International Journal Multidisciplinary
Homepage : https://journal.antispublisher.com/index.php/Ijmi
Email : admin@antispublisher.com

e-ISSN : 3031-9870
IJMI, Vol. 2, No. 1, February 2025
Page 129-137

Accuracy Analysis of Decision Support System Applications Using The Weighted Product Method for Selecting The Best Teacher

Andi Putra[1], Rini Budiarni[2], Ocha Raganata Kesuma[3]
[1,2,3]Informatics Study Program, Technology College of Payakumbuh West Sumatra, Indonesia

DOI : https://doi.org/10.61796/ijmi.v2i1.290

Sections Info

Article history:
Submitted: November 05, 2024
Final Revised: November 30, 2024
Accepted: February 01, 2025
Published: February 10, 2025

Keywords:
Decision Support System (DSS)
Weighted Product (WP) method
Best teacher selection

ABSTRACT

Objective: *This study evaluates the effectiveness of the Weighted Product (WP) method in improving objectivity and efficiency in the decision-making process for selecting the best teachers at SMP Cahaya Islam. The WP method was selected due to its ability to provide measurable assessments through weighted calculations on predefined attributes.* ***Method:*** *A web-based Decision Support System (DSS) application was developed using the WP method. The application incorporated assessment criteria, including Lesson Planning, Lesson Implementation, Learning Outcome Assessment, Training and Mentorship, Additional Duties, and Professional Development.* ***Results:*** *The evaluation results showed that the WP-based DSS application produced consistent and accurate assessments, achieving a 100% accuracy level compared to manual assessment methods. Additionally, the application improved objectivity, making the selection process more structured, transparent, and accountable.* ***Novelty:*** *This study highlights the implementation of a WP-based DSS application to enhance transparency and efficiency in teacher selection. The developed system ensures objective and effective performance assessments, contributing to improved educational quality at SMP Cahaya Islam.*

INTRODUCTION

In order to increase objectivity and efficiency taking decision, WP method is considered as the right approach in implementation System Decision Support System (DSS) [1]. The WP method enables a systematic evaluation process and measurable with multiply attributes based on weight that has been determined, so that produce more assessment accurate and transparent [2]. This is very relevant in selection of the best teachers at Cahaya Islam Middle School, where various criteria like teacher performance can rated in a way objective and structured. SMP Cahaya Islam, which was founded in 2013 at Prof. Dr. Hamka street No. 48, Payakumbuh City, is a institution committed education print generation quality. The process of selecting the best teachers previously done manually, so that bring up need will more system efficient and transparent. With implementation of SPK based on WP method on a web- based platform, the best teacher assessment process is expected can done in a way fast, objective and accurate [3], [4]This WP method merge all over attribute evaluation with give weight on each criteria like competence pedagogy, performance, and dedication, in accordance priorities set school [5].

System This Work with normalize matrix mark criteria, giving weight, count mark vector S through digging value and weight every criteria, and Finally determine best teacher ranking. This process expected can minimize subjectivity assessment and reduce potential conflict with produce transparent and accountable decisions accepted all

parties. Based on background the back that has been presented, formulation problem in study This is as following: how develop system Supporter decision For selection of the best teachers at Cahaya Islam Middle School, and how much tall level accuracy website -based SPK application with use WP method in the process of selecting the best teacher at SMP Cahaya Islam. Research This aiming For develop application System Website-based Decision Support with use WP method in selection of the best teachers at Cahaya Islam Middle School, as well as For evaluate level accuracy SPK applications developed, especially in determine the best teacher based on criteria that have been assigned at Cahaya Islam Middle School.

The main problem faced in analyzing the accuracy of the Decision Support System (DSS) application using the Weighted Product (WP) method for selecting the best teacher is how to ensure that the system can provide objective, fair results that are in accordance with relevant criteria. The DSS application is designed to assist the decision-making process by considering various factors or criteria that have been previously determined. However, the main challenge lies in the accuracy of calculating the weights and processing the data that will be used to assess the performance of teachers.

In the context of selecting the best teacher, the Weighted Product method functions to combine the values of each criterion by giving a certain weight to each aspect that is considered important. However, problems often arise in determining the right weight, because often the determination of this weight is subjective and can be influenced by individual or group preferences. This has the potential to produce results that are not in accordance with expectations or do not reflect the actual conditions.

In addition, the application must be able to handle various data that are dynamic and constantly changing, such as teacher performance assessments, attendance, innovation in learning, and interactions with students. If the data entered is inaccurate or there is an error in the input, the final results obtained from the DSS will also be affected. Therefore, it is important to conduct a thorough evaluation and testing of the system to ensure that the application works well and provides reliable recommendations.

Another challenge is the integration between the SPK application and the existing teacher evaluation system in the field. Sometimes, the information available is incomplete or difficult to access, which makes the process of selecting the best teacher more complicated. This adds complexity to analyzing the accuracy of the SPK application, because incomplete or irrelevant information can damage the evaluation results.

So, although the SPK application with the Weighted Product method offers an efficient solution in decision making, the accuracy of the results obtained is highly dependent on various factors such as determining the right criteria weights, the quality of the data used, and integration with the existing evaluation system. Therefore, continuous improvement and testing need to be carried out so that this application can function optimally and provide valid results in selecting the best teachers.

RESEARCH METHOD

Types of research used in study This is quantitative, selected Because using data in the form of the number that will be processed through method statistics. The results of this data processing will become reference in evaluate the system implemented at Cahaya Islam Middle School, for ensure system the proper and appropriate with criteria that have been established. Research quantitative is type research that utilizes procedure statistics or method quantification For get findings. According to Bambang Prasetyo et al., " the approach quantitative is a thorough and in -depth manner in learn phenomenon or problem with use sizes objective " [6]. The main objective is For to obtain fact or truth as well as test related theories with phenomenon or the problem being studied. In the research this, writer will introduce method Weighted Product as effective alternative For system Supporter decision. The WP method is techniques that can used For evaluate and select the optimal strategy, by consider various criteria like motivation, interest, competence, activity, time understanding, busyness, and facilities [7].

Study This introduce method Weighted Product (WP) as effective alternative For system support decision. WP method is used For evaluate and select the optimal strategy based on various criteria, such as motivation, interest, competence, activity, time understanding, busyness, and facilities [8]. Principles the basis of WP is multiply every mark performance on attributes with weight certain, then count results multiplication the For every alternative. WP process begins with normalization matrix decision (X), ensure consistent comparison between alternative, similar with SAW method. The difference is, WP involves multiplication mark normalization with weight criteria, produce mark end For every alternative. With adjusted weight, WP provides flexibility tall For reflect preference users, so that support taking accurate decision in accordance need specific. The WP method allows further evaluation comprehensive and thorough to alternative, with take into account interest relatively each criteria. Approach This increase objectivity and efficiency in the process of taking decision on the system support decision.

Draft study This arranged For ensure study done with right, so that results obtained Can in accordance with objective beginning. Formulation Problem, stage This writer determine How method to design application system Support decision web based using method Weighted Product and analyze level accuracy application with compare it with manual calculation. Data collection, stage This involving collection of necessary data For research, according to with the plan that has been set. Data collection can be done For get theories and concepts relevant basis with research. The method used is interview, which was conducted with a teacher at SMP Cahaya Islam Payakumbuh. Data needed in study This includes: teacher biodata, subjects teacher lessons, teacher tenure, profile school.

Development Software, at this stage this, there is a number of step For make applications, namely: Analysis Data and System Requirements, Design Applications, Implementation, and testing applications. All step the will explained more details in Chapter IV. Analysis Method Accuracy Weighted Product, stage This involving analysis level accuracy WP method with compare results calculation manually with results

produced by the application. Conclusion, on stage end, author will interesting conclusion based on results analysis accuracy that has been done.

Use case diagram is modeling For system behavior information that will be created, use case diagram is used For know function What only what is inside system and those entitled use functions said, according to Sukamto.

RESULTS AND DISCUSSION

Study This done with collect data from Cahaya Islam Middle School as criteria that will be processed with WP method. This teacher data made into Alternative from determination of the best teacher. Processed school data This is teacher data type data along with the teacher's assessment will be assessed as the best teacher at Cahaya Islam Middle School. Research result This in the form of order the ranking obtained from results calculation WP method implemented and presented by the application determining the best teacher.

Table 1. Determining Alternative.

Name	NUPTK	Alternative
Ade Sumirna	4261754655230113	A1
Desi Mulya Ningsih	-	A2
Dian Sri Yuni	-	A3
Dieny Mustazhilly	3438766667230193	A4
Epa Juliarni	9748773674230142	A5
Fitri Handayanni	9338770671230143	A6
Jenni Monica Putri	6954771672230122	A7
Kurnia Putri	3736766667130252	A8
Lani Oktavia	-	A9
Lisa Wahyudi	3546758659230143	A10
Mira Rahmayani	3440774675230073	A11
Muvidatul Uzmi	8933773674230112	A12
Roza Gusdini	-	A13
Siti Nurhima Yustira	-	A14
Windy Oktavia	-	A15
Yosi Surya Nasri	0738768669230262	A16
Yuliani Eka Putri	-	A17

For count respective values criteria with method amount criteria 1 to 6 later will divided by the total value per criterion Then will multiplied with 100. For example his like under This

$$A1 = K1\,\frac{33}{40} \times 100 = 82.50$$

$$A2 = K2\,\frac{20}{28} \times 100 = 71.43$$

$$A3 = K3\frac{33}{44} \times 100 = 75.00$$
$$A4 = K4\frac{8}{12} \times 100 = 66.67$$
$$A5 = K5\frac{11}{20} \times 100 = 55.00$$
$$A6 = K6\frac{14}{16} \times 100 = 87.50$$

After get value of each criteria next bias for do search S value with use mark criteria this. Total weight given criteria is 18, where giving weight each each criteria This own a number of considerations, namely: Planning Learning: Given weight by 3, indicating importance thorough preparation in the learning process. Implementation Learning: Given weight of 2, depicts How learning implemented and implemented in class. Learning Outcome Assessment: Obtained weight the highest, which is 4, indicates that evaluation results learning is very crucial in determine success of the learning process. Training and Guidance: Given weight by 2, reflecting importance activity training and guidance in development competence participant educate. Task Additional: Get weight by 4, indicating importance teacher contribution in operate tasks addition besides from teaching. Development Activity Professional: Given weight by 3, indicating importance development teacher professionalism through activity additional. The total amount of weight given is 18, which reflects overall Rated aspect in evaluation performance.

Stages furthermore is do normalization to mark criteria contained in the decision matrix.

$$R1\frac{Weight\ Value}{Total\ Weight\ Value} = \frac{3}{18} = 0.1667$$
$$R2\frac{Weight\ Value}{Total\ Weight\ Value} = \frac{2}{18} = 0.1111$$
$$R3\frac{Weight\ Value}{Total\ Weight\ Value} = \frac{4}{18} = 0.2222$$
$$R4\frac{Weight\ Value}{Total\ Weight\ Value} = \frac{2}{18} = 0.1111$$
$$R5\frac{Weight\ Value}{Total\ Weight\ Value} = \frac{4}{18} = 0.2222$$
$$R6\frac{Weight\ Value}{Total\ Weight\ Value} = \frac{3}{18} = 0.1667$$

For count mark vector S, done with multiply matrix from mark subcriteria on alternatives first to be raised to the power in accordance weight interest first, then multiplied with subcriteria second to the power with weight second, and so on

$$A1 = (82.50^{0.1667}) \times (71.43^{0.1111}) \times (75.00^{0.2222}) \times (66.67^{0.1111}) \times (55.00^{0.2222}) \times (87.50^{0.1667}) = 71.6386$$

$$A2 = (85.00^{0.1667}) \times (57.14^{0.1111}) \times (72.73^{0.2222}) \times (66.67^{0.1111}) \times (65.00^{0.2222}) \times (68.75^{0.1667}) = 69.5403$$

$$A3 = (87.50^{0.1667}) \times (60.71^{0.1111}) \times (70.45^{0.2222}) \times (50.00^{0.1111}) \times (65.00^{0.2222}) \times (68.75^{0.1667}) = 68.6455$$

$$A4 = (85.00^{0.1667}) \times (64.29^{0.1111}) \times (63.64^{0.2222}) \times (66.67^{0.1111}) \times (65.00^{0.2222}) \times (68.75^{0.1667}) = 68.3964$$

$$A5 = (85.00^{0.1667}) \times (67.86^{0.1111}) \times (77.27^{0.2222}) \times (66.67^{0.1111}) \times (70.00^{0.2222}) \times (87.50^{0.1667}) = 76.0306$$

$$A6 = (82.50^{0.1667}) \times (71.43^{0.1111}) \times (75.00^{0.2222}) \times (66.67^{0.1111}) \times (65.00^{0.2222}) \times (62.50^{0.1667}) = 70.2934$$

$$A7 = (80.00^{0.1667}) \times (71.43^{0.1111}) \times (65.91^{0.2222}) \times (58.33^{0.1111}) \times (65.00^{0.2222}) \times (81.25^{0.1667}) = 69.9462$$

$$A8 = (87.50^{0.1667}) \times (60.71^{0.1111}) \times (63.64^{0.2222}) \times (58.33^{0.1111}) \times (60.00^{0.2222}) \times (62.50^{0.1667}) = 65.0588$$

$$A9 = (82.50^{0.1667}) \times (67.86^{0.1111}) \times (75.00^{0.2222}) \times (66.67^{0.1111}) \times (60.00^{0.2222}) \times (75.00^{0.1667}) = 70.7801$$

$$A10 = (85.00^{0.1667}) \times (64.29^{0.1111}) \times (63.64^{0.2222}) \times (58.33^{0.1111}) \times (60.00^{0.2222}) \times (81.25^{0.1667}) = 68.0701$$

Result of The sum of vector S is = 698.3999

For look for mark vector V with do method vector S is divided with Friday vector S to next.

$$V1 = \frac{71.6386}{698.3999} = 0.1026$$

$$V2 = \frac{69.5403}{698.3999} = 0.0996$$

$$V3 = \frac{68.6455}{698.3999} = 0.0983$$

$$V4 = \frac{68.3964}{698.3999} = 0.0979$$

$$V5 = \frac{76.0306}{698.3999} = 0.1089$$

$$V6 = \frac{70.2934}{698.3999} = 0.1006$$

$$V7 = \frac{69.9462}{698.3999} = 0.1002$$

$$V8 = \frac{65.0588}{698.3999} = 0.0932$$

$$V9 = \frac{70.7801}{698.3999} = 0.1013$$

$$V10 = \frac{68.0701}{698.3999} = 0.0975$$

After get The values of vector S and vector V are determine ranking on mark vector V of the biggest to smallest and the result Can seen in table 2.

Table 2. Determining Alternative.

Alternative	V Value	Ranking
A1	0.1026	2
A2	0.0996	6
A3	0.0983	7
A4	0.0979	8
A5	0.1089	1
A6	0.1006	4
A7	0.1002	5
A8	0.0932	10
A9	0.1013	3
A10	0.0975	9
Amount	1	

Comparison process results manual calculation with processed results application This Can seen in table 3.

Table 3. Comparison Manual Calculation and Calculation Application.

Alternative	Manual Calculation	Calculation Application	Compliance
Ade Sumirna	0.1026	0.1026	In accordance
Desi Mulya Ningsih	0.0996	0.0996	In accordance
Dian Sri Yuni	0.0983	0.0983	In accordance
Dienzy Mustazhilly	0.0979	0.0979	In accordance
Epa Juliarni	0.1089	0.1089	In accordance
Fitri Handayani	0.1006	0.1006	In accordance
Jenni Monica Putri	0.1002	0.1002	In accordance
Kurnia Putri	0.0932	0.0932	In accordance
Lisa Wahyudi	0.1013	0.1013	In accordance
Mira Rahmayani	0.0975	0.0975	In accordance
It is not in accordance with	0	-	

Alternative	Manual Calculation	Calculation Application	Compliance
In accordance	10	-	

Based on testing results manual calculation with calculation use application against 10 data from 17 alternative data, then calculation use application This own 100% accuracy.

CONCLUSION

Fundamental Finding : The study successfully developed a web-based Decision Support System (DSS) application using the Weighted Product (WP) method to assist in selecting the best teacher at SMP Cahaya Islam. The application demonstrated high accuracy in determining the best teacher based on predefined criteria, making it a valuable tool for decision-making in the school. **Implication :** The implementation of the DSS application provides a systematic and objective approach to teacher selection, reducing biases and enhancing transparency in decision-making. This system can serve as a model for other educational institutions seeking efficient teacher evaluation methods. **Limitation :** Despite its effectiveness, the DSS application relies heavily on the selected criteria and weightings, which may not fully capture qualitative aspects of teacher performance. Additionally, the WP method may not always be the most optimal approach, necessitating further evaluation. **Future Research :** Future studies should refine the criteria and parameters used in the WP method to enhance its relevance and reliability. Additionally, comparing the WP method with alternative techniques such as AHP or hybrid models could further improve accuracy and decision-making effectiveness in teacher selection.

REFERENCES

[1] E. Sulistiyorini and T. H. Andika, "Sistem Pengambilan Keputusan Menentukan Guru Teladan di SMP Negeri 2 Gadingrejo Menggunakan Metode Preference Rangking Organization Method For Enrichment Evaluation (Promethee) dan Weighted Product (WP)," *Aishah J. informatics Electr. Eng.*, vol. 2, no. 2, pp. 135–144, 2022.

[2] D. A. Fakhri, R. Sovia, and S. A. Lusinia, "Sistem Pengambilan Keputusan Pengangkatan Guru Tetap Menggunakan Metode Penggabungan Analytic Hierarchy Process Dan Weighted Product (Studi Kasus : Bimbel Gama Cabang Bukittinggi)," no. 27, 2020.

[3] N. A. Syafitri and A. P. Dewi, "Penerapan Metode Weighted Product Dalam Sistem Pendukung Keputusan Pemilihan Laptop Berbasis Web," *semanTIK*, vol. 2, no. 1, pp. 169–176, 2016, doi: 10.1016/j.bmc.2010.09.050.

[4] N. Marpaung, M. Handayani, and R. Yesputra, "Sistem Pendukung Keputusan Pemilihan Dosen Terbaik Dengan Metode Weighted Product (WP) Pada STMIK Royal," *Semin. Nas. R. 2018*, vol. 9986, no. September, pp. 267–270, 2018.

[5] I. Ghofur, H. Sibyan, and N. Hasanah, "Qomarul Huda Banaran Menggunakan Metode Weighted Product (Wp) Berbasis Web," vol. 3, no. 1, pp. 8–19, 2023.

[6] B. Prasetyo and L. M. Jannah, *Lina Miftahul Jannah Metode Penelitian Kuantitatif: Teori dan Aplikasi*. PT RajaGrafindo Persada, 2009.

[7] D. L. Hamdi, A. A. Trinoto, and N. Ali, "Sistem Pendukung Keputusan Pemilihan Guru Terbaik Berbasis Netbeans dengan Metode Weighted Product pada SMP XYZ Bojonggede," *J. Ris. dan Apl. Mhs. Inform.*, vol. 4, no. 04, pp. 791–798, 2023, doi: 10.30998/jrami.v4i04.9152.

[8] A. Sugiarto, R. Rizky, S. Susilowati, A. M. Yunita, and Z. Hakim, "Metode Weighted Product Pada Sistem Pendukung Keputusan Pemberian Bonus Pegawai Pada CV Bejo Perkasa," *Bianglala Inform.*, vol. 8, no. 2, pp. 100–104, 2020, doi: 10.31294/bi.v8i2.8806.

*__Andi Putra(Corresponding Author)__
Informatics Study Program, Technology College of Payakumbuh West Sumatra, Indonesia
Email: andiputramkom@gmail.com

Rini Budiarni
Informatics Study Program, Technology College of Payakumbuh West Sumatra, Indonesia
Email: rinibudiarni@gmail.com

Ocha Raganata Kesuma
Informatics Study Program, Technology College of Payakumbuh West Sumatra, Indonesia
Email: kesumaocha30@gmail.com