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Review Article

Application of Analytical Hierarchy Process in Functional Position Credit Point Assessment

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Abstract: Credit score evaluation for functional positions is a critical component in the career development of employees at the Financial Supervisory Agency (BPK) in Jakarta. However, this evaluation process often encounters challenges related to objectivity, consistency, and transparency due to the combination of qualitative and quantitative criteria. This study aims to apply the Analytical Hierarchy Process (AHP) as a decision support tool in the credit score assessment system. AHP is chosen for its ability to break down complex problems into a hierarchical structure and to assign priority weights through pairwise comparisons among criteria. This method is used to determine the priority weights of each evaluation component, including both main and supporting elements, leading to more structured and accountable decisions. The findings indicate that the implementation of AHP enhances the accuracy and objectivity of the credit score evaluation process for functional positions at BPK. Therefore, this approach can serve as the foundation for developing a more transparent and efficient technology-based assessment system.

Keywords: Analytical Hierarchy Process; BPK; Credit score; Decision-making; Functional position

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1. Introduction

The credit score assessment serves as a vital component in the career development system for functional officials in government institutions, including within the Financial Supervisory Agency (BPK) of the Republic of Indonesia. This credit score functions as a key consideration for determining promotions and career advancements. Therefore, the credibility and effectiveness of the credit score evaluation process play a crucial role in ensuring fair and merit-based human resource development.

In practice, however, the assessment process often encounters various issues, such as subjectivity in judgment, inconsistencies in the weighting of evaluation components and sub-components, and limited use of technology in supporting decision-making. These challenges raise concerns about transparency, objectivity, and fairness, which are essential in public sector governance and employee management.

To address these issues, it is necessary to adopt a systematic and structured decision-making approach that can accommodate multiple evaluation criteria. One such approach is the Analytical Hierarchy Process (AHP), a multi-criteria decision-making method developed by Thomas L. Saaty. AHP has been widely recognized and applied in various sectors, including human resource management in the public sector, due to its ability to break down

complex problems into a hierarchical framework and facilitate rational decision-making through pairwise comparisons.

Several studies have highlighted the effectiveness of AHP in improving public sector performance evaluation systems. For instance, AHP has been used to assess employee performance by considering diverse factors such as education, work experience, and professional contributions (Shashi & Sovit, 2024). Furthermore, combining AHP with other approaches, such as fuzzy logic, has shown potential to enhance evaluation accuracy and accommodate uncertainty in qualitative judgments (Kencana, 2024).

This research aims to apply the AHP method in the credit score assessment system for functional positions at BPK. The goal is to improve the objectivity, consistency, and transparency of the evaluation process. By implementing an AHP-based decision support system, BPK can conduct performance assessments and promotion decisions more systematically and accountably, aligning with the principles of good governance in public administration.

2. Proposed Method

By utilizing the Analytical Hierarchy Process (AHP) method, which is used to generate alternatives for functional position employees based on the credit scores that have been assessed for prioritization in promotion, it can handle the selection process in the decision support system.

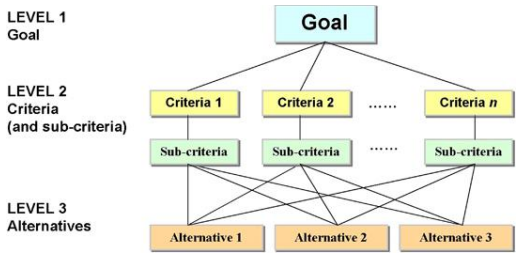

Figure 1. AHP method Stages

Exploring the use of AHP can enhance decision-making in performance evaluations in the public sector (hussain, et al., 2024). AHP in multi-criteria decision-making is very suitable for assessing organizational and individual performance in the public sector (Sinulingga, Sihombing, & Irmayani, 2022). Using AHP in public sector employee performance evaluation can support better decision-making (Claus & Aldianto, 2024). The Analytical Hierarchy Process is used to improve decision-making in employee performance evaluation (Minutolo, 2023). The decision-making process involves the following steps:

1. **Problem Breakdown and Solution Selection**: Identify the problem and decide what solution is desired, then structure the hierarchy for the problem at hand. The hierarchy is established by setting the goal for the overall system with weight values ranging from 1 to 9.
2. **Prioritizing Components**:
   - Compare components pairwise according to the given criteria.
   - The pairwise comparison matrix will be filled with numbers to demonstrate the relative importance of one component compared to others.
3. **Synthesis**: The assessments of the pairwise comparisons are combined to obtain a complete set of priorities. The following steps are carried out:
   - Determine the priority values of the evaluation criteria.
   - Create a comparison table for the priorities of each evaluation criterion by comparing each criterion.
   - Determine the weights for each evaluation criterion.
   - Calculate the weight values for each evaluation criterion.
   - Consider the consistency during decision formation, as it is important to understand how well the consistency holds, because users do not want decisions based on considerations with low consistency. The following steps are carried out:
     1. Multiply each value in the first column by the relative priority of the first criterion, the value in the second column by the relative priority of the second criterion, and so on.

2. Sum each row.
3. Divide the row sum by the relative priority of the corresponding criterion.
4. Add the results from the above calculations with the total number of criteria, resulting in λ max.
5. Calculate the Consistency Index (CI) using the formula:
   CI = (λ max - n) / n
   Where n = the number of elements.
6. Calculate the Consistency Ratio (CR) using the formula:
   CR = CI / IR
   Where:
   CR = Consistency Ratio
   CI = Consistency Index
   IR = Random Index
7. Check the Hierarchy Consistency.
   If the consistency ratio is greater than 0.1 or 10%, then the evaluation data needs to be corrected. However, if the consistency ratio (CI/CR) is less than or equal to 0.1, the calculation results are correct.

3. Results and Discussion

The Analytical Hierarchy Process (AHP) method can be used to calculate the final value of alternatives, namely determining the priority of the best functional position employees based on the credit scores that have been submitted and assessed. The output generated is a ranking of weighted values from the highest to the lowest. In the business process of credit score assessment and promotion proposals, there are 4 criteria: Education, Inspection, Professional Development, and Support. Each criterion has its respective weight. The calculation between alternatives and criteria using the Analytical Hierarchy Process will result in a ranking of employees based on their assessed credit scores. The use of AHP in employee performance evaluation in the public sector ensures accuracy and fairness in the assessment (Harjanto, Setiyowati, & Vulandari, 2021). It presents the application of AHP in public administration with an emphasis on the benefits gained in the employee performance evaluation process (Escobar, Aguarón, Moreno-Jiménez, & Turón, 2023). The use of AHP can improve objectivity and efficiency in the employee performance evaluation in government institutions (Damanik, Rerung, Lubis, Panggabean, & Azizah, 2023).

The AHP method is applied to assign weights to each credit score assessment criterion, based on the rules from the supervising institution. The following are the implementation steps:

1. The main criteria include: education, task execution, professional development, and supporting elements.
2. Through pairwise weighting and priority matrix calculations, the weights for each criterion are obtained with valid consistency (CR < 0.1).
3. The AHP calculation results are automatically used by the system to generate the final scores, which serve as the basis for evaluating credit score proposals.

The use of AHP has been proven to assist decision-makers in determining priorities objectively and consistently based on the preferences and experience of the experts.

This section will explain the process of how the input data will be processed by the system to provide accurate input data as the basis for calculations and as a reference in the decision-making process to select the prioritized employees for promotion.

Input of Activity Details

The input of activity details is carried out by functional position employees who fill in the activity description field, which includes activity choices along with their respective credit score values in accordance with the Regulation of the Secretary General of the Financial Supervisory Agency of the Republic of Indonesia Number 5 of 2021 concerning Technical Guidelines for the Functional Position of Inspectors. Employees also upload supporting documents related to the implementation of the activities. This is then verified by the proposing officials and the Secretariat.

Evaluation by the Team

The verified activity data is assessed by the Evaluation Team, up to the level of the Head of the Evaluation Team, by comparing the alignment between the proposed activity values and the uploaded supporting documents.

Credit Score Equivalence

Since the credit score values submitted by employees do not have a maximum value, to simplify the priority determination process, after the evaluation process, each criterion must be adequately assessed in the decision-making process to determine which employees should be prioritized for promotion. Therefore, for the prioritization process, each credit score value must be adjusted so that the maximum value is ≤ 10, as follows:

Table 1. Equivalency of Credit Score Values

Credit Score	K1	K2	Credit Score	K3	K4
0–9	1	1	0–1	2	2
10–19	2	2	2–4	4	4
20–29	3	3	5–7	6	6
30–39	4	4	8–10	8	8
40–49	5	5	>10	10	10
50–59	6	6			
60–69	7	7			
70–79	8	8			
80–89	9	9			
>90	10	10			

Criteria Collection

The following is a table of criteria used to store data or criterion values that will be used to determine employees with priority for promotion proposals based on their credit scores:

Table 2. Criteria

Code	Criterion Name
K1	Education
K2	Audit Implementation
K3	Professional Development
K4	Supporting Activities

The priority target value scale uses a 1 to 9 range as described below:

Table 3. Priority Scale Comparison

Scale Code	Definition
1	Equally Important
2	Slightly More Important
3	Somewhat More Important
4	Moderately More Important
5	More Important
6	Considerably More Important
7	Significantly More Important
8	Almost Absolutely More Important
9	Absolutely More Important

Criteria Comparison

In this section, the calculation of the criteria weighting will be carried out which is useful for accommodating the criteria weighting data that has been selected by the user.

Criteria Comparison Matrix

In the criteria comparison matrix, the consistency of each criterion is calculated based on the level of importance between one criterion and another based on user considerations. The criteria comparison value can be seen in the following table:

Table 4. Comparison of Criteria

Criteria code	K1	K2	K3	K4
K1	1	0.2	3	7
K2	5	1	5	9
K3	0.3	0.2	1	3
K4	0.14	0.11	0.3	1
Sum	6.44	1.51	9.3	20

Priority Comparison Matrix

At this stage of the priority comparison matrix, the process of determining the priority of the criteria will be carried out to determine the suitability of the values that have been entered into the matrix. The values in this matrix are obtained by dividing the values in the row column by the total number in the column, the priority comparison matrix can be seen in the following table.

Table 5. Priority Comparison

Criteria code	K1	K2	K3	K4	Sum	Priority
K1	0.1553	0.1325	0.3226	0.3500	0.9603	0.2401
K2	0.7764	0.6623	0.5376	0.4500	2.4263	0.6066
K3	0.0466	0.1325	0.1075	0.1500	0.4366	0.1091
K4	0.0217	0.0728	0.0323	0.0500	0.1768	0.0442

Addition Matrix for Each Row

At this stage, the value in the matrix is obtained by multiplying the value of the row column in the comparison criteria matrix table with the priority value of each criterion, the matrix can be seen in the following table

Table 6. Addition of Each Row

Criteria code	K1	K2	K3	K4	Sum
K1	0.1553	0.0265	0.9677	2.45	3.600
K2	3.8820	0.6623	2.6882	4.05	11.282
K3	0.0140	0.0265	0.1075	0.45	0.598
K4	0.0030	0.0080	0.0097	0.05	0.071

Calculating Consistency Ratio

The value in the consistency ratio matrix is obtained from the sum value in the sum matrix of each row and the priority value from the criteria priority comparison matrix. While the result column is the result of the sum between the sum value obtained from the sum matrix of each row and the priority value which can be seen in the following table:

Table 7. Consistency Ratio

Consistency Ratio (sum of each row + Priority weight)			
Criterion	Sum	Priority	Result
K1	3.600	0.2401	3.840
K2	11.282	0.6066	11.889
K3	0.598	0.1091	0.707
K4	0.071	0.0442	0.115
Total			16.551

After getting the ratio number, the consistency ratio value can be calculated as below

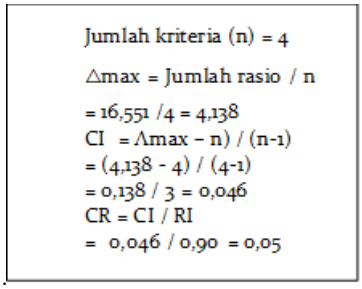

Figure 2. Calculation of ratio value

Since the consistency ratio (CR) is ≤ 0.1, the calculation is acceptable.

Alternative Comparison

The following table shows the alternatives used to determine which employees are prioritized for promotion (based on user input):

Table 8. Employee Values according to criteria

		Criteria			
Alternative	Name	K1	K2	K3	K4
A1	Gtt	60	86	2	1
A2	Yni	55	73	3	0.4
A3	BPH	40	99	0.4	0.5
A4	Snrs	88	23	2.3	6
A5	Dn Sd	35	65	7.6	2
A6	Ftny	74	58	5.6	3.5
A7	RD	104	37	1	0.9
A8	Rn Ft	77	77	1	2.4
A9	Zlw	109	69	0.3	5.2
A10	ER	68	90	2	1

The credit scores obtained by employees in the table above need to be adjusted to the adjusted criteria values as follows:

Table 9. Employee scores according to adjusted criteria

		Criteria			
Alternative	Name	K1	K2	K3	K4
		Credit points submitted, assessed and have been approved for assessment			
A1	Gtt	7	9	4	2
A2	Yni	6	8	6	2
A3	BPH	5	10	2	2
A4	Snrs	9	3	6	6
A5	Dn Sd	4	7	8	2
A6	Ftny	8	6	6	4
A7	RD	10	4	2	2
A8	Rn Ft	8	8	2	4
A9	Zlw	10	7	2	6
A10	ER	7	10	2	2

The adjusted credit score data for each employee is then multiplied by the priority weight value of each corresponding criterion, the calculation is presented as follows:

Table 10. Final Score Calculations

A1	:	(7 x0,1533) + (9 x 0,662) + (4 x 0,108) + (2 x 0,050) = 7,577
A2	:	(6 x0,1533) + (8 x 0,662) + (6 x 0,108) + (2 x 0,050) = 6,975
A3	:	(5 x0,1533) + (10 x 0,662) + (2 x 0,108) + (2 x 0,050) = 7,7714
A4	:	(9 x0,1533) + (3 x 0,662) + (6 x 0,108) + (6 x 0,050) = 4,329
A5	:	(4 x0,1533) + (7 x 0,662) + (8 x 0,108) + (2 x 0,050) = 6,217
A6	:	(8 x0,1533) + (6 x 0,662) + (6 x 0,108) + (4 x 0,050) = 6,061
A7	:	(10 x0,1533) + (4 x 0,662) + (2 x 0,108) + (4 x 0,050) = 4,517
A8	:	(8 x0,1533) + (8 x 0,662) + (2 x 0,108) + (4 x 0,050) = 6,955
A9	:	(10 x0,1533) + (7 x 0,662) + (2 x 0,108) + (6 x 0,050) = 6,704
A10	:	(7 x0,1533) + 109 x 0,662) + (2 x 0,108) + (2 x 0,050) = 8,025

Table 11. Final Scores and Rankings

No	Name	K1	K2	K 3	K 4	Score	Ran k
A1	Gtt	7	9	4	2	7.58	3
A2	Yni	6	8	6	2	6.97	4
A3	BPH	5	10	2	2	7.77	2
A4	Snrs	9	3	6	6	4.33	10
A5	Dn Sd	4	7	8	2	6.22	7
A6	Ftny	8	6	6	4	6.06	8
A7	RD	10	4	2	2	4.52	9
A8	Rn Ft	8	8	2	4	6.96	5
A9	Zlw	10	7	2	6	6.70	6
A1 0	ER	7	10	2	2	8.02	1

Based on the above calculations, employee A10 (ER) achieved the highest score (8.02), and therefore, based on credit score evaluation, should be prioritized for promotion

The research results indicate that the AHP method provides a systematic and objective approach in the decision-making process related to credit score evaluation. By breaking down the assessment into several relevant criteria and assigning weights based on their level of importance, AHP enhances transparency in the evaluation process. This model also facilitates the development of a technology-based system to support the digitalization of the credit score evaluation process, aligning with bureaucratic reform and the modernization of the personnel system at BPK. However, the implementation of AHP still requires the involvement of experts and competent stakeholders in structuring and weighting the criteria, as well as training for system users to ensure that the outcomes are well-accepted and optimally implemented.

4. Conclusions

This study successfully implemented the Analytical Hierarchy Process (AHP) method in the credit score assessment system for functional positions at the Audit Board of Indonesia (BPK). The application of AHP provides a more organized and transparent structure for decision-making, particularly in the evaluation process that involves various complex criteria and sub-criteria. The results of the weight calculations using AHP indicate that this method can address issues of subjectivity and inconsistency commonly found in conventional assessment methods. AHP also offers a more objective and fair representation of employee

contributions in areas such as education, task execution, and professional development, which were previously difficult to measure accurately.

Although this method has proven effective in enhancing the accuracy and objectivity of credit score assessments, the implementation of AHP requires the involvement of experts in determining appropriate criteria and sub-criteria, as well as in assigning valid weights. Therefore, AHP can serve as a strong foundation for developing a more efficient, transparent, and accountable technology-based assessment system within BPK.

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