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IMPLEMENTATION OF THE SAW METHOD IN THE EMPLOYEE ASSESSMENT SYSTEM FOR PKH IN BATU BARA REGENCY

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Abstract: The assessment of PKH employees in Batu Bara Regency still requires an objective and measurable evaluation process to support performance decisions. Manual assessment can cause subjectivity and take more time, especially when several criteria must be considered. This study aims to apply the Simple Additive Weighting (SAW) method to the PKH employee assessment system in Batu Bara Regency. The criteria used in this assessment are attendance, teamwork, responsibility, communication, and length of service. The SAW method is applied by determining criteria weights, converting employee values, normalizing the decision matrix, and calculating preference values to obtain the final ranking. The results show that alternative A1, Rahmi Rizkya, obtained the highest score of 0.9504 and ranked first, while alternative A5, Toni Syahpradanadaely, obtained the lowest score of 0.4831. Based on these results, the SAW method can help the employee assessment process become more objective, structured, and useful as a reference for evaluating PKH employee performance.

Keywords: decision support system; PKH employee; simple additive weighting

Abstrak: Penilaian pegawai PKH Kabupaten Batu Bara membutuhkan proses evaluasi yang objektif dan terukur untuk mendukung pengambilan keputusan terhadap kinerja pegawai. Penilaian yang masih dilakukan secara manual dapat menimbulkan subjektivitas dan membutuhkan waktu lebih lama, terutama jika penilaian melibatkan beberapa kriteria. Penelitian ini bertujuan untuk menerapkan metode Simple Additive Weighting (SAW) pada sistem penilaian pegawai PKH Kabupaten Batu Bara. Kriteria yang digunakan dalam penilaian meliputi kehadiran, kerja sama tim, tanggung jawab, komunikasi, dan masa kerja. Metode SAW diterapkan melalui penentuan bobot kriteria, konversi nilai pegawai, normalisasi matriks keputusan, serta perhitungan nilai preferensi untuk memperoleh hasil perankingan. Hasil penelitian menunjukkan bahwa alternatif A1 atas nama Rahmi Rizkya memperoleh nilai tertinggi sebesar 0,9504 dan menempati peringkat pertama, sedangkan alternatif A5 atas nama Toni Syahpradanadaely memperoleh nilai terendah sebesar 0,4831. Berdasarkan hasil tersebut, metode SAW dapat membantu proses penilaian pegawai menjadi lebih objektif, terstruktur, dan dapat dijadikan acuan dalam evaluasi kinerja pegawai PKH.

Kata kunci: pegawai PKH; simple additive weighting; sistem pendukung keputusan

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INTRODUCTION

The Family Hope Program (Program Keluarga Harapan/PKH) is one of the social protection programs that plays an important role in assisting underprivileged communities through mentoring and the provision of social assistance. In its implementation, the success of PKH is not only determined by the accuracy of targeting aid recipients, but also by the quality of performance of the employees or facilitators involved in the program. PKH employees are responsible for data collection, data updating, assisting beneficiary families, preparing reports, and supporting the smooth implementation of the program in the field. Therefore, the assessment of PKH employee performance needs to be carried out objectively, measurably, and in accordance with predetermined criteria.

In practice, the employee assessment process is still often carried out manually, which has the potential to cause several problems. Manual assessment requires a relatively long time, especially when the number of employees being assessed is quite large. In addition, this process may also lead to subjectivity because decisions tend to depend more on personal judgment rather than systematic calculation. Similar problems were also found in previous research on the selection of the best social facilitator for the Family Hope Program, which showed that the assessment process requires a system capable of supporting decision-making more accurately and structurally [1]. Another study on the selection of the Family Hope Program also showed that calculation methods can help make the selection process more accurate according to the criteria used [2].

One method that can be applied in a decision support system is Simple Additive Weighting (SAW). The SAW method is known as a weighted summation method used to determine the final value of each alternative based on several criteria. The calculation process in this method is carried out by assigning weights to each criterion, normalizing the values, and then calculating the preference values to produce a ranking. The SAW method is widely used because its process is simple, easy to understand, and suitable for assessment cases involving multiple criteria. Previous research has shown that the SAW method can be applied in employee performance assessment at the National Narcotics Agency of Ogan Komering Ilir Regency [3]. In addition, the SAW method has also been used in employee performance assessment at the Inspectorate of Pringsewu Regency [4], as well as in employee performance assessment at FIFGROUP [5].

Besides being applied in government institutions, the SAW method is also widely used in selecting the best employees in various organizations and companies. Previous studies have shown that this method is able to support the assessment process based on criteria such as discipline, responsibility, attendance, teamwork, and work quality [6], [7]. The implementation of a system-based SAW method can also simplify data processing, reduce calculation errors, and produce rankings more quickly and transparently [8]. This is also supported by research conducted at PT Telkom Akses Tasikmalaya and PT Hasta Bersama Prima Jaya, which proved that the SAW method can be used as a basis for employee performance evaluation [9], [10].

While previous SAW studies often rely on subjective weighting, the manual assessment of PKH employees in Batu Bara Regency faces challenges of bias

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and a lack of validated standards. To address this, this research contributes a more robust SAW implementation by integrating criteria weights strictly validated by regional PKH experts. Furthermore, the system's stability is empirically proven through sensitivity analysis, delivering a highly objective and scientifically tested evaluation framework.

METHOD

The SAW method was used to solve the problem of assessing PKH employees in Batu Bara Regency based on several predetermined criteria. This method works by calculating the weighted sum value of each alternative, so that it can produce employee rankings from the highest to the lowest score [11], [12]. In this study, the alternatives used were PKH employee data, while the assessment criteria consisted of several aspects related to employee performance. Each criterion was assigned a weight according to its level of importance, and then the employee score for each criterion was calculated through the normalization process.

Since all criteria used in this study are categorized as benefit criteria, the normalization formula used is as follows:

$$R_{ij} = \frac{X_{ij}}{\max X_{ij}} \quad (1)$$

After the normalization value is obtained, the next step is to calculate the preference value for each alternative. The preference value formula is as follows:

$$V_i = \sum_{j=1}^{n} W_j R_{ij} \quad (2)$$

Description:
R_{ij} : normalization value
X_{ij} : alternative value for each criterion
$\max X_{ij}$: the highest value of each criterion
$\min X_{ij}$: the lowest value of each criterion
W_j : criterion weight
V_i : final value of the alternative

The implementation process of the SAW method is carried out through several stages so that the employee assessment results can be obtained in a structured manner. These stages include determining the criteria and alternatives, constructing the decision matrix, performing normalization and calculating preference values, and obtaining the final result through the ranking process.

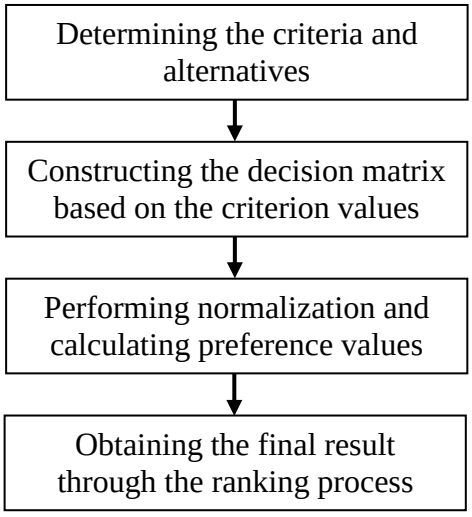

Image 1. Stages of the SAW Method

The following criteria data were entered into the decision support system for assessing PKH employees in Batu Bara Regency. All criteria used are categorized as benefit criteria, meaning that the higher the score obtained, the better the result.

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Table 1. Criteria Data

Code	Criteria	Weight
C1	Attendance	0.25
C2	Teamwork	0.20
C3	Responsibility	0.20
C4	Communication	0.20
C5	Length of Service	0.15

The calculation process of the SAW method uses original scores and sub-criteria scores. Original scores are used for the attendance and length of service criteria, while sub-criteria scores are used for the teamwork, responsibility, and communication criteria.

Table 2. Teamwork Sub-Criteria

Score	Description
5	Excellent
4	Good
3	Fair
2	Poor
1	Very Poor

Table 3. Responsibility Sub-Criteria

Score	Description
5	Excellent
4	Good
3	Fair
2	Poor
1	Very Poor

Table 4. Communication Sub-Criteria

Score	Description
5	Excellent
4	Good
3	Fair
2	Poor
1	Very Poor

The sub-criteria scoring scale (1 to 5) was directly adopted from the official PKH Standard Operating Procedures (SOP). Meanwhile, the criteria weights including Attendance (0.25) [13], Teamwork (0.20), Responsibility (0.20), Communication (0.20), and Length of Service (0.15) [14] were established through expert validation with the Batu Bara PKH District Coordinator. This ensures that all numerical values used in the calculation are valid, accountable, and authorized by the primary expert in the field.

The criteria C1, C2, C3, C4, and C5 are categorized as benefit criteria, meaning that the higher the score obtained, the better the result. After the criteria weights were determined, each employee's score was entered into the decision matrix according to the criteria used. The normalization process was carried out to obtain comparable values for each criterion. The normalized values were then multiplied by the criteria weights to obtain the preference values, which were subsequently used to determine the final ranking of the employees. This structured approach ensures that the assessment process is both objective and transparent, while providing a clear basis for decision-making regarding employee performance.

RESULT AND DISCUSSION

The implementation of the SAW method transforms the manual evaluation into a structured, data driven process. The performance scores of 20 PKH facilitators are first mapped into a decision matrix based on the validated criteria. This step is scientifically crucial for the normalization process, ensuring that criteria with different numerical scales (e.g., the high value of Attendance versus the 1-5 scale of Teamwork) can be proportionally and accurately compared. The raw dataset is presented in Table 5.

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Table 5. Weighted Score Conversion Data

Code	Alternative	C1	C2	C3	C4	C5
A1	Rahmi Rizkya	25	5	4	5	5
A2	Lisnawati	22	4	5	4	3
A3	Dedek Syahrani	20	3	3	4	2
A4	Dyah Ayu Puspanjani	21	4	4	3	4
A5	Toni Syahpradanadaely	18	2	3	2	1
A6	Rahman Khairun Nazmi	26	3	3	4	3
A7	Muhammad Yasir Fahmi	23	4	4	4	3
A8	Hanny Rahma Sari	22	3	4	4	2
A9	Azmi Wijayanti Harahap	19	3	2	3	1
A10	Nia Astriani	24	4	5	5	4
...	...	...	...	...	...	...
A17	Azwar Hadi	20	3	3	4	1
A18	Dame Situmorang	22	4	4	4	3
A19	Delima	24	4	5	3	4
A20	Husnul Zen	25	5	4	5	3

Table 6. Normalization of Each Alternative for Each Criterion

Code	Alternative	C1	C2	C3	C4	C5
A1	Rahmi Rizkya	0.962	1	0.8	1	1
A2	Lisnawati	0.846	0.8	1	0.8	0.6
A3	Dedek Syahrani	0.769	0.6	0.6	0.8	0.4
A4	Dyah Ayu Puspanjani	0.808	0.8	0.8	0.6	0.8
A5	Toni Syahpradanadaely	0.692	0.4	0.6	0.4	0.2
A6	Rahman Khairun Nazmi	1	0.6	0.6	0.8	0.6
A7	Muhammad Yasir Fahmi	0.885	0.8	0.8	0.8	0.6
A8	Hanny Rahma Sari	0.846	0.6	0.8	0.8	0.4
A9	Azmi Wijayanti Harahap	0.731	0.6	0.4	0.6	0.2
A10	Nia Astriani	0.923	0.8	1	1	0.8
...	...	...	...	...	...	...
A17	Azwar Hadi	0.769	0.6	0.6	0.8	0.2
A18	Dame Situmorang	0.846	0.8	0.8	0.8	0.6
A19	Delima	0.923	0.8	1	0.6	0.8
A20	Husnul Zen	0.962	1	0.8	1	0.6

Table 7. Assessment Results of PKH

Alternative	Final Score	Ranking
A1	0.9504	1
A12	0.9204	2
A16	0.9204	3
A10	0.9108	4
A20	0.8904	5
A14	0.8312	6
A19	0.8308	7
A2	0.8215	8
A11	0.8008	9
A7	0.7912	10
...	...	...
A5	0.4831	20

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Based on the results in Table 7, alternative A1 (Rahmi Rizkya) successfully achieved the first rank with the highest score of 0.9504. Analytically, this superiority is heavily driven by A1's exceptional performance in the highest-weighted criterion, which is Attendance (C1 = 0.25), where A1 scored 25.

Furthermore, A1 consistently obtained perfect scores (5) in Teamwork (C2), Communication (C4), and Length of Service (C5). This optimal combination of high discipline and excellent soft skills mathematically secures A1's position at the top of the ranking, proving that the system objectively rewards comprehensively well-performing employees.

Evaluation and Scientific Validation

To scientifically validate the system's accuracy, a two-part evaluation was conducted. First, the SAW ranking results were cross-verified with empirical ground-truth data from the Batu Bara PKH management, demonstrating a high correlation with actual HR evaluations. Second, a sensitivity analysis tested the ranking stability across three scenarios: Scenario 1 (original weights), Scenario 2 (equal weights: 0.20), and Scenario 3 (prioritizing experience: 0.25).

Table 8. Sensitivity Analysis Scenarios (Top 3 Alternatives)

Alternative	Scenario 1 (Original)	Scenario 2 (Equal)	Scenario 3 (Experience)	Stability Status
A1 (Rahmi Rizkya)	0.9504 (Rank 1)	0.9524 (Rank 1)	0.9524 (Rank 1)	Stable
A12 (Ahmad Muhajir)	0.9204 (Rank 2)	0.9124 (Rank 2)	0.9024 (Rank 3)	Dynamic / Shifted
A16 (Asro Jasmilah)	0.9204 (Rank 2)	0.9124 (Rank 2)	0.9124 (Rank 2)	Stable

The results show that while altering weights causes minor shifts in runner-up positions (e.g., Ahmad Muhajir and Asro Jasmilah in Scenario 3), Rahmi Rizkya (A1) consistently secures the top rank. This proves the implemented SAW model is highly robust and objective against weight variations.

Dashboard View

The dashboard displays summary data on employees, assessment criteria, assessment status, gender composition, and recent employee records.

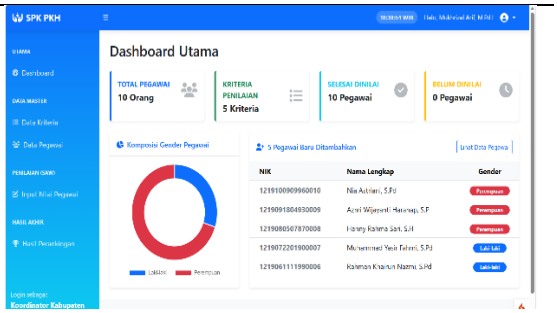

Image 2. Dashboard View

Employee Score Input View

This page displays a list of employees, their assessment status, and the action button to input or edit scores based on the established criteria.

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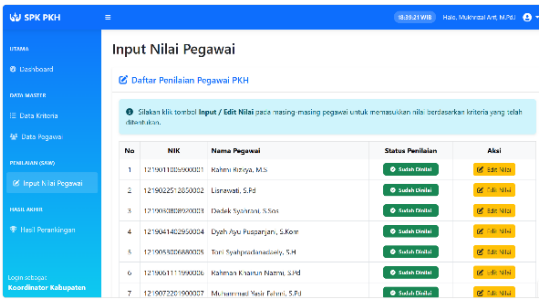

Image 3. Employee Score Input View

Ranking Results View

Displays final employee rankings and scores can be seen in image 4 :

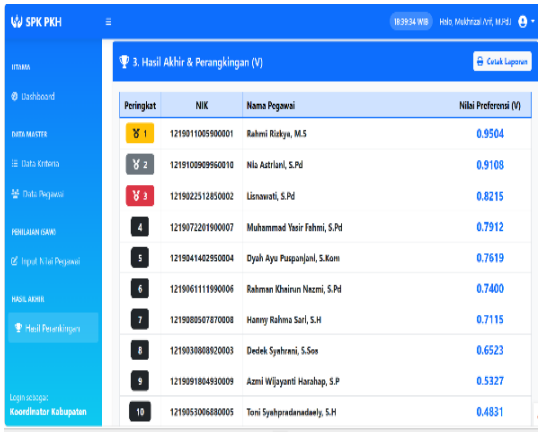

Image 4. Ranking Results View

Table 9. Black Box Testing Results

Test Scenario	Expected Result	Test Result	Status
Administrator Login	System authenticates credentials and redirects to the main Dashboard.	As expected	Valid
Input / Edit Employee Scores	System successfully saves or updates the input scores into the database based on the 5 criteria.	As expected	Valid
SAW Calculation Process	System correctly normalizes the decision matrix and accurately calculates preference values based on predefined weights.	As expected	Valid
View and Print Ranking	System accurately displays the final sorted rankings (highest to lowest) and generates the evaluation report.	As expected	Valid

Unlike standard SAW studies that rely on subjective weighting, this research integrates verified human resource standards validated by experts. Beyond successfully ranking Rahmi Rizkya (A1) as the top facilitator with a score of 0.9504, the system's operational reliability is empirically proven through Black Box testing. This approach delivers a highly objective, transparent, and practically tested evaluation framework tailored specifically for the PKH program in Batu Bara Regency.

CONCLUSION

The implementation of the Simple Additive Weighting method in the PKH employee assessment system in Batu Bara Regency helps make the assessment process more objective and measurable. The assessment uses five criteria: attendance, teamwork, responsibility, communication, and length of service. The results show that A1, Rahmi Rizkya, obtained the highest score of 0.9504, while A5, Toni Syahpradanadaely, obtained the lowest score of 0.4831. This system makes score calculation faster, ranking results clearer, and supports the evaluation of PKH employee performance.

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