**GROUPING STUDENT ACHIEVEMENT DATA IN A DECISION MAKING SYSTEM USING THE WEIGHT PRODUCT METHOD (CASE STUDY OF PRIVATE MTS ALWASHLIYAH SIMPANG MARBAU)**

**Adinda Puspita Sari1\* , Masrizal2, Rahma Mutiah3**

1,2,3 Information Systems, Labuhanbatu University

*email* : [adindapuspitasari77@gmail.com](mailto:adindapuspitasari77@gmail.com) 1 , [masrizal120405@gmail.com](mailto:masrizal120405@gmail.com) 2 , [rmuthea5@gmail.com](mailto:rmuthea5@gmail.com) 3

**Abstract:** Decision Support Systems (DSS) are information, modeling and data manipulation systems. The system is used to assist decision making in semi-structured situations and unstructured situations, where no one knows exactly how the decision should be made. Decision support systems can be produced using several types of methods, one of which is the *Weighted Product* (WP) Method. *The Weighted Product (WP)* method is a method that 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. SPK process to determine scholarship recipients. By using the Decision Support System, scholarship data at MTS Private Alwasliyah Simpang Merbau can be stored in it, so that if an error occurs in inputting grades or scholarship data, the incorrect data can be corrected without having to re-input the scholarship data. Scholarships are gifts in the form of financial assistance given to individuals with the aim of being used for the continuation of the education they are pursuing.

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

**Abstract:** Sistem Pendukung Keputusan (SPK) merupakan sistem informasi, pemodelan, dan pemanipulasi data. Sistem itu digunakan untuk membantu pengambilan keputusan dalam situasi yang semiterstuktur dan situasi yang tidak terstruktur, dimana tak seorang pun tahu secara pasti bagaimana keputusan seharusnya dibuat. Sistem pendukung keputusan dapat dihasilkan dengan menggunakan beberapa macam metode, salah satu diantaranya adalah Metode *Weighted Product* (WP). Metode *Weighted Product* (WP) adalah merupakan metode yang mengunakan perkalian untuk menghubungkan rating atribut, di mana rating setiap atribut harus dipangkatkan terlebih dahulu dengan bobot atribut yang bersangkutan. Proses ini sama halnya dengan proses normalisasi. Proses SPK untuk menentukan penerima beasiswa. Dengan menggunakan Sistem Pendukung Keputusan, data beasiswa di MTS Swasta Alwasliyah Simpang Merbau dapat disimpan di dalamnya, sehingga jika terjadi kesalahan dalam penginputan nilai atau data beasiswa, maka data yang salah tersebut dapat diperbaiki tanpa harus menginput data ulang data beasiswa. Beasiswa adalah pemberian berupa bantuan keuangan yang diberikan kepada perorangan yang bertujuan untuk digunakan demi keberlangsungan pendidikan yang ditempuh.

**Keywords:** *Siswi Berprestasi; Metode Weighted Product; Sistem Pendukung Keputusan*

**INTRODUCTION**

**​**

Student achievement is measured on a scale that is too narrow, limited to students' cognitive (intellectual) skills [1]. According to Naqawi, the word pupil comes from Arabic , which means the person who wants (the willer). According to Nata, said 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 [2] . 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 politeness indicator​​ evaluation For determine the recipient scholarship [3] . Scholarships are gifts in the form of financial assistance given to individuals with the aim of being used for the continuation of the education they are pursuing.

Decision Support Systems are information, modeling and data manipulation systems. The system is used to assist decision making in semi-structured situations and unstructured situations, where no one knows exactly how the decision should be made. Decision support systems can be produced using several types of methods, one of which is the *Weighted Product* (WP) Method. *The Weighted Product (WP)* method is a method that 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 [4] . 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. According to opinion Kusuma goddess that method Product Weight used For resolve cases​ where the data consists on Lots attribute interests [5] . This matter in accordance with the article entitled “System Evaluation Employee Using the *Fuzzy Multiple Attribute Decision Making* (FMADM) and *Weighted Product* (WP) Method" written by M. Ridwan Nur Septiandan Agus Sidiq Purnomo year 2017 [6] .

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.

**METHOD**

*A. Decision Support System*

A decision support system is a set of elements that are interconnected to form a unity in the process of selecting various alternative actions to solve a problem, so that the problem can be resolved effectively and efficiently. According to Kusrini the objectives of the Decision Support System are [7] :

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 [8] .

System Decision Support is 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 [9] .

Required steps in the retrieval process decision is [10] :

1. Intelligence
2. Forming a perception of the situation at hand is recognizing the decision situation and defining the main characteristics that exist in that situation
3. Building a model that represents the situation A model is a vehicle that assists in estimating the likely outcomes of a decision situation
4. 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
5. Design: Determining specific alternatives by identifying and clearly formulating possible steps [11] .
6. 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 [12] .

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 [13] .

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

The process of normalizing the criteria weight (W), ΣW = 1 is:

Wj=Wj/ΣWj ..........................(1)

Information :

Wj: Attribute weight

ΣWj: Sum of attribute weights

Calculating Vector S

Or

S = S1^wj \* S2 ^wj\*...Si

Information :

S : states the alternative

analogous to vector S

x : states the criterion value

w : states the weight of the criteria

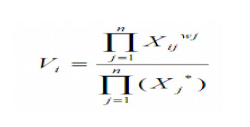
i : states an alternative

j : states the criteria

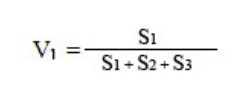
n : states the number of criteria

Wj is a power with a positive value for the profit attribute, and a negative value for the cost attribute [14] .

Calculating Vector V:



Or



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 [15] :

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  90-81  80-71  70-61  60-51 | 5  4  3  2  1 | 50 |
| 2 | C2 | Attitude | Very dilligent  Diligent  Not Diligent  Seldom  Not at all | 5  4  3  2  1 | 40 |
| 3 | C3 | Responsibility | Very active  Active  Currently  Less active  Not active | 5  4  3  2  1 | 30 |

*B. Research Instruments*

This research uses secondary data in the form of names of prospective students with achievements at school and criteria data used as instrumentation to obtain data in the process of selecting outstanding students.

**RESULTS AND DISCUSSION**

*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. Preference for Ai alternatives (Lestari, 2013): *Weighted Product* (WP) The weighted product method is a method for completing Multi Attribute Decision Making (MADM). Weighted Product uses a multiplication technique to connect attribute ratings, where the rating of each attribute must first be raised to the power of the weight attribute in question. 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:

**Academic score table**

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

2. Attitude value table

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

3. Table 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.

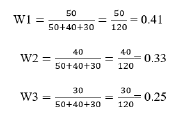
Table 2. Matching Table

|  |  |  |  |
| --- | --- | --- | --- |
| **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

To get the results, the weight must be corrected first, so the calculation can be done as follows using the formula:

Wj=Wj/ΣWj



The next step is to calculate the vector S, where the existing data will be multiplied but before that the weights of each criterion will be increased.



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:





****

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

Table 3. Ranking (Output)

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

**CONCLUSION**

Conclusion After analyzing, designing, implementing and testing in the previous chapters, a conclusion can be drawn regarding the Decision Support System for Scholarship Recipients at the Alwashliyah Simpang Marbau Private MTS, that in this research the *Weighted Product (WP) Method* can be applied to select outstanding students and to implement online selection of outstanding students by distributing them to the class.

**BIBLIOGRAPHY**

[1] "Decision Support System Determining The Best E-Commerce Using The Weighted Product Method".

[2] “4896-18304-1-PB”.

[3] HR Hatta, M. Rizaldi, and DM Khairina, "Application of the Weighted Product Method for Selection of Locations for New Muslim Cemeteries Using Google Maps Visualization," *J. Nas. Technol. and Sis. Inf.* , vol. 2, no. 3, pp. 85–94, 2016, doi: 10.25077/teknosi.v2i3.2016.85-94.

[4] N. Aisyah and AS Putra, "Decision Support System Recommendations for Selecting the Best Manager Using the AHP (Analytic Hierarchy Process) Method," *J. Esensi Infokom J. Esensi Sist. Inf. and Sis. Comput.* , vol. 5, no. 2, pp. 7–13, 2022, doi: 10.55886/infokom.v5i2.275.

[5] R. Dimaski and Jati Sasongko Wibowo, "Car Selection Decision Support System Using the WASPAS Method," *Pixel J. Ilm. Comput. Graph.* , vol. 15, no. 2, pp. 355–361, 2022, doi: 10.51903/pixel.v15i2.855.

[6] AP Kusuma, "Analysis Implementation Analytical Hierarchy Process Method and Weighted Product for Ranking Internet Package Selection System," *Procedia Eng. Life Sci.* , vol. 2, no. 1, 2021, doi: 10.21070/pels.v2i0.1173.

[7] FP Sihotang, "Implementation of the Weighted Product (WP) Method in the Decision Support System for Giving Employee Bonuses," *JATISI (Journal of Information Technology and Information Systems)* , vol. 8, no. 4, pp. 2158–2170, 2021, doi: 10.35957/jatisi.v8i4.1179.

[8] H. Mustafidah and RP Mayasari, "Decision Support System Using the TOPSIS Method for Selection of Tutoring Institutions," *Sainteks* , vol. 15, no. 1, pp. 39–53, 2019, [Online]. Available: http://jurnalnasional.ump.ac.id/index.php/SAINTEKS/article/view/6172

[9] T. Elizabeth, "Decision Support System for Giving Discounts to New World Building Stores Using the SMARTER Method," *JATISI (Journal of Information Technology and Information Systems)* , vol. 9, no. 2, pp. 1608–1620, 2022, doi: 10.35957/jatisi.v9i2.2521.

[10] IPO Priyana, D. Gede, H. Divayana, and G. Indrawan, "Utilization of the Weighted Product Method in Determining Opportunities for the Most Dominant Types of Violations of Tour Guides in Bali Province (Case Study: Bali Province Civil Service Police Unit Service)," no. 1, 2020.

[11] MH Adiansyah, M. Ahsan, and A. Endy Budianto, "Implementation of the Weighted Product Method as a Favorite Tourism and Culinary Recommendation System in Malang," *RAINSTEK J. Terap. Techno Science.* , vol. 2, no. 2, pp. 147–153, 2020, doi: 10.21067/jtst.v2i1.4243.

[12] RS Muhammad Yasir Permadi, Eva Faja Ripanti, "Housing Selection Model Using the Weighted Product (WP) Method," *J. Ris. Science and Technology. Inform.* , vol. 01, no. 01, pp. 167–174, 2023, doi: 10.26418/juristi.v1i1.61815.

[13] R. Supardi and A. Sudarsono, "Application of the Weighted Product (WP) Method in the Decision Support System for Selecting the Best Employees at PT. Agrodehasen Bengkulu," *J. Media Infotama* , vol. 19, no. 1, pp. 141–147, 2023, doi: 10.37676/jmi.v19i1.3505.

[14] A. Fitriyani, R. Komarudin, YI Maulana, and A. Haidir, "Application of the Weighted Product (WP) Method in Selecting the Best Chemical Supplier PT. Mayer Indah Indonesia Bogor," *Bianglala Inform.* , vol. 8, no. 1, pp. 36–43, 2020, doi: 10.31294/bi.v8i1.8106.

[15] S. Anisa and N. Ransi, "Implementation of the TOPSIS Method in SPK for Selecting Food Menus for Obesity Sufferers," *J. ◼ 1 CCS* , vol. 1, no. 3, pp. 1–5, 2023.