = \frac{6.479775668}{37,11044892} = 0.174807831$$
4. Salsa
$$V_4 = \frac{6.132621187}{37,11044892} = 0.165253215$$
5. Bella
$$V_5 = \frac{6.02255487}{37,11044892} = 0.162287285$$
6. N isa
$$V_6 = \frac{6.265207787}{37,11044892} = 0.168825956$$

From the results above it can be concluded that the achievement alternatives given are V_3 = 0.174807831

5.0 CONCLUSION
The conclusions obtained by the author are as follows method *Weighted product* (WP) can help in making decisions to determine the selection of outstanding students. With the decision making system for the selection of outstanding students in the teaching and learning process. Of the 6 students obtained the value of Agus = 0.1618 as the student with the lowest value and the value of Intan = 0.1748 as the best student

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