KOMPUTASI: JURNAL ILMIAH ILMU KOMPUTER DAN MATEMATIKA
VOL. 21 (2) (2024), 97-103, p-ISSN: 693-7554, e-ISSN:2654-3990

Implementation of the Simple Additive Weighting Method in Determining Favorite Lecturers Based on Student Preferences

Ahmad Jurnaidi Wahidin[1*], **Ratnasari**[2], **Agustinus Eko Setiawan**[3]

[1] Faculty of engineering and informatics, Bina Sarana Informatika University, Jakarta, Indonesia
[2,3] Faculty of technology & informatics, Aisyah University of Pringsewu, Lampung, Indonesia

Abstract

The issue in this study is the often subjective and unstructured process of evaluating lecturer performance, which typically involves only the preferences of campus management without including students' input. The objective of this study is to develop a decision support system that can evaluate and rank favorite lecturers based on student preferences in higher education institutions. The method used is Simple Additive Weighting (SAW). The research steps include developing a Likert scale-based questionnaire to collect data from students regarding lecturer performance, which is evaluated based on four main aspects: Pedagogy, Professionalism, Personality, and Social Interaction. The collected data is analyzed using the SAW method to calculate the total value of each lecturer alternative. The evaluation results show that Alternative A2 has the highest score with a value of 0.997, indicating that the associated lecturer received high ratings in all aspects assessed by students. The recommendation from this study is the implementation of a SAW-based decision support system to enhance objectivity and efficiency in lecturer performance evaluation, as well as to provide valuable feedback for the professional development of lecturers. This study not only contributes to the field of higher education but also brings innovation in the use of information technology to improve educational management.

Keywords: *Decision Support System; Educational Management; Lecturer Performance Evaluation; Simple Additive Weighting; Student Preferences.*

1. Introduction

In the era of continuous educational development, lecturers play a pivotal role as mentors and are no longer just sources of knowledge for students [1]. The role of lecturers in higher education extends beyond teaching, instructing, training, guiding, and evaluating [2] [3], but also involves mentoring and inspiring students. In this context, evaluating the performance of lecturers becomes crucial to ensure a quality learning experience for students [4][5]. However, this assessment process often becomes subjective and less structured, because it only involves the preferences of campus management without involving students..

The limitations in evaluating lecturers' performance based on student preferences serve as the primary background for conducting this research. The fundamental problem that arises is how to develop a decision support system that can assist in evaluating and ranking favorite lecturers based on student preferences more objectively and systematically, not only from the perspective of university management.

The primary focus in the modern world of education is to adopt a holistic approach in developing an educator's response to global challenges [6] [7]. There are four main aspects that shape the ideal educator: Pedagogy, Professionalism, Personality, and Social Interaction. Each aspect contributes uniquely to shaping the character of an educator who has the ability to lead and inspire their students [8].

Related literature has explored ways to enhance the capabilities of lecturers in response to the educational dynamics of the 21st century aimed at preparing lecturers as actors responsive to the ongoing global transformation [9]. Routine evaluation of lecturers' performance in higher education is crucial in improving quality [10] [11] [4] [12].

*Corresponding author. *E-mail address:* ahmad.ajn@bsi.ac.id
Received: 16 May 2024, Accepted: 28 July 2024 and available online 31 July 2024
DOI: https://doi.org/10.33751/komputasi.v21i2.5260

Through this approach, we can integrate various relevant criteria, such as pedagogical aspects, professionalism, personality, and social interaction, in evaluating the performance of lecturers holistically [13][14]. The implementation of Decision Support System (DSS) contributes to assisting in decision-making to determine the best lecturer in higher education [15] [16]. The Simple Additive Weighting (SAW) method is a valuable tool in decision support systems for selecting the best lecturers based on management assessments without involving students [17]

In this study, the researcher proposes the Simple Additive Weighting (SAW) method as an approach to address the issues at hand [18]. Simple Additive Weighting (SAW) is used to carry out assessments based on predetermined decision making multi-criteria[19] [20] [21] [22], this method allows the use of weights on each predetermined criterion to generate a total value [23].

The novelty of this research lies in evaluating lecturer performance from student preferences with the development of a decision support system that can increase objectivity and efficiency., as well as provide valuable feedback for the professional development of lecturers. Therefore, this research not only contributes to the field of higher education but also brings innovation in the use of information technology to improve educational management.

This evaluation process often becomes subjective and unstructured because it involves only the preferences of campus management without considering student input. This can lead to issues such as unfair and inaccurate assessments of lecturer performance, ultimately affecting the quality of education. By implementing automated methods like the Simple Additive Weighting (SAW), the evaluation process can become more objective and systematic, ensuring that all aspects of lecturer performance are assessed thoroughly and fairly.

2. Methods

This research was conducted through a series of structured and measurable steps to develop a decision support system in evaluating and ranking favorite lecturers based on student preferences, using a quantitative approach to collect data on students' preferences for their favorite lecturers. The research design involved the development of a Likert scale-based questionnaire to assess the performance of lecturers based on predetermined criteria [24].

Research Procedure:

a) Development of questionnaires based on predetermined assessment criteria, namely pedagogical aspects, professionalism, personality, and social interaction.
b) Data collection through questionnaires distributed to a sample of students representing the target population. Students are asked to assess each of their favorite lecturers using a Likert scale.
c) Analysis of the collected data using the Simple Additive Weighting (SAW) method to calculate the total value of each lecturer alternative. The steps for solving using the SAW method are as follows [25] [26] [27]:
   1) Determining the criteria to be used to evaluate alternatives (Ci).
   2) Determining the weight values (W) and categories for each criterion.
      There are 2 categories, namely benefit and cost. Benefit and cost are inversely related, where the higher the benefit, the better, while for cost it should be smaller [28].
   3) Determining the suitability rating for each alternative for each criterion.
   4) Creating a decision matrix based on the criteria (Ci).

Table 1. Matrix

$$R = \begin{vmatrix} r11 & r21 & r31 \\ r12 & r22 & r32 \\ r13 & r23 & r33 \end{vmatrix}$$

   5) Then, the matrix normalization is conducted based on the adapted equation according to the attribute type (either benefit or cost attribute), resulting in the normalized matrix R.
      The formula utilized for normalization is depicted in equation (1).

$$\mathbf{r_{ij}} = \begin{cases} \dfrac{\mathbf{x_{ij}}}{\mathbf{Max\ x_{ij}}} & \text{if j is the benefit category} \\ \square & \\ \dfrac{\mathbf{Min\ x_{ij}}}{\mathbf{x_{ij}}} & \text{if j is the cost category} \end{cases} \quad (1)$$

Explanation:
rij = normalized evaluation of performance
Maxij = maximum value for every column and row
Minij = minimum value for every column and row

Xij = the matrix's row and column
where i = 1,2,...,m and j = 1,2,...,n represent the normalized performance rating of alternative Ai on attribute Cj.

6) Calculate the total value for each alternative by summing the normalized R matrix multiplication results with the weight vector.

The preference value for each alternative (Vi) is determined using equation (2).

$$V_i = \sum_{j=1}^{n} w_j \, r_{ij} \qquad (2)$$

Explanation:
Vi = The final value of the alternative
wj = The predetermined weight
rij = Normalized matrix
A higher Vi value indicates that alternative Ai is more preferable.

7) Compare the total values for each alternative and select the alternative with the highest total value.

3. Result and Discussion

The Results and Discussion section highlights the main findings of the study, demonstrating the determination of criteria to the comparison of values between the evaluated alternatives, and providing an in-depth analysis of the calculation results. This provides a clear understanding of the quality and preferences of the alternatives.

3.1. Determining the criteria to be used for evaluating alternatives

This research employs four criteria in determining the best alternative.

a) Pedagogical Aspect
In the context of education, the pedagogical aspect is not only limited to the delivery of material but also encompasses the ability to guide and inspire. In the current digital era, lecturers are required to sharpen their skills in utilizing technology as an efficient and effective means of learning.

b) Professional Aspect
A lecturer with professional qualifications not only acts as an instructor in the classroom but also assumes the role of a leader and inspirer, as well as being an agent of change in educational innovation.

c) Personality Aspect
The character of a student is significantly influenced by the personality of the lecturer. Traits such as honesty, responsibility, and empathy are expected to be demonstrated by lecturers to their students.

d) Social Interaction Aspect
Social interaction is not only focused on the relationship between lecturers and students but also includes the involvement of lecturers in interactions with their peers and students' parents.

Table 2. Criteria

The Criteria Code	Criteria
C1	Pedagogical Aspect
C2	Professional Aspect
C3	Personality Aspect
C4	Social Interaction Aspect

3.2. Determining Weight Values (W) and Categories

In this research, the assignment of weight values is obtained through interviews with the head of the study program to acquire a more precise comparison regarding the criteria weights. Unlike other approaches, this research establishes that all criteria fall into the benefit category, where higher values indicate better quality. The determination of weight values and categories for each criterion is shown in Table 3.

Table 3. Weight Values and Categories on Criteria

The Criteria Code	Weight (W)	Category
C1	0,25	Benefits

C2	0,3	Benefits
C3	0,25	Benefits
C4	0,2	Benefits

3.3. Determining the suitability rating of each alternative for each criterion.

In this step, the researcher utilizes a questionnaire as the primary instrument to collect data, where the aim is to evaluate 7 lecturers considered as alternatives, with each lecturer being assessed on 4 aspects that serve as the research criteria. Each question in the questionnaire is rated using a Likert scale with weight values ranging from 1 to 5. To achieve the average value of each aspect that is the focus of the research, the total value of each aspect is divided by the number of respondents involved in the study. The data generated is then presented in a tabular format for further analysis.

Table 4. Evaluation Result of Each Alternative

	C1	C2	C3	C4
A1	3,50	3,72	3,83	3,72
A2	4,33	4,56	4,44	4,39
A3	3,50	3,78	3,94	3,56
A4	3,56	3,72	4,28	3,89
A5	4,06	4,17	4,50	4,39
A6	3,72	4,22	4,22	3,72
A7	3,72	3,78	3,78	3,89

3.4. Creating a decision matrix based on criteria (Ci)

From the values in Table 4, they are converted into a matrix as follows:

Table 5. A Decision Matrix

3,5	3,72	3,83	3,72
4,33	4,56	4,44	4,39
3,5	3,78	3,94	3,56
3,56	3,72	4,28	3,89
4,06	4,17	4,5	4,39
3,72	4,22	4,22	3,72
3,72	3,78	3,78	3,89

3.5. Matrix normalization

Matrix normalization uses equation (1), the results of normalization for the first to the fourth criteria are as follows:

Table 6. Normalization

R=

0,81	0,82	0,85	0,85
1	1	0,99	1
0,81	0,83	0,88	0,81
0,82	0,82	0,95	0,89
0,94	0,91	1	1
0,86	0,93	0,94	0,85
0,86	0,83	0,84	0,89

3.6. Calculating the total value for each alternative

At this stage, to determine the preference value, the calculation is done using equation (2), with weight value W = 0.25 0.3 0.25 0.2. The calculation is obtained as follows:

V1=(0,25x3,5) + (0,3x3,72) + (0,25x3,83) + (0,2x3,72) = **0,830**
V2=(0,25x4,33)+ (0,3x4,56) + (0,25x4,44) + (0,2x4,39) = **0,997**
V3=(0,25x3,5) + (0,3x3,78) + (0,25x3,94) + (0,2x3,56) = **0,832**
V4=(0,25x3,56)+ (0,3x3,72) + (0,25x4,28) + (0,2x3,89) = **0,865**
V5=(0,25x4,06)+ (0,3x4,17) + (0,25x4,5) + (0,2x4,39) = **0,958**
V6=(0,25x3,72)+ (0,3x4,22) + (0,25x4,22) + (0,2x3,72) = **0,897**

V7=(0,25x3,72)+ (0,3x3,78) + (0,25x3,78) + (0,2x3,89) = **0,851**

The results of the preference calculation above are presented in Table 7.

Table 7. Preference Value

Alternative	Preference (Vi)
A1	0,830
A2	0,997
A3	0,832
A4	0,865
A5	0,958
A6	0,897
A7	0,851

3.7. Compare the total values

From Table 7, then compare and rank each alternative and select the alternative with the highest total value.

Table 8. Ranking

Rank	Preference	Alternative
1	0,997	A2
2	0,958	A5
3	0,897	A6
4	0,865	A4
5	0,851	A7
6	0,832	A3
7	0,830	A1

Referring to Table 8, the highest value was obtained with a preference score of 0.997 held by A2, followed by A5, A6, A4, A7, A4, and finally A1.

4. Conclusion

Based on the calculation results using the Simple Additive Weighting (SAW) method on the evaluation data of lecturers' performance by students, it was found that the best alternative according to students' preferences is Alternative A2, which has the highest total score with a value of 0.997. This indicates that the lecturers associated with this alternative received high ratings in the pedagogical, professionalism, personality, and social interaction aspects from the students. These results provide a clear view of the favorite lecturers favored by the students, which can serve as a basis for educational institutions to improve educational management and enrich students' learning experiences.

References

[1] F. Gultom and H. Hernawaty, "Peran Dosen dalam Implementasi Kampus Merdeka," *All Fields Sci. J. Liaison Acad. Sosiety*, vol. 2, no. 4, pp. 217–225, 2022.

[2] E. I. Hamzah, "Peran Dosen Muda Dalam Membentuk Karakter Sosial Mahasiswa Di UIN Datokarama Palu," *Moderasi J. Stud. Ilmu Pengetah. Sos.*, vol. 4, no. 1, pp. 33–46, 2023.

[3] R. Ramadhani and R. F. Siregar, "Analisis Peran Dosen Pembimbing Lapangan Dan Mahasiswa Kampus Mengajar Angkatan 4 Di SD Negeri 101805 Batu Rejo," *J. Math. Educ. Sigma [JMES]*, vol. 4, no. 1, pp. 36–47, 2023.

[4] A. Lisdiyanto, "Sistem Penilaian Kinerja Tridharma Dosen Menggunakan SAW," *J. Teknol. Dan Sist.*

Inf. Bisnis, vol. 5, no. 1, pp. 69–72, 2023.

[5] O. Maharani and I. Rindaningsih, "Penilaian Kinerja Sebagai Penentu Prestasi Dan Kinerja Tenaga Kependidikan: Literature Review," *MAMEN J. Manaj.*, vol. 2, no. 1, pp. 159–170, 2023.

[6] A. Pare and H. Sihotang, "Pendidikan Holistik untuk Mengembangkan Keterampilan Abad 21 dalam Menghadapi Tantangan Era Digital," *J. Pendidik. Tambusai*, vol. 7, no. 3, pp. 27778–27787, 2023.

[7] A. Bier and D. Lasagabaster, "A holistic approach to language attitudes in two multilingual educational contexts," in *Modern Approaches to Researching Multilingualism: Studies in Honour of Larissa Aronin*, Springer, 2024, pp. 381–414.

[8] WartaGuru, "Kompetensi Guru : Pedagogik, Profesional, Kepribadian, dan Sosial," *wartaguru.id*, 2023. https://wartaguru.id/kompetensi-guru-pedagogik-profesional-kepribadian-dan-sosial/#:~:text=Artikel ini akan membahas empat aspek kunci yang,pendidik yang mampu memimpin dan menginspirasi siswa mereka.

[9] T. P. Pertiwi, D. D. Pangestuti, W. D. Febrian, A. H. Nove, R. Megavitry, and S. Imanirubiarko, "Strategi Pengembangan Kompetensi Dosen Untuk Menanggapi Tantangan Pendidikan Abad Ke-21," *J. Rev. Pendidik. Dan Pengajaran*, vol. 7, no. 1, pp. 2586–2596, 2024.

[10] F. T. Wulandari, A. Triayudi, M. Mesran, and K. Sussolaikah, "Sistem Pendukung Keputusan Penilaian Kinerja Dosen Menggunakan Metode (COPRAS)," *J. Inf. Syst. Res.*, vol. 5, no. 2, pp. 592–602, 2024.

[11] A. Ahyuna, B. Rahman, F. Nugroho, I. W. S. Nirawana, and A. Karim, "Analisa Penerapan Metode MABAC dengan Pembobotan Entropy dalam Penilaian Kinerja Dosen di Era Society 5.0," *Build. Informatics, Technol. Sci.*, vol. 5, no. 1, pp. 29–39, 2023.

[12] D. P. Indini, T. A. Siregar, and D. P. Utomo, "Implementasi Metode EDAS Dalam Penilaian Kinerja Dosen Pada Masa Pandemi Covid-19 dengan Pembobotan Entropy," *J. Informatics, Electr. Electron. Eng.*, vol. 3, no. 2, pp. 190–202, 2023.

[13] L. Napida, G. R. Tirta, H. Hilmin, and D. Noviani, "Pendidikan Holistik Komprehensif," *Faidatuna*, vol. 5, no. 1, pp. 125–135, 2024.

[14] L. Nahnu Najib, "Pendidikan Holistik Dalam Perspektif Kh Imam Zarkasyi." Universitas Muhammadiyah Ponorogo, 2023.

[15] S. Fernandez, C. Prihantoro, and A. K. Hidayah, "Implementasi Weighted Product Pada Pemilihan Dosen Terbaik di Universitas Muhammadiyah Bengkulu," *Pseudocode*, vol. 8, no. 2, pp. 126–133, 2021.

[16] S. Syam and N. Komalasari, "Implementasi Metode WASPAS Dalam Sistem Pendukung Keputusan Pemilihan Dosen Terbaik," *Jutis (Jurnal Tek. Inform.*, vol. 11, no. 2, pp. 151–159, 2023.

[17] C. A. Gemawaty and Y. Yuliani, "Pemilihan Dosen Terbaik dengan Metode SAW (Simple Additive Weighting)," *JISAMAR (Journal Inf. Syst. Applied, Manag. Account. Res.*, vol. 7, no. 3, pp. 711–717, 2023.

[18] "Aplikasi_SPK_Pemilihan_Dosen_Terbaik_Met." .

[19] B. Bachchhav, S. Bharne, A. Choudhari, and S. Pattanshetti, "Selection of spot welding electrode material by AHP, TOPSIS, and SAW," *Mater. Today Proc.*, 2023.

[20] H. Aulawi, F. Nuraeni, R. Setiawan, W. F. Rianto, A. S. Pratama, and H. Maulana, "Simple Additive Weighting in the Development of a Decision Support System for the Selection of House Construction Project Teams," in *2023 International Conference on Computer Science, Information Technology and Engineering (ICCoSITE)*, 2023, pp. 517–522, doi: 10.1109/ICCoSITE57641.2023.10127813.

[21] H. Jin, "Analyzing factors and resource policymaking options for sustainable resource management

and carbon neutrality in mining industry: Empirical study in China," *Resour. Policy*, vol. 86, p. 104185, 2023.

[22] A. Ibrahim and R. A. Surya, "The Implementation of Simple Additive Weighting (SAW) Method in Decision Support System for the Best School Selection in Jambi," *J. Phys. Conf. Ser.*, vol. 1338, no. 1, p. 12054, 2019, doi: 10.1088/1742-6596/1338/1/012054.

[23] L. V Aprilian and M. H. K. Saputra, *Belajar cepat metode SAW*. Kreatif, 2020.

[24] P. Utomo, A. Budiman, and D. N. Amadi, "Optimasi Metode Simple Additive Weighting Menggunakan Skala Likert dalam Aplikasi Pemilihan Peserta Rapat Bersih Dusun," *J. Comput. Inf. Syst. Ampera*, vol. 4, no. 3, pp. 141–156, 2023.

[25] I. As'ad *et al.*, *Buku sistem pendukung keputusan (SPK) [sumber elektronis]*. Yogyakarta: Nuta Media, 2023.

[26] I. A. Setyani and Y. R. Sipayung, "Sistem Pendukung Keputusan Menentukan Siswa Berprestasi dengan Metode SAW (Simple Addtive Weighting)," *J. Sist. Komput. dan Inform.*, vol. 4, no. 4, pp. 632–641, 2023.

[27] N. Hanin and A. Adi, "Sistem Pendukung Keputusan Pemilihan Cafe Bagi Mahasiswa Kota Pontianak Dengan Metode SAW," *J. Nas. Teknol. Dan Sist. Inf.*, vol. 9, no. 2, pp. 95–102, 2023.

[28] N. Vafaei, R. A. Ribeiro, and L. M. Camarinha-Matos, "Assessing Normalization Techniques for Simple Additive Weighting Method," *Procedia Comput. Sci.*, vol. 199, pp. 1229–1236, 2022, doi: https://doi.org/10.1016/j.procs.2022.01.156.