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# New employee recruitment selection decision support system using the web-based VIKOR method (Case Study: Gatarego II)

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Abstract

Human resource needs are crucial for supporting a company's sustainability and progress. Appropriate workforce planning and recruitment are essential for objective selection and the production of qualified employees. However, manual employee selection processes can potentially lead to subjectivity and suboptimal decision-making. This study aims to design and build a decision support system that can assist the Human Resources (HR) department in selecting prospective employees more effectively and structuredly, and provide suitability recommendations based on predetermined criteria. The method used in this study is the VlseKriterijumska Optimizacija I Kompromisno Resenje (VIKOR) system, which uses four main criteria: written tests, interviews, skills, and experience. The system was developed web-based to facilitate data access and management, and allows for adjustment of criteria and assessment weights as needed. The system's testing results on four respondents from each division showed a score of 0.47, which is considered good. This indicates that the system is capable of facilitating the evaluation process and providing alternative decisions in the selection of prospective employees. Based on these results, it can be concluded that the developed VIKOR-based decision support system is capable of increasing the effectiveness and objectivity of the employee selection process and providing effective support for decision-making.

Keywords: Decision Support System; Employee Selection; VIKOR..

## 1. Introduction

Employees are individuals employed by a company to carry out various operational activities according to their assigned duties and responsibilities [1]. In the context of human resource management, employees are inseparable from other management functions, as they play a key role in achieving organizational goals [2]. Employees with strong competencies, skills, and experience will significantly contribute to improving the company's performance and quality [3].

To meet the need for a qualified workforce, companies need to implement an effective, objective, and structured selection process [4]. However, in practice, the selection process for new employees is often still carried out manually, potentially leading to subjectivity, inconsistent assessments, and less than optimal decision-making.

(GATAREGO II), as part of the workforce management system in Timor-Leste, plays a crucial role in employee data management and the recruitment process. The challenge faced is that the selection process for new employees has not been optimally computerized, requiring a system capable of supporting more effective and transparent decision-making [5].

Previous studies have developed Decision Support Systems (DSS) for employee selection using various methods such as SAW, TOPSIS, and AHP. However, these methods have limitations in handling conflicts between criteria and have not been able to produce optimal compromise solutions. Therefore,

other methodological approaches are needed that can provide more accurate and objective decision results.

The VIKOR method was chosen because it is able to determine the best compromise solution from a number of alternatives based on proximity to the ideal solution [6]. The novelty of this research lies in the application of the VIKOR method in a web-based system that can accommodate dynamic changes in criteria and weights, thereby increasing the flexibility and quality of decision-making compared to conventional methods.

This study aims to design and implement a web-based decision support system using the VlseKriterijumska Optimizacija I Kompromisno Resenje (VIKOR) method in the selection process for new employees at (GATAREGO II), and to evaluate the system's ability to produce more objective, effective, and accurate decisions based on predetermined criteria.

## 2. Method

### 2.1 Research design

This study uses an applied quantitative approach to develop and implement a Decision Support System (DSS) in the new employee recruitment selection process at GATAREGO II [7]. This approach was chosen because it is capable of processing numerical data and producing objective, calculation-based decisions using a multi-criteria method.

### 2.2 Research scheme

The research outline illustrates the systematic flow in developing a VIKOR-based DSS. The research phase begins with problem identification and literature review to understand the concept of employee selection and multi-criteria decision-making methods. Data collection and analysis are then conducted to ensure that the data obtained meets the requirements for processing in the system.

The next stage was the design and development of a web-based decision support system, which integrated the VlseKriterijumska Optimizacija I Kompromisno Resenje (VIKOR) method into the calculation process [8]. This method was used to rank alternative job candidates based on predetermined criteria, namely written tests, interviews, skills, and experience.

After the system was developed, implementation and testing were carried out to evaluate its performance and the suitability of the results. If the results obtained did not meet user needs, iterative maintenance was carried out until the system could deliver optimal results.

### 2.3 Data collection technique

Data collection was conducted to obtain relevant information regarding the criteria and alternatives in the employee selection process [9]. The methods used included:

a. Observation: Direct observations were conducted of the employee selection process at GATAREGO II to understand the workflow, assessment criteria, and decision-making mechanisms used. The results of the observations provided a clear picture of the problems encountered in the selection process.
b. Interviews: Interviews were conducted with Human Resources (HR) staff to gather information regarding the selection criteria, the importance of each criterion, and the expected system requirements. The data obtained were used as the basis for determining the criteria's weighting.
c. Literature Review: A literature review was conducted by reviewing scientific journals, books, and previous research relevant to the topic of decision support systems and the VIKOR method. This stage aimed to strengthen the theoretical foundation and identify research gaps.

### 2.4 System Development Methods

The system development was carried out using the Agile Software Development approach, which emphasizes iterative and collaborative processes [10]. The stages in the Agile method include: 1) Requirements: Identifying and documenting system requirements based on observation and interview results, 2) Design: Designing the system architecture, database, and user interface in a simple and modular manner. 3) Development: Developing a web-based system in stages in sprint cycles to ensure flexibility to changing requirements. 4) Testing: Conducting system tests to ensure functions run well and are in accordance with user needs. 5) Deployment: Implementing the system into an operational environment so that it can be used by related parties. 6) Review: Conducting system evaluations based on user feedback for continuous improvement.

### 2.5 Data analysis method (VIKOR)

The method used in this study is VlseKriterijumska Optimizacija I Kompromisno Resenje (VIKOR), which is a multicriteria decision-making method that aims to determine the best compromise solution based on proximity to the ideal solution [11]. The stages of the VIKOR method are as follows: 1) Determination of the Decision Matrix: Compiling alternative data for prospective employees based on the values of each criterion. 2) Matrix Normalization: Normalizing the data to equalize the scale between criteria. 3) Determination of Criteria Weights: Determining the level of importance of each criterion based on the results of the interview. 4) Calculation of S and R Values: Calculating the utility value (S) and regret value (R) for each alternative. 5) Calculation of the VIKOR Index (Q): Calculating the VIKOR index value as a basis for ranking alternatives. 6) Alternative Ranking: Sorting alternatives based on the Q value, where the smallest value indicates the best alternative.

### 2.6 System testing

System testing was conducted to evaluate the performance and user acceptance of the developed system. Testing involved several respondents from each division at GATAREGO II. The test results were analyzed to determine the system's effectiveness in assisting the decision-making process.

## 3. Results and Discussion

Method analysis

The primary data in this study was obtained through direct observation of the employee recruitment selection process. Assessment was based on four main criteria: written test (C1), interview (C2), soft skills (C3), and work experience (C4). Each criterion is classified as a benefit attribute, meaning the higher the score, the better the candidate's suitability. The weight of each criterion is determined based on company policy and its importance in the decision-making process. The distribution of criterion weights is presented in Table 1.

Table 1. Criteria weight values.

| Criteria | | | |
|---|---|---|---|
| | | Attribute | Weight |
| C1 | Written test | Benefit | 0.20 |
| C2 | Interview | Benefit | 0.40 |
| C3 | Soft skills | Benefit | 0.20 |
| C4 | Experience | Benefit | 0.20 |
| Total | | | 1.00 |

Based on Table 1, the interview criterion (C2) has the highest weighting of 0.40, indicating that communication and direct assessment are the dominant factors in the selection process. Meanwhile, the written test, soft skills, and work experience criteria each have a weighting of 0.20, indicating a balanced contribution to supporting the final decision.

Criteria pairwase comparison matrix

A pairwise comparison matrix of criteria is constructed to determine the relative importance of each criterion in the decision-making process. Comparisons are made using a preference scale to assess the dominance of one criterion over another. The results of the pairwise comparison matrix are presented in Table 2.

Table 2. Pairwise comparison matrix of criteria.

| Criteria | Written test | Interview | Soft skills | Experience |
|---|---|---|---|---|
| Written test | 1 | 0.5 | 0.3333333 | 0.2 |
| Interview | 2 | 1 | 0.3333333 | 0.25 |
| Soft skills | 3 | 3 | 1 | 0.5 |
| Experience | 5 | 4 | 2 | 1 |
| Total | 11 | 8.5 | 3.6666663 | 1.95 |

Based on Table 2, each matrix element indicates the relative importance of each criterion. A diagonal value of 1 indicates that each criterion is equally important compared to itself, while values outside the diagonal represent comparisons between criteria. Next, a normalization process is performed by dividing each value in the matrix column by the total value of the corresponding column. For example, in the written test column, values 1, 2, 3, and 5 are divided by the column total of 11. This process aims to convert the comparison values into proportions that can be directly compared.

The normalization results show the relative weight distribution of each criterion. In general, criteria with higher comparative scores, such as experience and soft skills, tend to have a greater influence on the decision-making process [12]. This indicates that the company prioritizes work experience and interpersonal skills over written tests. Therefore, the results of this analysis provide an objective basis for determining the criteria weights to be used in subsequent calculations within the decision support system.

Normalization results of criteria comparison

The priority vector is obtained by adding the values in each row of the normalized pairwise comparison matrix [13]. Next, the weight of each criterion is calculated by dividing the value of the priority vector by the number of criteria (nnn). In this study, a 4 × 4 matrix was used, so that n = 4n = 4n = 4. The next step is to determine the eigenvalues, which are obtained by multiplying the weight of each criterion by the total value in the initial comparison matrix column. For example, the weight of the written test criterion of 0.09 multiplied by the total column of 11 produces an eigenvalue of 0.94. The same process is carried out for all criteria, resulting in the following values: 0.13 × 8.5 = 1.10; 0.29 × 3.6667 = 1.06; and 0.50 × 1.95 = 0.97. The total eigenvalue is obtained by adding up all the eigenvalues in each criterion. The results of the normalization calculations, priority vectors, weights, and eigenvalues are presented in Table 3.

Table 3. Results of normalization of pairwise comparison matrix and calculation of criteria weights.

| Criteria | Written test | Interview | Soft skill | Experience | P.Vektor | Weight | Eigen value |
|---|---|---|---|---|---|---|---|
| Written test | 0.09 | 0.06 | 0.09 | 0.10 | 0.34 | 0.09 | 0.94 |
| Interview | 0.18 | 0.12 | 0.09 | 0.13 | 0.52 | 0.13 | 1.10 |
| Soft skill | 0.27 | 0.35 | 0.27 | 0.26 | 1.15 | 0.29 | 1.06 |
| Experience | 0.45 | 0.47 | 0.55 | 0.51 | 1.98 | 0.50 | 0.97 |
| Total | 1.00 | 1.00 | 1.00 | 1.00 | 4.00 | 1.00 | 4.07 |

Based on Table 3, the total eigenvalue is 4.07. This value is used to calculate the maximum λ (lambda) value as part of the consistency test in the AHP method. Furthermore, the weighting results show that the experience criterion has the highest weighting of 0.50, followed by soft skills at 0.29, interviews at 0.13, and written tests at 0.09. This indicates that work experience is the most dominant factor in the decision-making process. Thus, companies tend to prioritize candidates with good work experience and interpersonal skills over those with academic abilities alone.

Random Index (RI)

The Random Index (RI) is a random index value used in the Analytical Hierarchy Process (AHP) method to measure the level of consistency in pairwise comparison assessments [14]. The RI value is used as a benchmark in calculating the Consistency Ratio (CR), which aims to ensure that the assessments given are not random and remain consistent [15]. The RI value based on matrix size (n) was determined by Thomas L. Saaty and is presented in Table 4.

Table 4. Random index (RI).

| Table RI | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| n | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| RI | 0 | 0 | 0,58 | 0,9 | 1,12 | 1,32 | 1,32 | 1,41 | 1,45 | 1,49 |

Consistency test (Consistency index and consistency ratio)

Consistency testing is performed to ensure that the assessments in the pairwise comparison matrix are logical and not random. This stage involves calculating the Consistency Index (CI) and Consistency Ratio (CR). The Consistency Index (CI) value is calculated using the formula:

$$CI = \frac{\lambda_{max} - n}{\text{ɳ} - 1} \quad (1)$$

Based on the results of the previous calculations, the value obtained is λmax=4.07 and the number of criteria n=4n = 4n=4, so that:

$$CI = \frac{4{,}07 - 4}{4 - 1} = 0{,}02 \quad (2)$$

The Consistency Ratio (CR) value is calculated using the formula:

$$CR = \frac{\text{CI}}{RI} \quad (3)$$

By using a Random Index (RI) value of 0.90 for n=4n, we obtain:

$$CR = \frac{0{,}02}{0{,}90} = 0{,}02 \quad (4)$$

The calculation results show that the CR value of 0.02 is less than the tolerance limit of 0.1. This indicates that the pairwise comparison matrix used in this study is consistent and acceptable. Therefore, the resulting criteria weights can be used in subsequent analysis stages in a decision support system.

Determining new employee candidates using the VIKOR method

In this study, the process of determining new employee candidates was carried out using the VIKOR method as a multi-criteria decision-making method. The initial stage in this method is to compile a comparison matrix between alternatives based on each predetermined criterion. The data used were the results of the selection of employee candidates based on the written test criteria obtained from the CAC. The alternatives being compared consisted of four candidates, namely A1 (Angelitu), A2 (Antoniu), A3 (Arlindo), and A4 (Marito). Next, a pairwise comparison matrix was compiled for the written test criteria to determine the relative level of preference between alternatives. The comparison matrix is presented in Table 5.

Table 5. Pairwise comparison matrix of written test criteria.

| Written test | Employee | A1 20 | A2 40 | A 3 70 | A4 80 |
|---|---|---|---|---|---|
| 20 A1 | Angelitu | 1 | 0.25 | 0.14 | 0.25 |
| 40 A2 | Antoniu | 4 | 10 | 0.14 | 0.25 |
| 70 A3 | Arlindo | 7 | 0.5 | 1 | 0.333333 |
| 80 A4 | Marito | 8 | 0.5 | 0.5 | 1 |
| Total | | 20 | 2.25 | 1.78 | 1.833333 |

Based on Table 5, each value in the matrix indicates the relative importance of each alternative to the written test criteria. A value of 1 indicates equal importance, while values below or above 1 indicate lower or higher preference. This step forms the basis for the normalization process and the subsequent calculation of the VIKOR index to obtain the final ranking of prospective employees.

Normalization results of the written test alternative comparison matrix

The next step in the VIKOR method is to normalize the pairwise comparison matrix for the written test criteria. Normalization is done by dividing each matrix element by the total of the corresponding column. For example, the element in row A1 and column A1 has a value of 1 divided by the total of column A1 (20), resulting in 0.05. The normalization results for each alternative are presented in Table 6. Next, the preference vector value (p.vector) is obtained by summing the normalized values of each row. The weight of each alternative is then calculated by dividing the value of each alternative's preference vector by the total of the entire preference vector.

Table 6. Normalization of the pairwise comparison matrix of the written test.

| Tes Tulis | A1 | A2 | A3 | A4 | p.vektor | Bobot |
|---|---|---|---|---|---|---|
| A1 | 0.05 | 0.111111 | 0.078652 | 0.136364 | 0.37612658 | 0.094031614 |

| Tes Tulis | A1 | A2 | A3 | A4 | p.vektor | Bobot |
|---|---|---|---|---|---|---|
| A2 | 0.2 | 0.444444 | 0.078652 | 0.136364 | 0.859459791 | 0.214864948 |
| A3 | 0.35 | 0.222222 | 0.561798 | 0.181818 | 1.315838008 | 0.328959502 |
| A4 | 0.4 | 0.222222 | 0.280899 | 0.545455 | 1.448575743 | 0.362143936 |
| Total | 1.00 | 1.00 | 1.00 | 1.00 | 4.00 | 1.00 |

Determination of pairwise comparison matrix of interview criteria

The next step in the VIKOR method is to conduct pairwise comparisons between alternatives for the interview criteria. This comparison is conducted to determine the relative preference level of each alternative candidate for the interview criteria. The alternatives being compared consist of four candidates: A1 (Angelitu), A2 (Antoniu), A3 (Arlindo), and A4 (Marito). Each value in the matrix indicates the relative importance level between the alternatives. A value of 1 indicates equal importance, while a value greater than 1 indicates higher preference, and a value less than 1 indicates lower preference. The results of the pairwise comparison matrix are presented in Table 7. The total value in each column will be used in the normalization stage to calculate the preference vector and weight for each alternative.

Table 7. Pairwise comparison matrix of interview criteria.

| Interview | Employee | A1 90 | A2 50 | A 3 40 | A4 70 |
|---|---|---|---|---|---|
| 90 A1 | Angelitu | 1 | 0.2 | 0.25 | 0.14 |
| 50 A2 | Antoniu | 5 | 1 | 0.25 | 0.14 |
| 40 A3 | Arlindo | 4 | 0.5 | 1 | 0.14 |
| 70 A4 | Marito | 7 | 0.5 | 0.5 | 1 |
| Total | | 17 | 2.2 | 2.00 | 1.42 |

Based on Table 7, it can be seen that alternative A4 has the highest relative preference in the interview criteria compared to the other alternatives. The total column value will be used in the normalization stage to calculate the alternative weights as the basis for the final ranking using the VIKOR method.

Normalization of pairwise comparison matrix of interview criteria

The next step in the VIKOR method is to normalize the pairwise comparison matrix for the interview criteria. Normalization is done by dividing each matrix element by the total of the corresponding column. For example, the element in row A1 and column A1 has a value of 1 divided by the total of column A1 (17), resulting in 0.058824. The normalization results for each alternative are presented in Table 8. The preference vector (p.vector) value is obtained by summing the normalized values in each row. Next, the weight of each alternative is calculated by dividing the p.vector value of each alternative by the total p.vector. This weight reflects the relative importance of each alternative to the interview criteria.

Table 8. Normalization of pairwise comparison matrix of interview criteria.

| Interview | A1 | A2 | A3 | A4 | p.vektor | Weight |
|---|---|---|---|---|---|---|
| A1 | 0.058824 | 0.090909 | 0.125 | 0.098592 | 0.373324 | 0.093331 |
| A2 | 0.294118 | 0.454545 | 0.125 | 0.098592 | 0.972255 | 0.243064 |
| A3 | 0.235294 | 0.227273 | 0.5 | 0.098592 | 1.061158 | 0.26529 |
| A4 | 0.411765 | 0.227273 | 0.25 | 0.704225 | 1.593263 | 0.398316 |
| Total | 1 | 1 | 1 | 1 | 4.00 | 1.00 |

Based on Table 8, it can be seen that alternative A4 has the highest weight (0.398), indicating the highest relative preference for the interview criteria compared to the other alternatives. These results will be used in the next stage of the VIKOR calculation to determine the final ranking of prospective employees.

Pairwise comparison matrix of soft skill criteria

The next step in the analysis using the VIKOR method is to construct a pairwise comparison matrix for the Soft Skills criteria. This matrix aims to assess the relative preferences of each prospective employee based on interpersonal skills. Each value in the matrix indicates the degree of dominance of one alternative over another, with 1 indicating equal preferences. The comparison results are presented in Table 9, where A2 (Antoniu) shows the highest relative preference, while A1 (Angelitu) shows the lowest relative preference. The column totals are used as the basis for normalization calculations to determine the preference vector and alternative weights in the next stage.

Table 9. Pairwise comparison matrix of soft skill criteria.

| Soft skills | Employee | A1 70 | A2 100 | A 3 80 | A4 90 |
|---|---|---|---|---|---|
| 70 A1 | Angelitu | 1 | 0.1 | 0.125 | 0.111 |
| 100 A2 | Antoniu | 10 | 1 | 0.125 | 0.111 |
| 80 A3 | Arlindo | 8 | 0.5 | 1 | 0.111 |
| 90 A4 | Marito | 9 | 0.5 | 0.125 | 1 |
| Total | | 28 | 2.1 | 1.375 | 1.333 |

Normalization of pairwise comparison matrix of soft skill criteria

The next step in the VIKOR method is to normalize the pairwise comparison matrix for the Soft Skills criteria. Normalization is done by dividing each matrix element by the total of the corresponding column. For example, the element in row A1 and column A1 has a value of 1 divided by the total of column A1 (28), resulting in 0.035714. The normalization results for each alternative are presented in Table 10. The preference vector value (p.vector) is obtained by summing the normalized values of each row, while the weight is calculated by dividing the p.vector of each alternative by the total of the overall preference vector. This weight reflects the relative importance of each alternative on the Soft Skills criteria. Based on Table 10, it can be seen that alternative A4 has the highest weight (0.350), indicating the highest relative preference on the Soft Skills criteria compared to the other alternatives. This result will be used in the next VIKOR calculation stage to determine the final ranking of prospective employees.

Table 10. Normalization of pairwise comparison matrix of soft skill criteria.

| Soft Skill | A1 | A2 | A3 | A4 | p.vektor | Bobot |
|---|---|---|---|---|---|---|
| A1 | 0.035714 | 0.047619 | 0.090909 | 0.083271 | 0.257513 | 0.0643781 |
| A2 | 0.357143 | 0.47619 | 0.090909 | 0.083271 | 1.007513 | 0.251878 |
| A3 | 0.285714 | 0.238095 | 0.727273 | 0.083271 | 1.334353 | 0.333588 |
| A4 | 0.321429 | 0.238095 | 0.090909 | 0.750188 | 1.40062 | 0.350155 |
| Total | 1.00 | 1.00 | 1.00 | 1.00 | 4.00 | 1,00 |

Determination of pairwise comparison matrix of experience criteria

The next step in the VIKOR method is to conduct pairwise comparisons between alternatives for the Experience criterion. The purpose of this comparison is to determine the relative preference level of each prospective employee based on their work experience. The alternatives being compared consist of four candidates: A1 (Angelitu), A2 (Antoniu), A3 (Arlindo), and A4 (Marito). Each value in the matrix indicates the relative importance level between the alternatives. A value of 1 indicates equal importance, a value greater than 1 indicates higher preference, and a value less than 1 indicates lower preference. The results of the pairwise comparison matrix are presented in Table 11. The total value in each column will be used in the normalization stage to calculate the preference vector and weight for each alternative. Based on Table 11, it can be seen that alternative A4 has a relatively high preference for the Experience criterion compared to the other alternatives. The total value of this column will be used in the normalization stage to determine the alternative weights in the VIKOR method, which will later become the basis for determining the final ranking of prospective employees.

Table 11. Pairwise comparison matrix of experience criteria.

| Experience | Employee | A1 90 | A2 60 | A 3 20 | A4 70 |
|---|---|---|---|---|---|
| 90 A1 | Angelitu | 1 | 0.16 | 0.5 | 0.14 |

| Experience | Employee | A1 90 | A2 60 | A 3 20 | A4 70 |
|---|---|---|---|---|---|
| 60 A2 | Antoniu | 6 | 1 | 0.5 | 0.14 |
| 20 A3 | Arlindo | 2 | 0.5 | 1 | 0.14 |
| 70 A4 | Marito | 7 | 0.5 | 0.5 | 1 |
| Total | | 16 | 2.16 | 2.5 | 1.42 |

Normalization of pairwise comparison matrix of experience criteria

The next step in the VIKOR method is to normalize the pairwise comparison matrix for the Experience criterion. Normalization is done by dividing each matrix element by the total of the corresponding column. For example, the element in row A1 and column A1 has a value of 1 divided by the total of column A1 (16), resulting in 0.0625. The normalization results for each alternative are presented in Table 12. The preference vector value (p.vector) is obtained by summing the normalized values of each row, while the weight is calculated by dividing the p.vector of each alternative by the total of the overall preference vector. This weight reflects the relative importance of each alternative on the Experience criterion. Based on Table 12, it can be seen that alternative A4 has the highest weight (0.393), indicating the highest relative preference on the Experience criterion compared to the other alternatives. This result will be used in the next stage of the VIKOR calculation to determine the final ranking of prospective employees.

Table 12. Normalization of pairwise comparison matrix of experience criteria.

| Experience | A1 | A2 | A3 | A4 | p.vektor | Weight |
|---|---|---|---|---|---|---|
| A1 | 0.0625 | 0.074074 | 0.2 | 0.098592 | 0.435166 | 0.108791 |
| A2 | 0.375 | 0.462963 | 0.2 | 0.098592 | 1.136555 | 0.284139 |
| A3 | 0.125 | 0.231481 | 0.4 | 0.098592 | 0.855073 | 0.213768 |
| A4 | 0.4375 | 0.231481 | 0.2 | 0.704225 | 1.573207 | 0.393302 |
| Total | 1.00 | 1.00 | 1.00 | 1.00 | 4.00 | 1.00 |

Matrix normalization and determination of criteria weights

After calculating the pairwise comparison matrix for each alternative across all criteria, the next step is to normalize the criterion comparison matrix and calculate the criterion weights. Normalization is performed by dividing each matrix element by the total of the corresponding column, while the criterion weights are obtained from the average of the normalized values of each criterion. The obtained criterion weights are presented in Table 13. These values indicate the relative importance of each criterion in the assessment of prospective employees. Criteria with higher weights have a greater influence on determining the final ranking using the VIKOR method. Based on Table 13, it can be seen that the Experience criterion has the highest weight (0.50), making it the most influential criterion in determining prospective employees. Meanwhile, the Written Test criterion has the lowest weight (0.09), so its contribution is relatively smaller in determining the final ranking. These weights will be used in the VIKOR calculation stage to determine the final ranking of prospective employees.

Table 13. Criteria weight values.

| Weight value<br>Criteria | 0.09 | 0.13 | 0.29 | 0.50 |
|---|---|---|---|---|

Alternative score matrix results

After normalizing the pairwise comparison matrix for each criterion, the next step is to construct an alternative score matrix. This matrix is obtained by taking the preference vector (p vector) values of each alternative for each criterion. The p vector values reflect the relative preference level of each prospective employee for each criterion. This score matrix will be used as the basis for calculating the VIKOR method to determine the final ranking. Based on Table 14, it can be seen that the anarelua alternative has the highest p vector value for almost all criteria, indicating the highest relative preference compared to the other alternatives. This score matrix will then be used to calculate the Q value in the VIKOR method, thus determining the final ranking of prospective employees.

Table 14. Alternative score matrix based on p vector.

| | Written test | Interview | Soft skills | Experience |
|---|---|---|---|---|
| Grasiela | 0.376126458 | 0.093331042 | 0.06437831 | 0.108791406 |
| José Valenti | .859459791 | 0.243063663 | 0.25187831 | 0.284138628 |
| Rui | 1.315838008 | 0.265289599 | 0.333588267 | 0.213768258 |
| Anarelua | 1.448575743 | 0.398315696 | 0.350155112 | 0.393301708 |

Calculation of Alternative Final Scores with Criteria Weights

After constructing the alternative score matrix based on the p.vector, the next step is to multiply the score of each alternative by the criterion weight. The purpose of this step is to calculate a final score that reflects the relative contribution of each criterion in determining the ranking of prospective employees. The results of the final score calculation along with the alternative rankings are presented in Table 15. The final score is obtained by summing the results of each alternative's multiplication on all criteria by the corresponding criterion weight. The ranking indicates the order of preference of the alternatives, with the highest score occupying the first position.

Table 15. Results of multiplying alternative scores by criteria weights and rankings.

| | Written test | Interview | Soft skills | Experience | Skor | Ranking |
|---|---|---|---|---|---|---|
| Grasiela | 0.032272197 | 0.012099888 | 0.018586115 | 0.053944458 | 0.116902658 | 4 |
| José Valenti | 0.073742899 | 0.031511951 | 0.072717646 | 0.140890764 | 0.31886326 | 3 |
| Rui | 0.112900814 | 0.034393429 | 0.096307434 | 0.105997461 | 0.349599137 | 2 |
| Anarelua | 0.124289904 | 0.051639577 | 0.101090307 | 0.195019518 | 0.472039305 | 1 |

Discussion

Based on the analysis using the AHP and VIKOR methods, each candidate's preference level for the predetermined selection criteria can be determined. The initial assessment using AHP to determine criterion weights showed that the Experience criterion had the highest weighting (0.50), followed by Soft Skills (0.29), Interview (0.13), and Written Test (0.09). This indicates that the company places greater emphasis on work experience and interpersonal skills than solely academic aspects. The consistency test of the pairwise comparison matrix yielded a Consistency Ratio (CR) of 0.02, which is lower than the threshold of 0.1.

This indicates that the assessments provided are consistent and can be used as a basis for further calculations. The next step used the VIKOR method to determine the final ranking of the candidates. The alternative score matrix based on the p.vector showed that the Anarelua alternative had the highest scores for almost all criteria, particularly the Experience and Soft Skills criteria. After multiplying the alternative scores by the criterion weights, a final score was obtained that reflects the relative contribution of each criterion. As a result, Anarelua ranked first with a score of 0.4720, followed by Rui (0.3496), José Valenti (0.3189), and Grasiela (0.1169). These results indicate that the assessment using AHP for criteria weighting and VIKOR for alternative determination is able to provide objective and transparent decisions. This method considers all criteria proportionally and makes it easier for companies to determine the most suitable candidate.

## 4. Conclusion

The criteria weights obtained through AHP indicate that work experience and soft skills are the dominant factors in the employee selection process, while the written test has the lowest influence. The AHP consistency test shows a CR value of $0.02 < 0.1$, so the criteria weights used are valid and consistent. The VIKOR method successfully ranked prospective employees objectively, with Anarelua in first place, reflecting the candidate with the best combination of work experience, soft skills, interviews, and written tests. This approach can be used as a decision support system for employee selection to improve efficiency and accuracy in company HR decision-making.

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