



Implementation of The Weighted Product Method for The Distribution of Bidik Misi Scholarships for Vacation High School Taruna Persada Dumai

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ABSTRACT

Scholarship is one of the factors that can increase student motivation. This scholarship is given to high achieving students and underprivileged students to continue to achieve their dreams. However, the low capacity of the scholarship means that this scholarship is very limited and is only for students who are eligible to receive it. However, it is not uncommon for errors to occur in distributing scholarships because there is no real calculation in the selection of scholarship acceptance so that the scholarships are not on target. Based on these problems, a decision support system that is able to solve the problem is needed so that the awarding of scholarships becomes more precise and efficient so that the authors conduct research using the Weighted Product method which can solve the problem by multiplying to connect the attribute value, where the attribute value must first be ranked by weight. attribute in question. As for the criteria for providing scholarships, namely achievements, parents' income, number of siblings, social status, and place of residence. The result of this research is a system that is able to rank the best alternatives as a recommendation in giving scholarships so that the scholarships can be distributed appropriately.

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1. Introduction

Taruna Persada Dumai Vocational High School (SMK) is a private vocational high school that is the national reference for accreditation A. As a school with many achievements, SMK Taruna Persada Dumai always tries to improve the quality of education by producing quality alumni. Currently the process of determining bidikmisi scholarship recipients is carried out by the curriculum section by collecting student data with predetermined criteria such as good / superior achievement, parent / guardian income, number of siblings, social status, and place of residence. However, with no

There is a process of calculating the scholarship selection which is not uncommon for the awarding of scholarships that are not right on target. To overcome this problem, a decision support system is needed that is able to select prospective students who receive Bidik Misi scholarships effectively and efficiently by applying the Weighted Product method so that the distribution of the scholarships is expected to be on target and in accordance with the school's expectations in creating quality alumni.

Weighted Product (WP) is one of the methods used to solve Multi Attribute Decision Making (MADM) problems. WP is a method that uses multiplication to relate the attribute rating, where the rating of each attribute must be ranked first with the weight in question. The WP method is more efficient because the time required in the calculation is shorter. The weights for the benefit attributes function as positive powers in the multiplication process, while the cost weights function as negative powers.

2. Research Method

Systems Development Method The waterfall model of the System Development Life Cycle (SDLC) has several stages from the start of the system being planned until the system is implemented, operated and maintained. If the operating system that has been developed still raises critical problems and cannot be



resolved in the system maintenance stage, it is necessary to re-develop a system to overcome it and this process returns to the first stage, namely the system planning stage. The system development life cycle can be seen in Figure 1

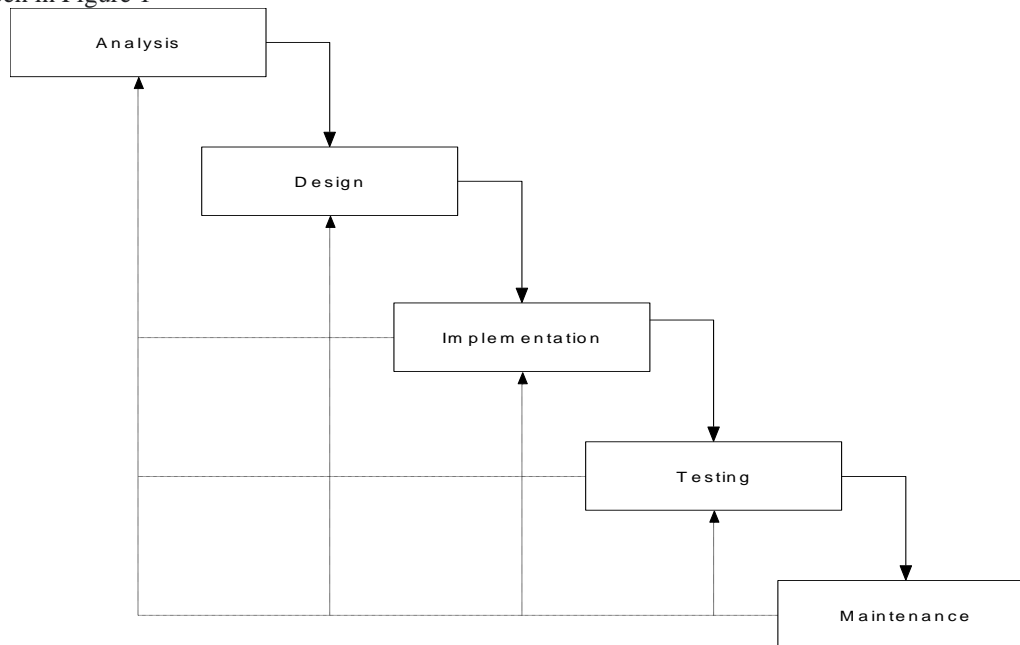


Fig 1. The main stages

The main stages of the system development life cycle consist of several stages, namely:

2.1. Analysis

At this stage the researcher will first carry out an analysis of the running system and analyze the weaknesses of the system in decision-making management in selecting the distribution of Bidik Misi scholarships at SMK Taruna Persada Dumai.

2.2. Design

At this stage, a decision support system based on the weighted product method that will be applied to SMK Taruna Persada Dumai will be designed in accordance with the data that has been obtained from data collection that has been carried out such as data from observations and field research. Researchers will determine the appearance of the system, database, programming language and input design used on the system so that it can produce the expected output. The system will be designed globally using system planning tools, namely Unified Modeling Language (UML), Use Case Diagrams, Activity Diagrams, Sequence Diagrams, and Class Diagrams. Then in detail, the design will be carried out by forming a data file design, input, output and flowchart. For design clarity, both globally and in detail, this will be set out in Chapter IV.

2.3. Implementation

In the implementation stage, the system that has been completed will then be implemented on the device used and the user to carry out system installation, and system usage (user friendly) procedures, and system configuration settings related to hardware and other supporting software. .

2.4. Testing

At the testing stage, a coding trial was carried out by inputting the criteria and weight of prospective students receiving the Bidik Misi Scholarship so as to produce a decision based on the concept of the weighted product method. which is used in determining student recipients of Bidik Misi scholarships at SMK Taruna Persada Dumai.

2.5. Maintenance

At the maintenance stage, the system checks the input data stored in a MySQL-based database and backs up the database on the decision support system at SMK Taruna Persada Dumai regularly and updates the antivirus to prevent data loss or damage.

3. Results and discussions

3.1 Unified Modelling Language (UML)

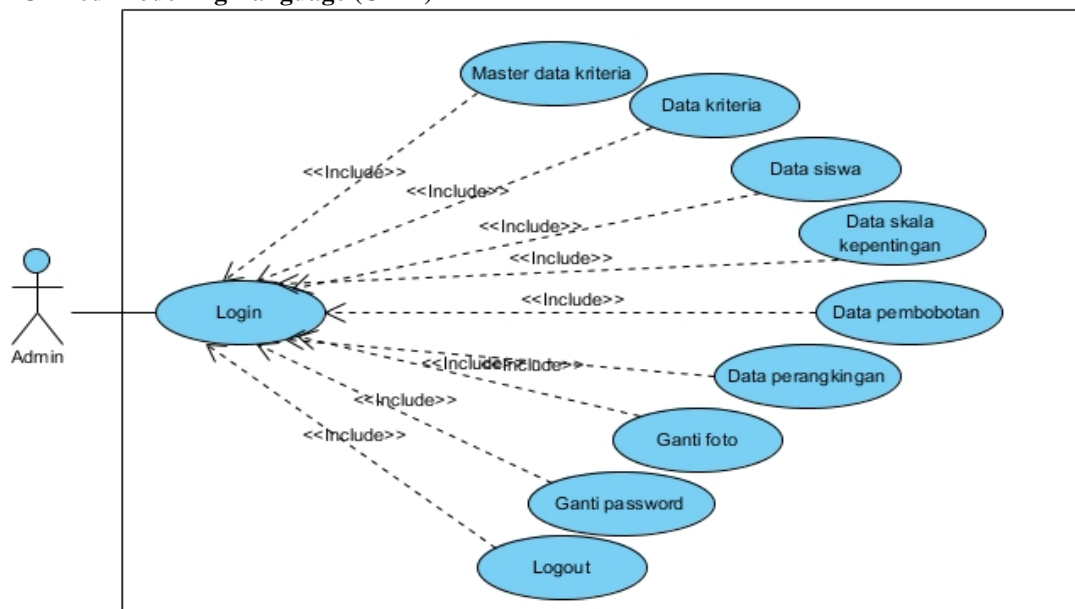


Fig 2. Use Case Diagram

Use Case Diagram on the implementation of the Bidik Misi scholarship SPK at SMK Taruna Persada Dumai can be seen in the picture

3.2 Calculation of the Weighted Product Method

Determination of Alternative Distribution of Bidik Misi Scholarship Selection for Taruna Persada Vocational High School Dumai In this case study sample, 3 students were taken, namely:

- a. Aditya Dwi Prasetyo
- b. Aditya Handayani
- c. Fauzi Wahyudi

Tabel 1.
Alternatif Student

Alternatif	Achievement	Kriteria			
		Parent's Income	Many Brothers	Social Status	Residence
Aditya Dwi Prasetyo	4	1	2	1	1
Aditya Handayani	3	1	3	1	1
Fauzi Wahyudi	3	1	3	1	5

Alternative Determination of Criteria for Bidik Misi Scholarship at SMK Taruna Dumai

- a. Achievement (C1)
- b. Parents' Income (C2)
- c. Number of Siblings (C3)
- d. Social Status (C4)
- e. Residence (C5)

Decision makers assign preference weights as:

$$W = (5, 5, 4, 2, 2)$$

From each of these criteria the weights will be determined. The weight consists of five numbers, namely low, moderate, medium, high, and very high.



Table 2.
Appraisement criteria

criteria	Skala	Appraise
Prestasi	$x \geq 9$	5
	$8,5 \leq x < 9$	4
	$7,5 \leq x < 8,5$	3
	$> 2013 < 2016$	
	$6 \leq x < 7,5$	2
Parent's Income	$3.500.000 \leq 2013 < 6$	1
	$x \geq 5.000.000$	1
	$3.500.000 \leq x < 5.000.000$	2
	$2.500.000 \leq x < 3.500.000$	3
	$> 2013 < 2016$	
Many Brothers	$1.000.000 \leq x < 2.500.000$	4
	$3.500.000 \leq 2013 < 1.000.000$	5
	$x \geq 7$. Orang	5
	5 Orang $\leq x < 6$ Orang	4
	3 Orang $\leq x < 4$ Orang	3
Social Status	1 Orang $\leq x < 2$ Orang	2
	$3.500.000 \leq 2013$	
	Tidak Ada Bersaudara	1
	Yatim Piatu	5
	Yatim	4
Place	Piatu	3
	Adopsi	2
	Ortu Lengkap	1
	Sewa	5
	Kontrak	4
	Menumpang	3
	Semi Permanen	2
	Permanen	1

Decision making gives weight, based on the level of importance of each of the required criteria as follows:

$$W1 = \frac{5}{(5 + 5 + 4 + 2 + 2)} = 0,278$$

$$W2 = \frac{5}{(5 + 5 + 4 + 2 + 2)} = 0,278$$

$$W3 = \frac{4}{(5 + 5 + 4 + 2 + 2)} = 0,222$$

$$W4 = \frac{2}{(5 + 5 + 4 + 2 + 2)} = 0,111$$

$$W5 = \frac{2}{(5 + 5 + 4 + 2 + 2)} = 0,111$$

Tabel 3.
Repair Appraisement

Kriteria	Skala Kepentingan	Perbaikan Bobot	
Prestasi	5		0,278
Penghasilan Orang Tua	5	0,21	0,278
Jumlah Bersaudara	4	40,2	0,222
Status Sosial	2	14	0,111
Tempat Tinggal	2	0,28	0,111
		6	0,111
		0,14	
		3	

Furthermore, the calculation of the vector S will be carried out as follows:

$$S_1 = (4^{0,278} \ 1^{0,278} \ 2^{0,222} \ 1^{0,111} \ 1^{0,111})$$

$$= 1,469 * 1 * 1,166 * 1 * 1$$

$$= 1,712$$

$$S_2 = (3^{0,278} \ 1^{0,278} \ 3^{0,222} \ 1^{0,111} \ 1^{0,111})$$

$$= 1,356 * 1 * 1,276 * 1 * 1$$

$$= 1,730$$

$$S_3 = (3^{0,278} \ 1^{0,278} \ 3^{0,222} \ 1^{0,111} \ 5^{0,111})$$

$$= 1,356 * 1 * 1,276 * 1 * 1,195$$

$$= 2,067$$

The value of the Vector V that will be used for ranking can be calculated as follows:

$$V1 = \frac{1,712}{(1,712 + 1,730 + 2,067)} = 0,31076$$

$$V2 = \frac{1,730}{(1,712 + 1,730 + 2,067)} = 0,31403$$

$$V3 = \frac{2,067}{(1,712 + 1,730 + 2,067)} = 0,37520$$

From the example above, the students selected from the 3 candidate students are: Fauzi Wahyudi

3.3 System Interface

After all the design stages are complete, then the next step is to implement the system that has been built.



Fig 3. Login Page View



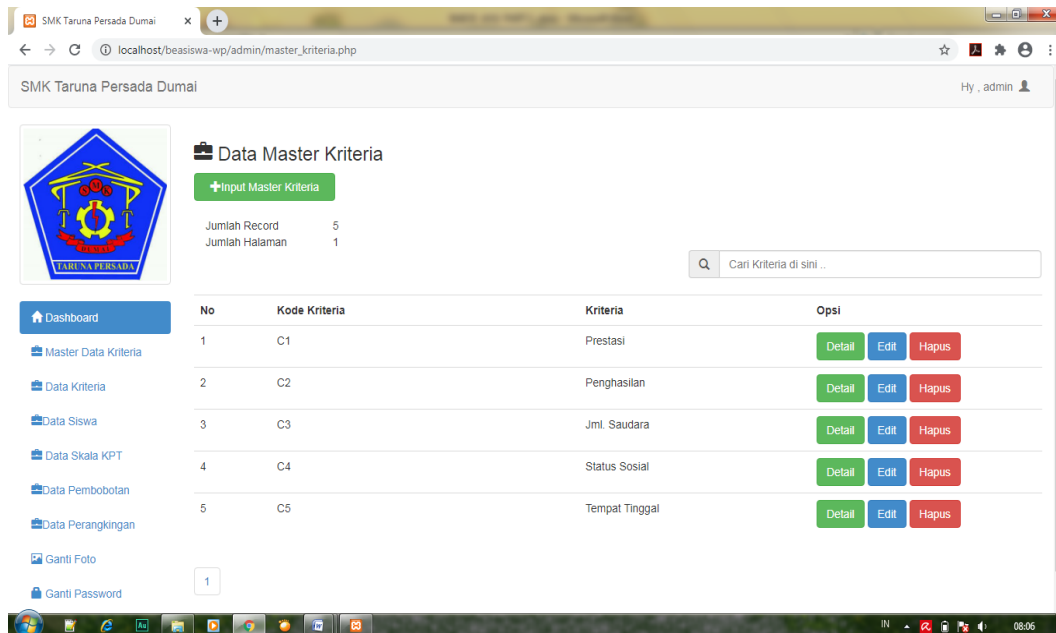


Fig 12. Display menu criteria

4. Conclusion

From the descriptions in the chapters that have been discussed previously, in this study the following conclusions can be drawn:

- The Decision Support System by implementing the weighted product method is able to sort the names of students receiving the Bidik Misi scholarship as a result of the recommendations suggested to SMK Taruna Persada Dumai.
- The results achieved by the system are the student's name and the ranking of each student where from the test results with 5 criteria used and with 11 student data samples the highest score is 0.103006 as the best alternative for the Bidik Misi scholarship recipient.

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