JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol XI No 3, Juni 2025, hlm. 565 – 572 ISSN 2550-0201 (Online)
DOI: https://doi.org/ 10.33330/jurteksi.v11i3.4019
Available online at https://jurnal.stmikroyal.ac.id/index.php/jurteksi

DATA STRUCTURE MODELING IN THE BEST TEACHER RATING SYSTEM USING TOPSIS ALGORITHM

Parini[1*], Febby Madona Yuma[1]
[1]Information System, Universitas Royal
Email: [*]parini.royal@gmail.com

Abstract: Teacher performance appraisal is a very important aspect in improving the quality of education today, but often occurs during the assessment process of subjectivity constraints and lack of a structured system, in this study aims to build a data structure modeling and facilitate the school MAS Islamiyah Hessa Air Genting in the assessment to determine the best teacher transparently and measurably by using the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) algorithm. The TOPSIS method was chosen because it is able to provide ranking results based on the closeness of alternatives to the ideal solution. In this modeling, assessment criteria data such as pedagogical, professional, personality, social competencies, as well as other indicators such as teacher discipline and achievement are modeled structurally in a relational database. The results show that the designed data structure is able to support the decision-making process efficiently and objectively.

Keywords: data structure; decision support system; teacher assessment; topsis; ranking.

Abstrak: Penilaian kinerja guru merupakan aspek yang sangat penting dalam peningkatan mutu pendidikan saat ini, namun sering terjadi saat proses penilaian kendala subjektivitas dan kurangnya sistem yang terstruktur, dalam penelitian ini bertujuan untuk membangun pemodelan struktur data serta mempermudah pihak sekolah MAS Islamiyah Hessa Air Genting dalam penilaian untuk menentukan guru terbaik secara transparan dan terukur dengan menggunakan algoritma Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). Metode TOPSIS dipilih karena mampu memberikan hasil perankingan berdasarkan kedekatan alternatif terhadap solusi ideal. Dalam pemodelan ini, data kriteria penilaian seperti kompetensi pedagogik, profesional, kepribadian, sosial, serta indikator lain seperti kedisiplinan dan prestasi guru dimodelkan secara terstruktur dalam basis data relasional. Hasil penelitian menunjukkan bahwa struktur data yang dirancang mampu mendukung proses pengambilan keputusan secara efisien dan objektif.

Kata kunci: struktur data; topsis; penilaian guru; sistem pendukung keputusan; perangkingan

INTRODUCTION

In today's world of education, the quality of teachers is one of the main factors that determine the success of educational programs in schools such as the teaching and learning process, improving the quality of schools requires professional teachers. Professional teachers who have the responsibility to educate, teach, guide, train, and conduct assessments and evaluations of students.

One important step in improving the quality of education in Indonesia is to

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol XI No 3, Juni 2025, hlm. 565 – 572 ISSN 2550-0201 (Online)
DOI: https://doi.org/ 10.33330/jurteksi.v11i3.4019
Available online at https://jurnal.stmikroyal.ac.id/index.php/jurteksi

evaluate teacher performance. This evaluation plays a role in encouraging the enthusiasm, dedication, and professionalism of teachers, as well as being a form of appreciation for their contribution and dedication [1].

A teacher's performance can be considered successful if all assessment criteria have been met. If all of these criteria are achieved, then the quality of the teacher's work is considered good [2]. One of the schools in Asahan Regency, namely MAS Islamiyah Hessa Air Genting, always gives awards to teachers who are considered the best teachers, currently the best teacher assessment at MAS Islamiyah Hessa Air Genting still uses manual and subjective methods, thus creating the potential for bias and injustice in this assessment cannot be said to be efficient and effective.

Therefore, to avoid the subjectivity of the decisions produced, an objective, transparent, and structured assessment system is needed to evaluate teacher performance as a whole. To determine who is the best teacher, a decision support system is used. Decision support system A system that can provide support in solving problems and delivering solutions to problems that are semi-structured or unstructured [3].

Data structures and algorithms are crucial components that are interrelated and support the development of optimal and efficient applications. Greater focus on these two aspects can result in significant improvements, especially in terms of access speed, as well as provide clear guidance in improving the way problems are solved or finding more effective solutions [4].

Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) Algorithm One of the methods that can be used in the assessment of the best teachers based on previous research conducted by Iffan effendi with the title Implementation of the Topsis Method to improve the best teacher assessment provides results using the TOPSIS method declared to pass the blackbox testing test [5].

Furthermore, previous research conducted by Jihan Khoirunisa Anggraini and Mira Orisa with the title Decision Support System for selecting the best teacher with the Web-based Topsis method (Case Study of SMAN 1 Kuaro) gave the results of obtaining the highest alternative value, namely A9 with a value of 0.7365 in system calculations and with this system it can help minimize errors, be more effective and efficient in evaluating the best teachers at SMAN 1 Kuaro [6], then research conducted by Janeman Sumah with the title Ideal Learning Model: Collaboration of TOPSIS Method and Decision Tree Algorithm gives the results of data processing and data testing, the algorithm can process well with Cross Validation Method fold = 10 and produces an accuracy rate of 94.6947% [7].

Based on the above background, problems can be formulated that can be solved, namely how to model the data structure in the best teacher assessment system using the topsis algorithm at MAS Islamiyah Hessa Air Genting based on the criteria values and weights that have been determined, thus this study aims to facilitate the MAS Islamiyah Hessa Air Genting school in the assessment to determine the best teacher using the topsis algorithm to be more effective and efficient.

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol XI No 3, Juni 2025, hlm. 565 – 572 ISSN 2550-0201 (Online)
DOI: https://doi.org/ 10.33330/jurteksi.v11i3.4019
Available online at https://jurnal.stmikroyal.ac.id/index.php/jurteksi

METHODS

Data Collection

Data collection is a technique used to collect certain information or facts. One of the important elements in research is the data collection stage. Errors during the data collection process can lead to less accurate analysis results. Therefore, the data used must be precise and relevant [8]. To complete the data for the best teacher assessment decision support system using the topsis algorithm, the conducted data collection methods in the following ways [9]:

Observation, This study conducted observations at MAS Islamiyah Hessa Air Genting by observing directly in the field to collect data.

Interview, This interview involved a question and answer session with seven teachers on matters related to the process of determining the best teacher. These included pedagogical, professional, social, and personality assessments, among others.

Literature Study, The data collection stage regarding information related to the topsis algorithm on the web such as journals, books etc.

TOPSIS Method

TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) is a multicriteria decision-making method used to determine the best alternative from a number of choices, based on the concept that the selected alternative must have the closest distance from the positive ideal solution and the farthest distance from the negative ideal solution [10]. The completion steps in using the TOPSIS method are as follows:

Describing alternatives (*m*) and criteria (*n*) into a matrix, where *Xij* is the measurement of the choice of the *i-th* alternative and the *j-th* criterion.

Create a matrix R, which is a normalized decision matrix. Each normalization of the value, Make weighting on the normalized matrix. After normalization, each column in matrix R is multiplied by the weights (*wj*), Determine the value of positive ideal solutions and negative ideal solutions. The ideal solution is denoted A+, while the negative ideal solution is denoted A-. the equation for determining the ideal solution can be seen in equation four, Calculate the separation measure.

This separation measure is a measurement of the distance or difference from an alternative to a positive ideal solution and a negative ideal solution, Calculating the preference value for each alternative. To determine the ranking *of each* alternative, it is necessary to first calculate the preference value of each alternative [11].

RESULTS AND DISCUSSION

The criteria that are assessed in determining the best teacher can be seen in table 1:

Table. 1 Weight Value

Code	Criteria	Value
K1	Padagogic	20%
K2	Professional	15%
K3	Social	10%
K4	Personality	10%
K5	Discipline	15%
K6	Teaching Innovation and Creativity	10%
K7	Achievement & Award	10%
K8	Student & Parent Satisfaction	10%

Padagogic competence assesses the teacher's ability to manage student learning in the classroom, here is the padagogic table:

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol XI No 3, Juni 2025, hlm. 565 – 572 ISSN 2550-0201 (Online)
DOI: https://doi.org/ 10.33330/jurteksi.v11i3.4019
Available online at https://jurnal.stmikroyal.ac.id/index.php/jurteksi

Table 2. Padagogic (K1)

No	Set	Description	Rating
1	>90	Very good	5
2	71-89	Good	4
3	60-70	Fair	3
4	50- 60	Less	2
5	<50	Very Poor	1

Professional Competence assessed mastery of subject matter, methodology, and scientific development in teachers can be seen in the table 3:

Table 3. Professional (K2)

No	Set	Description	Rating
1	>90	Very good	5
2	71-89	Good	4
3	60-70	Fair	3
4	51- 60	Less	2
5	<50	Very less	1

Social Competence assessed from the ability to interact with students, coworkers and the community can be seen in the following table 4:

Table 4. Social (K3)

No	Set	Description	Rating
1	>90	Very good	5
2	71-89	Good	4
3	60-70	Fair	3
4	52- 60	Less	2
5	<50	Very Less	1

Personality can be seen from the teacher who is authoritative, stable and an example of assessment:

Table 5. Personality (K4)

No	Set	Description	Rating
1	>90	Very good	5
2	71-89	Good	4
3	60-70	Fair	3
4	53- 60	Less	2
5	<50	Very less	1

Work Discipline is assessed from punctuality, teacher attendance and compliance with existing school rules.

Table 6. Discipline (K5)

No	Set	Description	Rating
1	>90	Very good	5
2	71-89	Good	4
3	60-70	Fair	3
4	54- 60	Less	2
5	<50	Very less	1

Teaching innovation and creativity in teachers can be assessed from how to use methods, media, and learning technology in class can be seen in the following table:

Table 7. Teaching Innovation and Creativity (K6)

No	Set	Description	Rating
1	>90	Very good	5
2	71-89	Good	4
3	60-70	Fair	3
4	55- 60	Less	2
5	<50	Very Less	1

Achievement and Reward in teachers can be assessed by academic achievement and and technology in learning assessment can be seen in the following table:

Table 8. Achievements and Awards (K7)

No	Set	Description	Rating
1	>90	Very good	5
2	71-89	Good	4
3	60-70	Fair	3
4	56- 60	Less	2
5	<50	Very less	1

Student and Parent Satisfaction with Teachers is assessed when students and parents/guardians fill out a questionnaire that is given when collecting report cards to assess teacher performance. The assessment can be seen in table 9:

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol XI No 3, Juni 2025, hlm. 565 – 572 ISSN 2550-0201 (Online)
DOI: https://doi.org/ 10.33330/jurteksi.v11i3.4019
Available online at https://jurnal.stmikroyal.ac.id/index.php/jurteksi

Table 9. Student parent satisfaction (K8)

No	Set	Description	Rating
1	>90	Very good	5
2	71-89	Good	4
3	60-70	Fair	3
4	57- 60	Less	2
5	<50	Very less	1

Each sub-criterion is evaluated based on a specific value range. The value assigned to each alternative across all criteria is determined by the policymaker, namely the school principal. The values can be seen in Table 10..

Table 10. Criteria Value

Name	K1	K2	K3	K4	K5	K6	K7	K8
Juraida	5	3	4	4	4	4	2	2
Budi Utomo	3	4	4	5	5	3	3	2
Syarifah	4	4	4	4	5	4	2	5
Arif Ihtisan	4	5	2	2	3	3	3	4
Febby Yulianh	5	3	2	4	4	4	4	5
Sartika	2	3	5	5	3	3	3	4
Muhklis	3	5	4	4	4	4	2	3
Hendri	4	5	4	2	2	4	5	4

The assessment process to determine the best teacher at MAS Islamiyah Hessa Air Genting.

1. The preparation of a normalized and weighted decision matrix is carried out using the standard formula of the TOPSIS method.

$$\text{Formula= } r_{ij}=\frac{x_{ij}}{\sqrt{\sum_{i}^{m}=1\ x_{ij}^{2}}} \qquad (1)$$

K1= $\sqrt{5(2)}$+(3) (2)+(4) (2)+(4) (2)+(5) (2)+ (2) (2)+(3) (2)+(4) (2) (=2,806)

K2= $\sqrt{3(2)}$+(4) (2)+(4) (2)+(5) (2)+(3) (2)+ (3) (2)+(5) (2)+(5) (2) (=2.8112)

K3= $\sqrt{4(2)}$+(4) (2)+(4) (2)+(2) (2)+(2) (2)+(5) (2)+(4) (2)+(4) (2) (=2.8084)

K4= $\sqrt{4(2)}$+(5) (2)+(4) (2)+ (2) (2)+(4) (2)+(5) (2)+(4) (2)+ (2) (2) (=2.801)

K5= $\sqrt{4(2)+5^{2}}$+(5) (2)+(3) (2)+(4) (2)+(3) (2)+(4) (2)+(2) (2)(= 2.8065)

K6= $\sqrt{4(2)}$+(3) (2)+(4) (2)+(3) (2)+(4) (2)+(3) (2)+(4) (2)+(4) (2)(= 2.8209)

K7= $\sqrt{2(2)+3^{2}}$+(2) (2)+(3) (2)+(4) (2)+(3) (2)+(2) (2)+(5) (2) (= 2.7952)

K8= $\sqrt{2(2)}$+(2) (2)+(5) (2)+(4) (2)+(5) (2)+(4) (2)+(3) (2)+(4) (2) (= 2.7993)

The following is a display of the decision matrix after going through the normalization process, which is presented in tabular

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol XI No 3, Juni 2025, hlm. 565 – 572 ISSN 2550-0201 (Online)
DOI: https://doi.org/ 10.33330/jurteksi.v11i3.4019
Available online at https://jurnal.stmikroyal.ac.id/index.php/jurteksi

Table 11. Normalization

K1	0.4181	0.3252	0.3391	0.3484	0.4181	0.2788	0.3252	0.3531
K2	0.3094	0.336	0.3536	0.3978	0.3094	0.3094	0.3978	0.3978
K3	0.3622	0.3529	0.3622	0.2786	0.2786	0.418	0.3715	0.3808
K4	0.3614	0.4066	0.3614	0.2711	0.3614	0.4066	0.3614	0.2711
K5	0.3621	0.4074	0.4074	0.3169	0.3621	0.3169	0.3621	0.2716
K6	0.3578	0.3211	0.3669	0.3211	0.3899	0.3211	0.3669	0.3761
K7	0.2963	0.3457	0.2963	0.3457	0.4247	0.3457	0.2963	0.4445
K8	0.2799	0.2799	0.4199	0.3639	0.4199	0.3546	0.3266	0.3546

Next, the calculation of the weighted normalization matrix is carried out, with weights taken from Table 1.

Formula $y_{ij} = w_{(i)\,rij}$ (2)

The calculation results are shown in the following table:

Table 12. Weighting Results

K1	0.0836	0.065	0.0678	0.0697	0.0836	0.0558	0.065	0.0706
K2	0.0464	0.0504	0.053	0.0597	0.0464	0.0464	0.0597	0.0597
K3	0.0362	0.0353	0.0362	0.0279	0.0279	0.0418	0.0372	0.0381
K4	0.0361	0.0407	0.0361	0.0271	0.0361	0.0407	0.0361	0.0271
K5	0.0543	0.0611	0.0611	0.0475	0.0543	0.0475	0.0543	0.0407
K6	0.0358	0.0321	0.0367	0.0321	0.039	0.0321	0.0367	0.0376
K7	0.0296	0.0346	0.0296	0.0346	0.0425	0.0346	0.0296	0.0445
K8	0.028	0.028	0.042	0.0364	0.042	0.0355	0.0327	0.0355

2. Calculating the distance matrix of alternatives with positive ideal and negative ideal solutions. The first step, to calculate the value of each alternative with a positive ideal solution matrix.

Positive Ideal Formula

$$D^{I+} = \sum_{i=1}^{n} (yi + -yij)2 \quad (3)$$

Negative Ideal Formula

$$D^{I-} = \sum_{i=1}^{n} (yi + -yij)2 \quad (4)$$

Table 13. Positive and Negative Ideal Solution Matrix

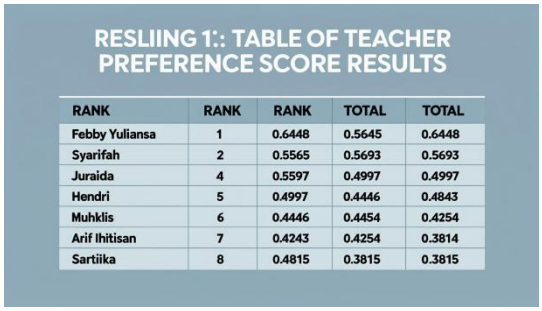
	Ideal Positive	Ideal Negative
K1	0.0836	0.0558
K2	0.0597	0.0464
K3	0.0418	0.0279
K4	0.0407	0.0271
K5	0.0611	0.0407
K6	0.039	0.0321
K7	0.0445	0.0296
K8	0.042	0.028

The preference value for each alternative can be seen in the following table 14:

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol XI No 3, Juni 2025, hlm. 565 – 572 ISSN 2550-0201 (Online)
DOI: https://doi.org/ 10.33330/jurteksi.v11i3.4019
Available online at https://jurnal.stmikroyal.ac.id/index.php/jurteksi

Table 14. Preference Value Results

Nama	D+ (Positive Distance)	D- (Negative Distance)	CC Score	Rank
Febby Yuliansah	0.021	0.0381	0.6448	1
Syarifah	0.0239	0.0312	0.5665	2
Juraida	0.0264	0.0336	0.5593	3
Hendri	0.0287	0.0284	0.497	4
Budi Utomo	0.0285	0.0279	0.4946	5
Muhklis	0.0273	0.0256	0.4843	6
Arif Ihtisan	0.0305	0.0226	0.4254	7
Sartika	0.0364	0.0224	0.3815	8


RESLIING 1:: TABLE OF TEACHER PREFERENCE SCORE RESULTS

RANK	RANK	RANK	TOTAL	TOTAL
Febby Yuliansa	1	0.6448	0.5645	0.6448
Syarifah	2	0.5565	0.5693	0.5693
Juraida	4	0.5597	0.4997	0.4997
Hendri	5	0.4997	0.4446	0.4843
Muhklis	6	0.4446	0.4454	0.4254
Arif Ihitisan	7	0.4243	0.4254	0.3814
Sartiika	8	0.4815	0.3815	0.3815

Image 1. Preference Value Results

CONCLUSION

This study has successfully built and designed a data structure that supports the best teacher selection system at MAS Islmaiyah Hessa Air Genting by utilizing the TOPSIS algorithm in the decision support system shows that the results of alternative calculations on behalf of Febby Yuliansyah occupy the first rank with a preference value of 0.6448, then the second rank is occupied by Syarifah with the results of a preference value of 0.5665 and which ranks third by Juraida with the results of a preference value of 0.497. The weight value of preferences and criteria plays an important role in the results of the TOPSIS calculation. If the weight value increases, the resulting ranking also tends to be higher.

With the integration of various assessment criteria into an organized system, the evaluation process becomes more measurable, objective, and effective. The TOPSIS method is also able to generate rankings based on the degree of closeness of alternatives to the best solution. The developed model can be used as a reference in making transparent and fair decisions in determining the best teacher.

BIBLIOGRAPHY

[1] N. Rasjid, H. Lesmana, and S. F. Situju, "Implementasi Algoritma Topsis untuk Menentukan Gaya Belajar Siswa," *J. Teknol. Sist. Inf.*, vol. 5, no. 1, pp. 203–213, 2024, doi: 10.35957/jtsi.v5i1.7675.

[2] Y. A. Anggraeny and B. Suprapto, "Implementasi Metode TOPSIS Sebagai Pendukung Keputusan Penentuan Guru Teladan Di SMK Grafika Gadingrejo," *JTKSI(Jurnal Teknol. Komput. dan Sist. Inf.)*, vol. 7, no. 3, pp. 180–188, 2024.

[3] S. S. Winarsih and A. W. Wahono, "Implementasi Dan Pengujian Struktur Data Berbasis Acuan Un-

tuk Program Aplikasi Mengungkap Kepribadian Berdasarkan Tanggal Lahir Dan Nama," *J. Teknol. Inf. dan Komun.*, vol. 10, no. 2, p. 11, 2022, doi: 10.30646/tikomsin.v10i2.631.

[4] I. Effendi, "Implementasi Metode Topsis Untuk Meningkatkan Penilaian Guru Terbaik," *JEKIN - J. Tek. Inform.*, vol. 1, no. 1, pp. 1–17, 2021, doi: 10.58794/jekin.v1i1.20.

[5] J. Khoirunnisa Anggraini and M. Orisa, "Sistem Pendukung Keputusan Pemilihan Guru Terbaik Dengan Metode Topsis Berbasis Web (Studi Kasus Sman 1 Kuaro)," *JATI (Jurnal Mhs. Tek. Inform.*, vol. 6, no. 2, pp. 1009–1015, 2023, doi: 10.36040/jati.v6i2.5422.

[6] Janeman Sumah, "Model Pembelajaran Ideal: Kolaborasi Metode Topsis Dan Algoritma Decision Tree," *J. Bisnis, Manajemen, Dan Inform.* , vol. 20, no. 1, pp. 18–31, 2023, doi: 10.26487/jbmi.v20i1.26841.

[7] Nurmayana and Y. Perwira, "Sistem Pendukung Keputusan Pemilihan Guru Berprestasi di SMK Negeri 1 Pantai Labu Dengan Menggunakan Metode Technique For Order Of Preference By Similarity To Ideal Solution (Topsis)," *JIKOMSI (Jurnal Ilmu Komput. dan Sist. Informasi)*, vol. 3, no. 3, pp. 229–250, 2021.

[8] M. H. Ilyas and P. Rosyani, "Perancangan Aplikasi Pemilihan Guru Terbaik Menggunakan Metode Topsis Berbasis Web (Studi Kasus SMK Teknindo Jaya)," *KERNEL J. Ris. Inov. Bid. Inform. dan Pendidik. Inform.*, vol. 2, no. 2, pp. 82–88, 2022, doi: 10.31284/j.kernel.2021.v2i2.2294.

[9] Faizal, L., & Irfan, I. (2025). Implementasi Metode TOPSIS pada Sistem Pendukung Keputusan Penilaian Kinerja Guru di SMKN 10 Bulukumba. *Jurnal Ilmiah Sistem Informasi Dan Teknik Informatika (JISTI)*, *8*(1), 43–53. https://doi.org/10.57093/jisti.v8i1.267

[10] Susliansyah, S., Rahadjeng, I. R., Sumarno, H., & Deleaniara. M, C. M. (2019). Penerapan Data Mining Dalam Penilaian Kinerja Guru Tetap Sd Negeri Kebalen 07 Dengan Metode Topsis. *Jurnal Pilar Nusa Mandiri*, *15*(1), 7–14. https://doi.org/10.33480/pilar.v15i1.2

[11] Widodo, S., Gutama, D. H., Wijaya, D. P., & Prastowo, W. D. (2024). Implementasi Algoritma Topsis pada Decision Support System Pemilihan Perguruan Tinggi Swasta Program Studi Informatika/Teknik Informatika. *Jurnal Teknik Industri Terintegrasi*, *7*(3), 1784–1791. https://doi.org/10.31004/jutin.v7i3.31295