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Decision Support System Based on RECA and COPRAS Methods in Performance Evaluation of Non-Permanent Employees

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Abstract: The evaluation of the performance of non-permanent employees is a significant challenge for organizations due to the high turnover rate and the limited tenure of these employees. The manual evaluation processes often lead to biases, inconsistencies, and a lack of accuracy in supporting decision-making. This research aims to develop a decision support system based on the RECA and COPRAS methods to produce a more objective, transparent, and systematic evaluation. RECA is used to determine the criteria weights proportionally based on each contribution, while COPRAS functions to assess and provide a final ranking of employee performance by considering both benefit and cost-type criteria. The research results show that this system is capable of sorting non-permanent employees fairly with ranking results of E-AS-05 with a score of 100%, E-AS-03 with a score of 97.32%, E-AS-01 with a score of 94.03%, E-AS-02 with a score of 88.34%, and E-AS-04 with a score of 82.19%. The integration of the RECA and COPRAS methods not only enhances the effectiveness of performance evaluation but also provides a tangible contribution to supporting more efficient and sustainable human resource management. The main contribution of this research lies in the integration of the RECA and COPRAS methods in the performance evaluation process of non-permanent employees, resulting in a more objective, transparent, and comprehensive decision support system. The integration of these two methods enriches the performance evaluation approach for non-permanent employees that companies can use as a basis for strategic decision-making related to promotions, employment contracts, and human resource development programs.
Keywords: Decision Support System; RECA Method; COPRAS Method; Performance Evaluation; Non-Permanent Employees

1. INTRODUCING

Evaluating employee performance, especially for non-permanent employees, plays a crucial role in maintaining the quality, productivity, and efficiency of the organization[1], [2]. Non-permanent employees are often faced with short-term work contracts and high turnover rates, making it necessary for organizations to have a measurable assessment mechanism to ensure their contributions remain optimal during their tenure. With a systematic performance evaluation, organizations can identify the strengths and weaknesses of each individual, provide constructive feedback, and place employees according to their competencies[3]–[5]. Furthermore, this evaluation process also assists management in making decisions regarding contract extensions, providing incentives, and developing more effective human resource strategies, ultimately supporting the sustainability and competitiveness of the

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organization. One of the main challenges faced by companies in evaluating the performance of non-permanent employees is the high turnover rate and the limited duration of employment that these types of employees have. Rapid workforce turnover often makes the evaluation process inconsistent, as companies have to assess performance within a relatively short time frame. Additionally, the limited duration of employment results in less in-depth performance data, making it difficult for management to perform comprehensive analyses. This situation is worsened by the potential for assessment bias due to limited interaction between employees and supervisors during the contract period. Therefore, companies need effective, objective evaluation methods that can produce fair decisions even when faced with high turnover dynamics and time constraints in evaluations.

The manual or subjective approach to assessing employee performance often presents significant limitations, especially in the context of non-permanent employees[6]. Evaluations that rely solely on the perceptions of superiors can lead to biases, whether due to personal closeness, differing evaluation standards, or limited observation time. Moreover, manual processes tend to be inconsistent across assessors and difficult to replicate during different evaluation periods, thus casting doubt on the accuracy of the assessment results. This inaccuracy can ultimately have negative impacts on managerial decision-making, such as contract extensions, incentives, or career development recommendations. Therefore, a data-driven, objective, and structured assessment system is needed to minimize bias and improve consistency and fairness in performance evaluations. Decision Support Systems (DSS) play a strategic role in helping organizations make more objective, transparent, and systematic decisions, particularly in the evaluation of temporary employee performance[7]–[9]. By integrating data, analytical methods, and decision-making models, DSS can reduce reliance on subjective assessments that are prone to bias and inconsistency. This system allows management to assess various performance criteria quantitatively, compare alternatives more measurably, and generate accountable rankings. Furthermore, the transparency offered by DSS makes the assessment process fairer, as every decision is based on clear data and methods. Thus, DSS not only improves decision accuracy but also supports organizations in managing human resources more effectively and sustainably[10]–[12].

The integration of the Respond to Criteria Weighting (RECA) method as a weighting method with the Complex Proportional Assessment (COPRAS) method as an assessment method provides a more comprehensive approach in evaluating employee performance. RECA is used to determine the weights of criteria objectively based on the level of response or relative contribution of each criterion to the evaluation objectives[13], [14]. With this method, each criterion can be weighted according to its level of importance, thus reducing the potential subjectivity that arises if weighting is done solely based on intuition or managerial preferences. This process makes the evaluation results more representative of the organization's needs and fairer to each evaluated employee. Meanwhile, the COPRAS method functions to perform the final calculations by processing employee performance values based on weights obtained from RECA. COPRAS evaluates alternatives by considering both positive (benefit) and negative (cost) aspects proportionally[15]–[17], resulting in a more accurate and comprehensive ranking of employees. Through the integration of these two methods, the performance evaluation of non-permanent employees can be systematically conducted by considering the differences in the levels of importance among criteria while balancing between profit and cost factors. The end result is a more transparent, objective performance ranking that can serve as a strong basis for managerial decision-making regarding contract extensions, awards, and workforce development strategies.

The application of a decision support system based on the RECA and COPRAS methods in evaluating the performance of temporary employees does not provide an effective solution to enhance the objectivity and accuracy of assessments. Through the RECA method, the weight of each performance criterion is calculated systematically according to its level of importance. This ensures that every aspect of the evaluation has the appropriate influence proportion on the final evaluation results. After the weights are obtained, the COPRAS method is used to assess and compare the performance of all employees, considering both positive and negative factors in a balanced manner. With the integration of RECA and COPRAS, the decision support system is able to present performance rankings of non-permanent employees transparently and measurably. The evaluation results not only assist management in identifying the best employees for rewards or contract extensions but also serve as a

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basis for providing constructive feedback to other employees to improve their performance. This implementation ultimately encourages the creation of a more fair and efficient evaluation process and supports human resource management strategies oriented towards the quality and productivity of the organization.

The purpose of this research is to implement a decision support system based on the RECA and COPRAS methods to evaluate the performance of non-permanent employees objectively, transparently, and systematically. In addition, this research aims to produce accurate performance rankings that can support management in making strategic decisions related to contract extensions, incentive grants, and workforce development. The contribution of this research lies in the development of a performance evaluation model for non-permanent employees that integrates the RECA method as an objective weighting technique and COPRAS as a proportional assessment method. Theoretically, this research enriches the literature on the application of Multi-Criteria Decision Making (MCDM) methods in the context of human resource management, especially for employee groups with high turnover rates. From a practical standpoint, this research provides a tool that can be used by management to conduct performance evaluations in a more fair, transparent, and accurate manner, thus supporting strategic decision-making related to contract extensions, incentive provision, and employee development program determination.

2. RESEARCH METHODOLOGY

The stages of research are a series of systematic steps designed and implemented to achieve research objectives in a directed and measurable manner. Each stage is interconnected to ensure that the research process runs logically, consistently, and produces valid findings. Through the research stages, one can clearly formulate problems, determine the appropriate methods, collect and analyze data objectively, and provide recommendations that are beneficial both theoretically and practically. The stages of research conducted are displayed in Fig. 1.

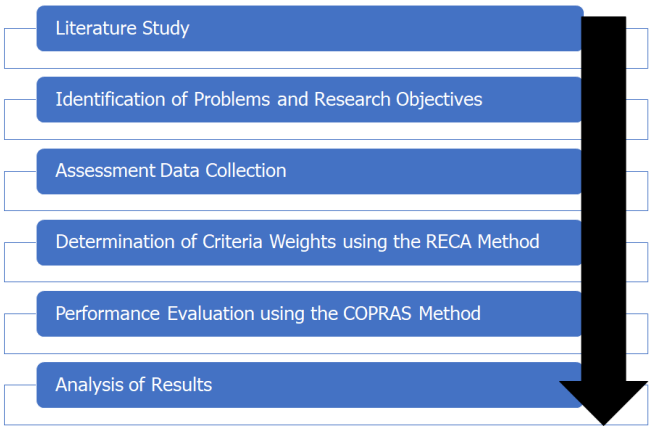

Figure 1. Research Stage

With the existence of the research stages in Fig. 1, the process of searching for solutions to a problem can be conducted in a more structured and accountable manner. This stage also serves as a guideline to ensure that the research stays focused on the problem and remains aligned with the established goals. In addition, through the research stages, every step taken can be replicated or re-tested by other researchers, thus increasing the credibility and reliability of the research results. Ultimately, the research stages become an important foundation in generating new knowledge and practical applications that are beneficial for the development of science and problem-solving in the real world.

2.1. Literature Study

Literature study is an important stage in research aimed at examining various theories, concepts, methods, and relevant past research findings related to the topic being studied. Through

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literature study, researchers can understand the development of science, identify research gaps, and find theoretical foundations that support the framework of thought. Additionally, literature study also assists in comparing the strengths and weaknesses of existing methods, making it a reference in the development of new, more effective models, methods, or approaches. Literature study serves as an academic foundation that strengthens arguments and enhances the validity of research.

The research conducted by Husain (2022) used the Simple Additive Weighting (SAW) method to compare the best job candidates with the aim of obtaining quality employees in line with the expectations of the company and leadership during the recruitment of contract employees[18]. The research by Rahayu (2021) also employed the SAW method to address the complexities in contract extension decisions due to the multitude of candidates and criteria used in assessments; the SAW method can assist in the decision-making process based on the optimal competency values of employees[19]. The results of this research emphasize the effectiveness of SAW in simplifying the selection process by providing direct rankings based on the aggregate scores of each criterion. Unlike that, the research conducted emphasizes the evaluation of non-permanent employee performance through a combination approach of two methods, namely RECA for determining the criteria weights objectively and COPRAS for ranking alternatives based on the relative contribution of each employee. The results of this study not only provide recommendations for the best employees but also give an objective overview of the strengths and weaknesses of each employee in terms of performance, which can be used as a basis for improvement and development of human resources. Thus, the main difference between the two studies lies in their focus: SAW places greater emphasis on the selection of new employee candidates, while RECA-COPRAS is directed at evaluating the performance of existing employees.

Research by Christiana (2022) applies the TOPSIS method in a web-based employee performance assessment system that generates preference scores as a basis for ranking, allowing the company to easily identify the top-performing employees in a practical and transparent manner[20]. The results of this study emphasize the implementation of web-based technology that facilitates the assessment process and accelerates decision-making. Meanwhile, the research conducted aims to evaluate the performance of non-permanent employees in a more comprehensive manner. RECA is used to objectively determine the weight of criteria, while COPRAS is used to calculate the relative contribution of each employee in generating the final ranking. The results of this study not only display employee rankings but also provide an objective assessment of performance aspects that can serve as a basis for employee improvement and development. Thus, the main difference between the two studies lies in the focus and research approach; the first emphasizes the integration of the TOPSIS method within a web-based platform for ease of access, while the RECA-COPRAS study places more emphasis on the objectivity of weights and in-depth evaluation of non-permanent employee performance.

Based on the results of the literature study, it can be concluded that the application of the RECA and COPRAS methods in decision support systems provides advantages in terms of objectivity and accuracy of performance evaluation. RECA plays a role in determining criteria weights more fairly based on the variation and contribution of each criterion, thereby reducing subjectivity in the assessment process. Meanwhile, COPRAS is capable of generating rankings that consider the relative contributions of each alternative, making the evaluation results more comprehensive and balanced. From various previous studies comparing the SAW and TOPSIS methods, the RECA-COPRAS approach has the advantage of integrating objective criteria weights with a detailed ranking model. This makes RECA-COPRAS superior in the context of evaluating the performance of non-permanent employees, as it can provide results that are not only in the form of final rankings but also information that can be used for sustainable human resource development. Thus, RECA-COPRAS becomes a relevant and effective method in supporting the decision-making process in the field of HR management.

2.2. RECA Method

The RECA method is one of the weighting methods in MCDM designed to determine the relative importance level of each criterion based on the contribution response to the evaluation objectives. This method focuses on how each criterion has a tangible impact on the decision outcomes, making the

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resulting weights more objective and proportional compared to solely subjective approaches. By emphasizing the responsiveness of criteria to the achievement of goals, RECA helps minimize assessment bias and increases accuracy in the decision-making process involving multiple criteria.

The initial stage is to compile a decision matrix that contains alternatives (such as employees) and assessment criteria (such as discipline, productivity, work quality, etc.). This matrix serves as the basis for data processing as it contains the performance values of each alternative against each criterion.

$$X = \begin{bmatrix} x_{11} & x_{21} & x_{31} & x_{41} \\ x_{12} & x_{22} & x_{32} & x_{42} \\ x_{13} & x_{23} & x_{33} & x_{43} \\ x_{1m} & x_{2m} & x_{3m} & x_{nm} \end{bmatrix} \quad (1)$$

Each value in the decision matrix is then positioned as a preference value that indicates the level of performance of an alternative on a criterion. This value serves as the initial input before the normalization process is carried out to allow for proportional comparison among criteria.

$$\mathrm{PV_{ij}} = \frac{\mathrm{x_{ij}}}{\sqrt[\mathrm{n}]{\prod_{\mathrm{j=1}}^{\mathrm{n}} \mathrm{x_{ij}}}} \quad (2)$$

At this stage, the preference values of each criterion are normalized to have a comparable scale. Normalization is necessary because each criterion usually has different units or ranges of values. This process ensures that no criterion dominates simply due to differences in measurement scale.

$$\mathrm{R_{ij}} = \frac{\mathrm{PV_{ij}}}{\mathrm{PV_j^{max}}} \quad (3)$$

The standard value is calculated from the normalization results for each criterion, usually in the form of an average or a baseline measurement that represents the data distribution for that criterion. The standard value serves as a reference in measuring how far the variation of values among alternatives is in relation to certain criteria.

$$\mathrm{N_i} = \frac{1}{\mathrm{N}} \sum \mathrm{R_{ij}} \quad (4)$$

After the standard value is obtained, the next step is to calculate the variation value of each criterion. This variation reflects the degree of dispersion of alternative values against certain criteria. The greater the variation, the higher the criterion's ability to differentiate alternatives.

$$\emptyset_\mathrm{j} = \sum_{\mathrm{i=1}}^{\mathrm{m}} \left[\mathrm{R_{ij}} - \mathrm{N_i}\right]^2 \quad (5)$$

The deviation preference value is obtained by measuring the difference or deviation of alternative values against the standard values for each criterion. This stage helps in understanding the sensitivity of the criteria to performance differences among alternatives.

$$\Omega_\mathrm{j} = \left|1 - \emptyset_\mathrm{j}\right| \quad (6)$$

The final stage is to calculate the weight values of each criterion based on the level of variation and its deviation. Criteria with high variation are usually assigned a larger weight because they have a greater impact in distinguishing alternatives. These weight results are then used in evaluation or ranking methods.

$$\mathrm{w_j} = \frac{\Omega_\mathrm{j}}{\sum_{\mathrm{j=1}}^{\mathrm{n}} \Omega_\mathrm{j}} \quad (7)$$

The RECA method provides a systematic approach in determining the weights of criteria by considering the variation, deviation, and contribution of each criterion to the performance differences of alternatives. Through stages starting from the preparation of the decision matrix, preference value calculation, normalization, to determining the final weights, RECA is able to produce more objective and proportional weighting. Thus, this method not only enhances accuracy in the multi-criteria decision-making process but also improves fairness and transparency of the evaluation results, making it relevant

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for application in various contexts, including employee performance assessment and other strategic alternative selections.

2.3. COPRAS Method

The COPRAS method is one of the methods in Multi-Criteria Decision Making (MCDM) used to evaluate and rank alternatives based on benefit and cost criteria. The advantage of this method lies in its ability to assess alternatives proportionally, taking into account the positive and negative contributions of each criterion, resulting in a more balanced, fair, and accurate decision.

Constructing the decision matrix is the first stage in the COPRAS method by creating a matrix that contains alternative values for each criterion. Alternatives are usually object to be assessed, while the criteria are the assessment factors using equation (1).

Normalization of the decision matrix is the second stage in the COPRAS method where the values of each criterion are normalized to be comparable. Normalization is carried out by dividing the value of each element by the total value of the criterion.

$$X_{ij} = \frac{x_{ij}}{\sum_{i=1}^{j} x_{ij}} \quad (8)$$

Calculating the weighted normalized matrix is the third stage in the COPRAS method by multiplying the normalized values by the criterion weights. The result shows the relative contribution of each alternative to each criterion.

$$D^i = d_{ij} = x_{ij} * w_i \quad (9)$$

Calculating the total value for benefit and cost criteria is the fourth stage in the COPRAS method by summing the benefit criteria values for each alternative, as well as summing the cost criteria values for each alternative.

$$S_{+i} = \sum_{j=1}^{n} D_{+}^{i} \quad (10)$$

$$S_{-i} = \sum_{j=1}^{n} D_{-}^{i} \quad (11)$$

Calculating the relative value of each alternative is the fifth stage in the COPRAS method, where the relative value is calculated by considering the contribution of benefits and costs from each alternative.

$$Q_i = S_{+i} + \frac{S_{-i} \min \sum_{i=1}^{m} S_{-i}}{S_{-i} \sum_{i=1}^{m} (S_{-min}/S_{-i})} = \frac{\sum_{i=1}^{m} S_{-i}}{S_{-i} \sum_{i=1}^{m} (1/S_{-i})} \quad (12)$$

Determining utility is the final stage in the COPRAS method by calculating the relative utility degree of each alternative against the best alternative.

$$U_i = \left[\frac{Q_i}{Q_{max}}\right] * 100\% \quad (13)$$

The COPRAS method provides a systematic and proportional approach to evaluating and ranking alternatives based on benefit and cost criteria. The strength of this method lies in its ability to balance positive and negative factors, making the evaluation results fairer, more transparent, and accurate. With simple yet structured steps, COPRAS can assist decision-makers in objectively selecting the best alternatives. Therefore, this method is highly relevant for use in various decision-making contexts, including employee performance evaluation, supplier selection, and organizational strategy planning.

3. RESULT AND DISCUSSIONS

The research on the decision support system based on RECA and COPRAS methods in the performance evaluation of non-permanent employees focuses on the development of a decision support system that can assess the performance of non-permanent employees objectively, transparently, and measurably. In this study, the RECA method is used to determine the weights of evaluation criteria

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based on variations and deviations in values, so that each criterion receives a weight according to its impact on achieving evaluation goals. Furthermore, the COPRAS method is applied to calculate and compare employee performance by considering both benefit and cost criteria, resulting in a fair and accurate performance ranking.

The integration of these two methods not only provides more representative evaluation results but also assists management in making important decisions related to contract extensions, incentive provision, and workforce development strategies. With this system in place, the performance assessment process of non-permanent employees can be conducted in a more consistent and efficient manner while minimizing the subjective bias that often arises in manual evaluations. The results of this research are expected to contribute significantly to improving the effectiveness of human resource management and strengthening the organization's competitiveness through a more professional management of temporary employees.

3.1. Identification of Problems and Research Objectives

Employee performance evaluation is one of the important aspects in human resource management, as the results are used as a basis for making managerial decisions related to development, rewards, and the sustainability of working relationships. However, in the context of non-permanent employees, this evaluation process often faces various obstacles. The high turnover rate, limited working period, and lack of historical performance data make the evaluation tend to be partial and subjective. This condition creates potential biases in assessments, inconsistencies among evaluators, and difficulties in objectively comparing individual performances. If this continues, organizations risk losing opportunities to retain high-performing employees or even making incorrect recommendations regarding contract extensions and incentives. The traditional approach that still relies on manual assessments by supervisors also has significant limitations. Evaluations based solely on observation or personal perception often fail to reflect employees' performance quality comprehensively. Additionally, differences in standards among evaluators make the evaluation results less consistent, leading to potentially inaccurate decisions. Therefore, a data-driven approach is needed to assess employee performance in a more systematic, transparent, and fair manner. In this case, the DSS serves as a solution to assist management in evaluating and ranking employee performance using multi-criteria decision-making methods.

To address this issue, this research proposes the integration of the RECA and COPRAS methods in building a decision support system. The RECA method is used to determine the weights of criteria objectively based on the variation and deviation of preference values, so that each criterion receives a weight corresponding to its actual contribution to the evaluation. Meanwhile, the COPRAS method is applied to rank employees by proportionally considering the criteria of benefits and costs. The combination of these two methods is expected to overcome the weaknesses of manual approaches, as well as provide assessment results that are fairer, more transparent, and accountable. Based on the description of the problems, the aim of this research is to develop a decision support system based on RECA and COPRAS that can be used to evaluate the performance of non-permanent employees. This study specifically aims to determine the weights of performance evaluation criteria objectively using the RECA method, to rank employees using the COPRAS method to yield accurate performance rankings, and to provide a stronger basis for decision-making for management regarding contract extensions, incentive distribution, and workforce development programs. With the achievement of these goals, this research is expected to contribute both theoretically to the MCDM literature and practically to human resource management in organizations.

3.2. Assessment Data Collection

The data collection for assessment is an important stage in evaluating the performance of temporary employees, as this data serves as the basis for analysis to produce more objective decisions. Assessment data is collected through instruments that are developed based on performance criteria relevant to the tasks and responsibilities of employees. In the context of this research, the assessment focuses on several key aspects such as productivity, punctuality, teamwork ability, discipline, and

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absence. The data collection process is conducted by involving supervisors or direct superiors, as they have a better understanding of the daily performance of temporary employees. In addition to direct assessments by supervisors, data can also be obtained from organizational administrative records, such as attendance, task completion reports, or project evaluation results. This aims to minimize subjective bias and ensure that the data obtained truly reflects the actual performance conditions of employees. Thus, data collection for assessments becomes more comprehensive as it combines qualitative evaluations from human assessments and quantitative data from administrative documents.

In the data collection process, a numerical rating scale is used for each of the established criteria. The use of this scale allows for easier and more systematic comparison between employees. A structured scale also helps to maintain consistency in evaluations, so that the data obtained is standardized and accountable. The collected evaluation data is presented in Table 1.

Table 1. Data Collection

Employee	Productivity	Timeliness	Cooperation	Discipline	Absence
E-AS-01	8	7	9	8	8
E-AS-02	7	8	8	7	9
E-AS-03	9	9	7	8	8
E-AS-04	6	7	8	7	7
E-AS-05	8	8	9	9	9

The data source in this study was obtained from the assessments of supervisors towards temporary employees who are currently working in the company, supplemented with administrative data in the form of attendance records, daily performance reports, and evaluation of work results. This data was collected to ensure that the assessments made are objective, accurate, and reflect the actual performance conditions. With structured data, this research is expected to provide a comprehensive picture of the performance of temporary employees and support the implementation of the RECA and COPRAS methods to generate fairer and more targeted decisions.

3.3. Determination of Criteria Weights using the RECA Method

The determination of criterion weights using the RECA method plays an important role in producing a more objective and proportional performance evaluation. This method emphasizes how each criterion has a real impact on the final evaluation results, so the weights produced are not merely based on subjective perceptions but reflect the relative importance of each criterion. Thus, RECA is able to enhance fairness in the assessment process and help organizations understand which aspects are most critical in evaluating the performance of non-permanent employees. In addition, RECA ensures that the weight of the criteria used in the decision support system is truly relevant to the evaluation objectives. The weights generated through this method allow management to focus more on key aspects that significantly contribute to productivity and work quality. This makes RECA a weighting method that not only improves the accuracy of the assessment results but also enhances the effectiveness of decision-making, especially regarding the management and development of non-permanent employees.

The initial stage of the RECA method is to compile a decision matrix that contains alternatives and assessment criteria. This matrix serves as the basis for data processing because it contains the performance values of each alternative against each criterion based on the assessment data in table 1, which is created using equation (1). The result of the decision matrix from the assessment data is as follows.

$$X = \begin{bmatrix} 8 & 7 & 9 & 8 & 8 \\ 7 & 8 & 8 & 7 & 9 \\ 9 & 9 & 7 & 8 & 8 \\ 6 & 7 & 8 & 7 & 7 \\ 8 & 8 & 9 & 9 & 9 \end{bmatrix}$$

The next stage of the RECA method is to calculate the preference value which indicates the performance level of an alternative on a certain criterion. This value serves as initial input before the

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normalization process is carried out so that it can be proportionally compared between criteria using equation (2), the results of the criterion preference value are displayed in Table 2.

Table 2. Preference Value of the RECA Method

Employee	Productivity	Timeliness	Cooperation	Discipline	Absence
E-AS-01	1.0626	0.9015	1.1023	1.0303	0.9798
E-AS-02	0.9297	1.0303	0.9798	0.9015	1.1023
E-AS-03	1.1954	1.1591	0.8573	1.0303	0.9798
E-AS-04	0.7969	0.9015	0.9798	0.9015	0.8573
E-AS-05	1.0626	1.0303	1.1023	1.1591	1.1023

The preference value function in the RECA method in this table reflects the extent to which an alternative can meet the needs or objectives of the decision by considering the relative contribution of each criterion. Through preference calculations, RECA can convert both quantitative and qualitative data into standardized measures that allow for objective comparisons between alternatives. Thus, the preference value function not only provides a comprehensive overview of the performance of alternatives against all criteria but also serves as the primary reference in the ranking and determination of the best choice.

The next stage of the RECA method is to calculate the normalization value, which is necessary because each criterion usually has different units or ranges of values. This process ensures that no criterion dominates simply due to differences in measurement scales using equation (3), the results of the criterion preference value are displayed in Table 3.

Table 3. Normalization Value of the RECA Method

Employee	Productivity	Timeliness	Cooperation	Discipline	Absence
E-AS-01	0.8889	0.7778	1.0000	0.8889	0.8889
E-AS-02	0.7778	0.8889	0.8889	0.7778	1.0000
E-AS-03	1.0000	1.0000	0.7778	0.8889	0.8889
E-AS-04	0.6667	0.7778	0.8889	0.7778	0.7778
E-AS-05	0.8889	0.8889	1.0000	1.0000	1.0000

The normalization value in the RECA method serves to equalize the data scale of various criteria so that each criterion has a proportionate contribution in the decision-making process. With normalization, each data is transformed into a measurable ratio or proportion within the same range, thus facilitating further preference calculations and weighting. This function ensures that the evaluation results are fairer, more consistent, and can objectively reflect the performance of alternatives against all criteria.

The next stage of the RECA method is to calculate the standard values derived from the normalization results for each criterion, usually in the form of an average or baseline measure that represents the data distribution for those criteria. The standard value serves as a reference in measuring how far the variation of values between alternatives is against certain criteria. Using equation (4), the results of the criterion preference value are displayed in Table 4.

Table 4. Standard Value of the RECA Method

Productivity	Timeliness	Cooperation	Discipline	Absence
0.8444	0.8667	0.9111	0.8667	0.9111

Standard value in the RECA method serves as a standard measurement obtained from the normalization results of each criterion, allowing data with different scales to be mapped into a uniform standard value. This standard value helps to equalize the level of importance among criteria, so that no criterion with a large scale dominates the decision outcome.

The next step of the RECA method is to calculate the variation value of each criterion. This variation illustrates the level of dispersion of alternative values against certain criteria. The greater the

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variation, the higher the ability of that criterion to differentiate alternatives. Using equation (5), the results of the criterion preference value are displayed in Table 5.

Table 5. Variation Value of the RECA Method

Productivity	Timeliness	Cooperation	Discipline	Absence
0.0642	0.0346	0.0346	0.0346	0.0346

The variation value in the RECA method serves to measure the degree of dispersion or variation of standard values of each criterion among all alternatives. By calculating the variation value, the RECA method can assess the relative significance of each criterion more objectively, ensuring that the resulting weights are not solely based on assumptions but also reflect the actual contribution of the data. This function ensures that the weighting results are more accurate, proportional, and aligned with the characteristics of the information contained in the dataset.

The next stage of the RECA method is calculating the preference deviation value obtained by measuring the difference or deviation of the alternative values against the standard value in each criterion. This stage helps in understanding the sensitivity of the criteria to performance differences between alternatives. Using equation (6), the results of the criterion preference value are displayed in Table 6.

Table 6. Preference Deviation Value of the RECA Method

Productivity	Timeliness	Cooperation	Discipline	Absence
0.9358	0.9654	0.9654	0.9654	0.9654

The preference deviation value in the RECA method serves to indicate the level of difference or deviation of preferences among alternatives based on the established standard values. This value is used to assess how much one alternative deviates from another in meeting the set criteria. The larger the deviation value, the greater the role of that criterion in distinguishing alternatives, while a small deviation indicates that the criterion is less significant in determining the performance differences of the alternatives. Thus, the preference deviation value helps identify the sensitivity of the criteria and enhances the accuracy of the weighting and ranking process for alternatives in an objective manner.

The next stage of the RECA method is to calculate the weight value of each criterion based on the level of variation and its deviation. Criteria with high variation are usually given a larger weight because they are more influential in differentiating alternatives. The results of these weights are then used in the evaluation or ranking method, the weights of the criteria are calculated using equation (7), and the results of the criterion preference value are displayed in Table 7.

Table 7. Weight Value of the RECA Method

Productivity	Timeliness	Cooperation	Discipline	Absence
0.1951	0.2012	0.2012	0.2012	0.2012

The weight value in the RECA method serves as a representation of the relative importance level of each criterion in the decision-making process. This weight value is obtained from the processing of variations and deviations in preferences, thus reflecting the actual contribution of each criterion to the performance differences among alternatives. With the weight value, each criterion is given an appropriate proportion in the calculation of the final value, ensuring that the resulting decisions are not biased towards certain criteria that have larger scales. This function ensures that the evaluation of alternatives is fairer, more consistent, and based on the empirical significance of the analyzed data.

3.4. Performance Evaluation using the COPRAS Method

Performance evaluation using the COPRAS method provides a comprehensive approach in assessing alternatives based on various criteria that are both beneficial and cost-related. In the context of temporary employees, this method allows companies to make a fairer comparison by considering the

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strengths and weaknesses of each employee in a balanced manner. COPRAS does not only focus on achieving positive criteria, but also takes into account limiting factors or constraints, making the evaluation results more representative of the actual performance conditions. Furthermore, the application of COPRAS in performance evaluation provides results in the form of clear and transparent rankings, making it easier for management to make strategic decisions, such as contract extensions, award grants, or employee skill development. With this approach, evaluation becomes not only a means to measure performance but also a tool for making objective and systematic decisions. This ultimately supports the creation of a more effective human resource management process, particularly in managing non-permanent employees who play an important role in the continuity of organizational operations.

The initial stage of the COPRAS method is to compile a decision matrix that contains alternatives and assessment criteria. This matrix serves as the basis for data processing because it contains the performance values of each alternative against each criterion based on the assessment data in table 1, which is created using equation (1). The result of the decision matrix from the assessment data is as follows.

$$X = \begin{bmatrix} 8 & 7 & 9 & 8 & 8 \\ 7 & 8 & 8 & 7 & 9 \\ 9 & 9 & 7 & 8 & 8 \\ 6 & 7 & 8 & 7 & 7 \\ 8 & 8 & 9 & 9 & 9 \end{bmatrix}$$

Normalization of the decision matrix is the second stage in the COPRAS method, where the value of each criterion is normalized to be comparable. Normalization is done by dividing the value of each element by the total value of the criterion calculated using equation (8), and the results of the criterion preference value are displayed in Table 8.

Table 8. Normalization Value of the COPRAS Method

Employee	Productivity	Timeliness	Cooperation	Discipline	Absence
E-AS-01	0.2105	0.1795	0.2195	0.2051	0.1951
E-AS-02	0.1842	0.2051	0.1951	0.1795	0.2195
E-AS-03	0.2368	0.2308	0.1707	0.2051	0.1951
E-AS-04	0.1579	0.1795	0.1951	0.1795	0.1707
E-AS-05	0.2105	0.2051	0.2195	0.2308	0.2195

The Normalization value in the COPRAS method serves to transform the initial values of each criterion into a standardized form so that all data is on the same scale and can be compared objectively. This normalization process is carried out by dividing each alternative's value by the total value of the same criterion, resulting in a proportion that shows the relative contribution of the alternative to that criterion. This normalization function is important to prevent criteria with a large scale from dominating the calculation results, and to ensure that all alternatives can be evaluated fairly. Thus, the normalization value becomes a fundamental basis in the calculation of weights and the determination of utility values in the COPRAS method.

The calculation of the total score for the benefit and cost criteria is the fourth stage in the COPRAS method, by summing the benefit criterion values for each alternative, as well as summing the cost criterion values for each alternative calculated using equation (9) and (10), the results of the criterion preference value are displayed in Table 9.

Table 9. Total Score for the Benefit and Cost Criteria of the COPRAS Method

Employee	Benefit	Cost
E-AS-01	0.8147	0.1951
E-AS-02	0.7639	0.2195
E-AS-03	0.8435	0.1951
E-AS-04	0.7120	0.1707

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E-AS-05	0.8659	0.2195

The total score for the benefit and cost criteria in the COPRAS method serves to calculate the accumulation of the weighted normalized scores of each alternative according to the nature of the criteria. In the benefit criterion, a higher total score indicates better performance of the alternative as it reflects optimal achievement of the desired factors. Conversely, in the cost criterion, a lower total score indicates a superior alternative due to lower costs or risks incurred. This total calculation is an important stage in differentiating the contributions between advantageous factors and disadvantageous factors, thus making the evaluation results more balanced and fairly reflecting the relative position of each alternative.

Calculating the relative value of each alternative is the fifth stage in the COPRAS method, where the relative value is calculated by considering the contribution of benefits and costs from each alternative using equation (11), the results of the relative value of each alternative are displayed in Table 10.

Table 10. Relative Value of the COPRAS Method

Employee	Relative Value
E-AS-01	0.1627
E-AS-02	0.1527
E-AS-03	0.1683
E-AS-04	0.1424
E-AS-05	0.1730

Relative value in the COPRAS method serves to determine the position or comparison of each alternative based on the total score from the benefit and cost criteria that have been calculated. This value is obtained by combining the positive contributions from the benefit criteria and the negative impacts from the cost criteria, thus producing a comprehensive measure that illustrates the relative advantages of each alternative. The higher the relative value, the better the alternative is at meeting the overall decision objectives. This function becomes a crucial stage because it allows decision-makers to assess the effectiveness of alternatives not only from one side but from the balance between the existing benefits and costs.

Determining utility is the final stage in the COPRAS method by calculating the degree of relative utility of each alternative against the best alternative calculated using equation (12), the results of the utility values of each alternative are displayed in Table 11.

Table 11. Utility Value of the COPRAS Method

Employee	Utility Value
E-AS-01	94.03%
E-AS-02	88.23%
E-AS-03	97.29%
E-AS-04	82.27%
E-AS-05	100%

The utility value in the COPRAS method serves to indicate the level of optimality of an alternative compared to the best available alternative. This value is calculated by comparing the relative value of each alternative against the highest Relative Value, and is then expressed as a percentage. In this way, the utility value provides an overview of how close the performance of an alternative is to the most ideal one. The higher the utility value, the more worthy the alternative is to be considered as a primary choice. This function is important because it presents the final results in an easily understandable format, while also serving as a basis for ranking alternatives in an objective and measurable way.

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3.5. Analysis of Results

The analysis of results is an important stage in research aimed at interpreting the findings obtained after the application of the methods used. In the context of evaluating the performance of non-permanent employees, result analysis becomes a means to assess the extent to which the integration of RECA and COPRAS methods can provide an objective, accurate, and relevant picture of the actual conditions. Through this stage, the previously raw assessment data can be processed into meaningful information that guides managerial decision-making. The analysis of results also serves to identify the strengths and weaknesses of each evaluated employee, allowing the company to formulate appropriate strategies in managing its human resources. With the RECA method, the weight of criteria can be determined proportionally based on its contribution, while COPRAS allows for a comprehensive performance comparison among employees. The combination of both produces fairer ranking results and reduces the potential for subjective bias in assessments.

The results of the calculations using the RECA and COPRAS integration methods produce rankings of the temporary employees that clearly and objectively show performance differences. From the analysis, it was found that employees with high productivity levels, good work quality, and consistent discipline ranked at the top, while employees with higher absenteeism and relatively low productivity occupied the last positions. This alternative ranking provides a comprehensive overview of the strengths and weaknesses of each employee, while also facilitating management in making strategic decisions, such as contract extensions, awards, and further training for employees who need performance improvement. The alternative ranking results are displayed in Fig. 2.

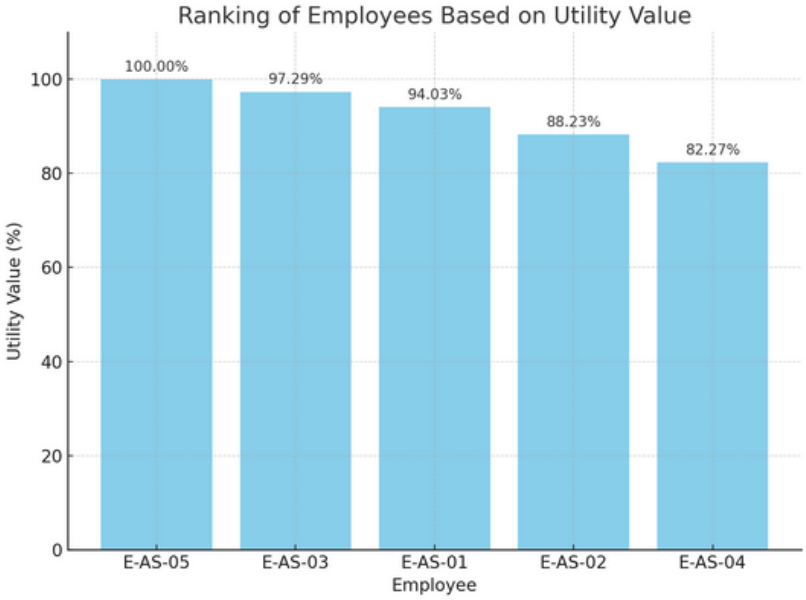

Figure 2. The Alternative Ranking Result

The employee ranking chart based on Utility Value shows that employee E-AS-05 holds the top position with a perfect score of 100%, followed by E-AS-03 with 97.29% and E-AS-01 with 94.03%. Meanwhile, E-AS-02 is in fourth place with a score of 88.23%, and the last ranking is occupied by E-AS-04 with 82.27%. These results indicate a significant difference among employees, which can serve as a basis for management in determining management strategies, whether in awarding, contract extensions, or coaching for employees who still need to improve their performance.

The change in criterion weights in the decision support system is one of the important aspects that can affect the final outcome of the evaluation and ranking process of alternatives. Criterion weights reflect the relative importance level of each factor considered in the evaluation, so small modifications to the weights can result in significant differences in ranking positions. Therefore, analysis of weight changes is necessary to assess how stable or sensitive the decision outcomes are to variations in

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assessment. With this analysis, decision-makers can be more confident that the results obtained do not solely depend on the subjectivity of weighting, but are also consistent even with shifts in the importance of the criteria. In addition, changes in the weights of criteria also serve as a means to test the reliability of the methods used in the decision-making process. A good method will demonstrate stable ranking results even when there are adjustments to the weights within certain limits, thus making the resulting decisions trustworthy. Conversely, if small changes in weights lead to significant shifts in rankings, then a reassessment of the model used or the selection of applied criteria is necessary. Thus, testing changes in the weights of criteria not only enhances objectivity in the decision-making process but also aids in formulating policies that are fairer, more transparent, and aligned with the real conditions on the ground.

The scenario of changing the weight of criteria by adding and reducing the weight by 0.05 is an approach used to test the sensitivity of decision outcomes to weight variations. In a multi-criteria-based decision support system, each criterion has a level of importance represented in the form of weights. However, in practice, these weights may undergo changes due to differences in the assessors' perceptions or organizational policies. Therefore, adding and reducing the weight by 0.05 is a simple yet effective step to see if small changes in the weight values can affect the ranking results of the alternatives produced. Through the implementation of this scenario, it can be determined to what extent the stability of the method used in facing parameter changes is. If the ranking results remain consistent despite variations in weight, it can be concluded that the decision-making model applied has a high level of reliability. Conversely, if there is a significant shift in ranking only due to a weight change of 0.05, it indicates a high sensitivity that needs to be considered by decision-makers. Thus, the scenarios of adding and reducing weights by 0.05 not only serve as a stability test tool but also provide a stronger basis for evaluating the validity of the decision support system results. The ranking results of alternatives based on weight changes are shown in Fig.3.

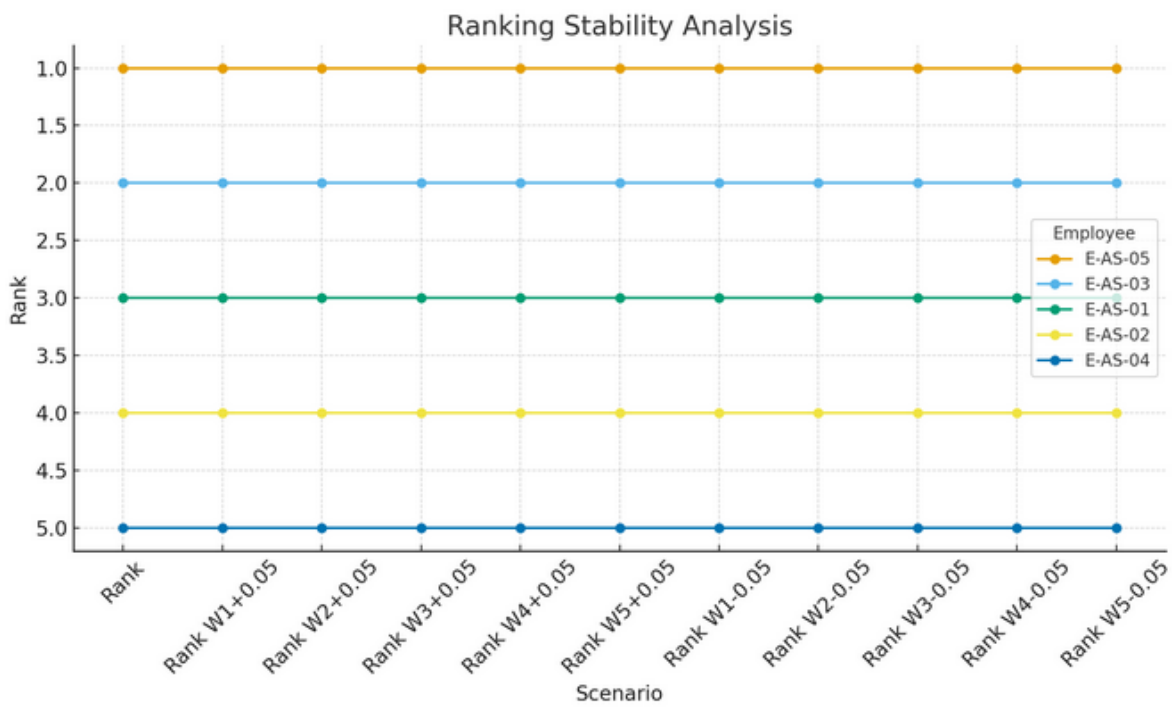

Figure 3. Ranking Alternatives of Criteria Weight Changes

The results of the Stability Analysis Ranking describe the ranking stability of five employees (E-AS-01 to E-AS-05) against various scenarios of criterion weight changes (W1 to W5 with variations of +0.05 and -0.05). From the graph, it can be seen that the ranking of each employee remains consistent in their positions, despite changes in weights in each scenario. Employee E-AS-05 always occupies rank

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1, followed by E-AS-03 in rank 2, E-AS-01 in rank 3, E-AS-02 in rank 4, and E-AS-04 in rank 5. This shows that the ranking results are very stable and not affected by variations in criterion weight changes, so the decisions made can be considered robust and reliable. The results of the changes in the criteria weights on the ranking of alternatives can be concluded that the analysis shows a high level of stability, where changes in the criteria weights do not affect the ranking order of employees. This condition confirms that the method used is capable of producing consistent, reliable decisions, and can serve as a strong foundation in the final decision-making related to identifying the best employees.

4. CONCLUSION

The implementation of a decision support system based on the RECA and COPRAS methods in evaluating the performance of temporary employees has proven capable of producing objective, systematic, and transparent rankings. The determination of criterion weights using RECA provides a fairer proportion in assessing the importance level of each performance aspect, while COPRAS allows for a comprehensive comparison between alternatives by considering both benefits and costs. This results in a final ranking with E-AS-05 having a score of 100%, E-AS-03 with a score of 97.32%, E-AS-01 with a score of 94.03%, E-AS-02 with a score of 88.34%, and E-AS-04 with a score of 82.19%. These results not only reflect the best performance but also identify weaknesses that need to be improved by each employee. This system can assist companies in making strategic decisions related to the management of temporary employees, such as contract extensions, award grants, and competency improvement training. With a measurable method-based evaluation, companies can minimize subjective bias in manual assessments and increase accuracy and efficiency in human resource management. DSS with the integration of RECA and COPRAS is not only relevant for performance evaluations but can also serve as a reference in supporting sustainable managerial policies. The main contribution of this research lies in the integration of the RECA and COPRAS methods in the performance evaluation process of non-permanent employees, resulting in a more objective, transparent, and comprehensive decision support system. The integration of these two methods enriches the performance evaluation approach for non-permanent employees that companies can use as a basis for strategic decision-making related to promotions, employment contracts, and human resource development programs. The results of the sensitivity analysis testing of changes in criterion weights against alternative rankings show a high level of stability, where changes in criterion weights do not affect the ranking order of employees. This condition affirms that the method used is capable of producing consistent, reliable decisions, and can serve as a strong basis in the final decision-making related to the determination of the best employees.

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