VOL. 23 (2) (2026), XX-XXp-ISSN: 693-7554, e-ISSN:2654-3990

Decision Support System for Civil Servant Mutation Using ORESTE

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Abstract

This study presents the development of a web-based Decision Support System (DSS) for determining civil servant mutations at the Center for Standardization of Food Crop Instruments (PSITP) Bogor using the Organization, Rangement et Synthèse de Données Relationnelles (ORESTE) method. The existing mutation process was conducted manually using Microsoft Excel, making it susceptible to calculation errors, subjective decision-making, and lengthy processing times. This research aims to develop a system that supports objective, transparent, and efficient employee mutation decisions based on performance and competency assessments. The study utilized data from 40 civil servants collected through interviews, observations, and institutional records. The ORESTE method was applied to rank employees by employing the Besson Rank technique to handle identical criterion values, followed by Distance Score calculations to obtain preference values (Vi) for final ranking. The system was developed using the Waterfall software development model, encompassing requirements analysis, system design, implementation with PHP and MySQL, testing, and maintenance. The resulting application provides role-based access for administrators, employees, and managers, as well as modules for managing employee data, performance and competency evaluations, automated ORESTE calculations, and ranking reports. Functional and validation testing demonstrated that the system operates correctly and produces accurate ranking results. The findings indicate that the proposed DSS effectively improves the objectivity, transparency, and accuracy of civil servant mutation decisions while reducing manual errors and processing time, thereby supporting more reliable and efficient personnel management.

***Keywords*:** *Decision Support System; Civil Servant Mutation; ORESTE; Performance Evaluation;*

1. Introduction

In order to support national development in the current reform era, both government and private institutions play a crucial role in achieving organizational goals effectively and efficiently. Human resources are the primary determinant of organizational success because they directly influence the quality of services and organizational performance. In government organizations, human resources are represented by Civil Servants (*Pegawai Negeri Sipil*-PNS), who are Indonesian citizens appointed permanently by authorized officials in accordance with Law Number 5 of 2014 concerning the State Civil Apparatus [1]. As public servants, civil servants are expected to perform their duties professionally, responsibly, honestly, and fairly in supporting government administration and national development [2].

One important aspect of civil servant management is employee mutation. Mutation is part of human resource development and organizational dynamics intended to improve organizational effectiveness while supporting employee career development [3]. In general, mutation refers to the transfer of employees from one position, work unit, or geographical location to another position of equivalent responsibility [9], [10]. Proper implementation of employee mutation enables organizations to optimize employee competencies while maintaining fairness and transparency in personnel management.

At the Center for Standardization of Food Crop Instruments (PSITP) Bogor, employee mutation is generally initiated through requests submitted by employees to the personnel division. The requests are evaluated based

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Received: 12 May 2026, Accepted: 30 July 2026 and available online 31 July 2026
DOI: https://doi.org/10.33751/komputasi.v19i2.5260

on administrative requirements, including years of service, disciplinary records, and performance appraisal results before receiving approval from the head of the institution. Employees usually request transfers for several reasons, such as accompanying a spouse assigned to another location, caring for elderly parents, or seeking career development opportunities. Although this procedure provides flexibility, it requires an objective and measurable evaluation process to ensure fair and transparent decision-making.

One of the main challenges encountered at PSITP Bogor is that employee performance and competency evaluations are still conducted manually using Microsoft Excel. Manual data processing requires considerable time and is vulnerable to human error, calculation mistakes, inconsistent assessments, and inaccurate data interpretation. Furthermore, transfer decisions are often based on limited analysis of employee information, making it difficult to objectively compare employees who possess similar qualifications. Consequently, the transfer process frequently experiences delays and may reduce organizational effectiveness.

Employee performance and competency are fundamental factors in determining mutation decisions. Performance reflects the achievement of work targets and responsibilities based on predetermined standards and organizational objectives [11], [12]. Meanwhile, competency represents the combination of knowledge, skills, experience, and work attitudes required to perform assigned duties effectively [13], [14]. Considering both aspects simultaneously provides a more comprehensive evaluation of employee readiness for transfer and career development.

To overcome these challenges, organizations increasingly utilize Decision Support Systems (DSS). Originally introduced by Michael Scott Morton in the 1970s, a DSS is a computer-based information system that processes data, applies analytical models, and provides recommendations to support decision-makers in solving semi-structured and unstructured problems [7]. Rather than replacing decision makers, DSS assists them in evaluating alternatives objectively through data analysis and simulation [8]. In human resource management, DSS has been widely implemented for employee recruitment, promotion, placement, and mutation decisions.

Several previous studies have proposed decision support systems for employee transfer and placement using Multi-Attribute Decision Making (MADM) methods. One of the commonly applied methods is the Fuzzy Simple Additive Weighting (F-SAW) method, which ranks employees according to weighted evaluation criteria [4]. Although effective in producing rankings, this approach still relies heavily on subjective weight determination and has limitations when several alternatives possess identical criterion values.

Therefore, this research applies the **Organization, Rangement and Synthesis of Relational Data (ORESTE)** method, one of the Multi-Attribute Decision Making (MADM) techniques designed to rank alternatives according to ordinal preferences [15]. A distinctive characteristic of ORESTE is the application of the **Besson Rank** procedure, which objectively handles identical criterion values by assigning average ranks before calculating the **Distance Score** and preference values for each alternative [15], [16]. Compared with conventional weighted-ranking methods, ORESTE provides a more objective mechanism for evaluating employees with similar assessment results.

The novelty of this research lies in integrating the ORESTE method into a web-based decision support system specifically developed for civil servant mutation at PSITP Bogor. The proposed system combines employee performance and competency criteria to generate objective, transparent, and accurate mutation recommendations while minimizing manual calculations and processing time. Therefore, this study aims to design, implement, and evaluate a web-based decision support system capable of improving the effectiveness, efficiency, transparency, and accuracy of civil servant mutation decisions at PSITP Bogor.

2. Methods

The method applied in developing this software is the Waterfall method. The Waterfall method itself is one of the methods commonly used in the software development process[17]. This research was conducted during the field practice period at the Bogor Food Crop Instrument Standardization Center, which took place from September 9, 2024 to October 9, 2024. The research location was at Jl. Merdeka No. 147, RT. 01 / RW. 5, Menteng, West Bogor District, Bogor City, West Java 16111.

Calculation ORESTE (Organization, Arrangement and Synthesis of Relational Data) method carried out through several systematic stages to determine the best alternative based on established criteria. The stages in the method are:ORESTE is as follows:

- Defining Alternatives and Criteria
  At this stage, alternatives (for example, the names of employees to be considered) and criteria (assessment factors such as performance, competency, age, length of service, etc.) are first determined. These criteria serve as benchmarks for decision-making. Each alternative will be evaluated based on these criteria.
- Convert Values into*Besson Rank*
  The value of each alternative for each criterion is converted into a ranking using the method*Besson Rank*The better an alternative's score against a criterion, the higher its ranking (or lower depending on the type of criterion). This ranking will serve as the basis for subsequent calculations.

- Count *Distance Score*
  This stage calculates the distance (difference) in ranking between alternatives for each criterion. This difference is called the Distance Score. The goal is to determine the extent of the difference in preferences between alternatives for each criterion.
- Calculating Preference Value (Vi)
  After getting*Distance Score*These scores are accumulated and weighted based on the importance of each criterion. The result of this accumulation is called the Preference Value (Vi) for each alternative. The lower the Vi value, the better or more preferred the alternative is considered.
- Performing Ranking
  In the final stage, the alternatives are ranked based on the Vi values obtained previously. The alternative with the lowest Vi value will be ranked highest because it is considered the best choice based on all the criteria used.

3. Results

3.1. *Proses Organization Rangement Et Synthese De Donnes Relationnelles (ORESTE)*

At this stage, the calculation *ORESTE* method. The process begins with assigning rankings, calculating the Distance Score, and obtaining preference scores to objectively determine the final ranking. The following are the calculation steps :

- *Defining Alternatives and Criteria*

The following are the names of performance and competency criteria which can be seen in tables 5 and 6.

Table 5. Performance Criteria

Performance	Information	Weight
C1	Service Orientation	0.26
C2	Integrity	0.23
C3	Commitment	0.19
C4	Discipline	0.19
C5	Collaboration	0.13
Amount		**1**

Table 6. Competency Criteria

Competence	Information	Weight
C1	Working Hours	0.38
C2	Education	0.34
C3	Age	0.28
Amount		**1**

Each criterion will be assigned a value based on its sub-criteria as a benchmark for evaluating each alternative. The table of sub-criteria for civil servant performance criteria can be seen in Table 7.

Table 7. Performance Sub-Criteria

NO	Sub Criteria	Min Value	Max Value
1.	Very good	91	100
2.	Good	76	90
3.	Enough	61	75
4.	Not enough	51	60
5.	Bad	10	50

The table of sub-criteria for the PNS work period criteria can be seen in table 8.

Table 8. Working Time Sub Criteria

NO	Sub Criteria	Min Value	Max Value
1.	Very Old	91	100
2.	Long	76	90
3.	Long enough	61	75
4.	New	50	60

The table of sub-criteria for the Civil Servant Education criteria can be seen in table 9.

Table 9. Education Sub-Criteria

NO	Sub Criteria	Min Value	Max Value
1.	S3	91	100
2.	S2	81	90
3.	S1	71	80
4.	D3	61	70
5.	High School	50	60

The table of sub-criteria for the civil servant age criteria can be seen in table 10.

Table 10. Age sub-criteria

NO	Sub Criteria	Min Value	Max Value
1.	Very Ripe	91	100
2.	KIND	75	90
3.	Ripe Enough	61	75
4.	Time	50	60

The following data is used as an alternative to the performance assessment criteria in the form of civil servant data. This can be seen in Table 11.

Table 11. Alternative data and performance assessment

NO	Alternative	C1	C2	C3	C4	C5
1.	A1	80	89	75	89	85
2.	A2	70	87	90	88	75
3.	A3	86	85	50	75	77
4.	A4	90	77	92	88	67
5.	A5	88	70	77	94	92
6.	A6	90	90	62	64	76
7.	A7	90	76	52	90	90
8.	A8	60	90	49	74	88
9.	A9	85	88	91	65	80
10.	A10	75	80	90	93	60

The following data is used as an alternative to the competency assessment criteria in the form of civil servant data. This can be seen in Table 12.

Table 12. Alternative data and competency assessment

NO	Alternative	C1	C2	C3
1.	A1	88	86	87
2.	A2	96	73	80
3.	A3	96	78	83
4.	A4	98	55	85
5.	A5	100	52	97
6.	A6	90	59	76
7.	A7	94	54	92
8.	A8	72	66	55
9.	A9	96	56	89
10.	A10	94	60	84

- *Converting Values into Besson Rank*

Evaluation and*besson Rank*Sorted from highest to lowest. If there are identical values, the average of the rankings is used. This can be seen in Tables 13, 14, 15, 16, and 17.

Table 13. Field orientation value criterion C1

NO	Alternative	Value (C1)	Besson Rank
1.	A4	90	2.0
2.	A6	90	2.0
3.	A7	90	2.0
4.	A5	88	4
5.	A3	86	5
6.	A9	85	6
7.	A1	80	7
8.	A10	75	8
9.	A2	70	9
10.	A8	60	10

Solution:

Since there are similarities for several C1 criteria, the calculation of the field orientation value is as follows: 1 + 2 + 3 = 6/3 = 2.0

Table 14. Besson Rank for Performance Criterion C2

NO	Alternative	Value (C2)	*Besson Rank*
1.	A6	90	1.5
2.	A8	90	1.5
3.	A1	89	3
4.	A9	88	4
5.	A2	87	5
6.	A3	85	6
7.	A10	80	7
8.	A4	77	8
9.	A7	76	9
10.	A5	70	10

Solution:

Since there are similarities for several C2 criteria, the calculation of the integration value is as follows: 1 + 2 = 3/2 = 1.5

Table 15. Commitment value of criteria C3

NO	Alternative	Nilai (C3)	*Besson Rank*
1.	A4	92	1
2.	A9	91	2
3.	A2	90	3.5
4.	A10	90	3.5
5.	A5	77	5
6.	A1	75	6
7.	A6	62	7
8.	A7	52	8
9.	A3	50	9
10.	A8	49	10

Solution:
Since there are similarities for several C3 criteria, the commitment value calculation is as follows: 3 + 4 = 7/2 = 3.5

Table 16. Discipline Value criteria C4

NO	Alternative	Nilai (C4)	*Besson Rank*
1.	**A5**	**94**	**1**
2.	**A10**	**93**	**2**
3.	**A7**	**90**	**3**
4.	**A1**	**89**	**4**
5.	**A2**	**88**	**5.5**
6.	**A4**	**88**	**5.5**
7.	**A3**	**75**	**7**
8.	**A8**	**74**	**8**
9.	**A9**	**65**	**9**
10.	**A6**	**64**	**10**

Solution:

Since there are similarities for several C4 criteria, the calculation of the discipline value is as follows: 5 + 6 = 11/2 = 5.5

Table 17. Cooperation value criteria C5

NO	Alternative	Value (C5)	*Besson Rank*
1.	A5	92	1
2.	A7	90	2
3.	A8	88	3
4.	A1	85	4
5.	A9	80	5
6.	A3	77	6
7.	A6	76	7
8.	A2	75	8
9.	A4	67	9
10.	A10	60	10

Evaluation and*besson Rank*Sorted from highest to lowest. If there are identical values, the average of the rankings is used. This can be seen in Tables 18, 19, and 20.

Table 18. Working time value criterion C**1**

NO	Alternative	Value (C1)	*Besson Rank*
1.	A5	100	1
2.	A4	98	2
3.	A2	96	4.0
4.	A3	96	4.0
5.	A9	96	4.0
6.	A7	94	6.5
7.	A10	94	6.5
8.	A6	90	8
9.	A1	88	9
10.	A8	72	10

Solution:
Since there are some similarities for several C1 criteria, the calculation of the working time value is as follows: 3 + 4 + 5 = 12/3 = 4.0
6 + 7 = 13/2 = 6.5

Table 19. Educational value of criterion C2

NO	Alternative	Value (C2)	*Besson Rank*
1.	A1	86	1
2.	A3	78	2
3.	A2	73	3
4.	A8	66	4
5.	A10	60	5
6.	A6	59	6
7.	A9	56	7
8.	A4	55	8
9.	A7	54	9
10.	A5	52	10

Table 20. Age value of criteria C3

NO	Alternative	Nilai (C3)	*Besson Rank*
1.	A5	97	1
2.	A7	92	2
3.	A9	89	3
4.	A1	87	4
5.	A4	85	5
6.	A10	84	6
7.	A3	83	7
8.	A2	80	8
9.	A6	76	9
10.	A8	55	10

- *Calculating Distance Score*

Count *distance score* This is done to measure the distance between each alternative and the criteria, with the ideal position being occupied by the best alternative and the most important criteria. The calculation uses the following formula:

$$D(a_i, C_j) = \left(\frac{1}{2} r_{C_j}^2 + \frac{1}{2} r_j (a_i)^2\right)^{1/2} \quad (1)$$

- *Calculating Preference Value (Vi)*

The preference value (Vi) is obtained from the accumulation*distance score*and sorted from the smallest to the largest value. The following are the results of the accumulated performance values*Distance Score*namely as follows:

Table 21. Accumulated Value *Distance Score* performance

NO	Alternative	C1	C2	C3	C4	C5
1.	A4	1.752	6.966	2.614	4.969	4.236
2.	A6	1.752	1.817	6.111	3.634	7.230
3.	A7	1.752	7.836	6.975	8.723	2.596
4.	A5	3.483	8.706	4.418	3.483	2.410
5.	A3	4.353	5.228	7.841	6.166	5.698
6.	A9	5.223	3.504	2.677	7.862	3.000
7.	A1	6.094	2.677	5.256	4.000	3.570
8.	A10	6.964	6.096	3.288	3.504	4.953
9.	A2	7.835	4.362	3.288	4.969	6.459
10.	A8	8.706	1.817	8.710	7.007	8.008
Weight		**0.26**	**0.23**	**0.19**	**0.19**	**0.13**

After getting the distance score, the next step is to calculate the preference value performance criteria by multiplying*distance score*Each criterion has its own weight. The formula for finding the preference value is as follows:

$$V_i = \sum_{j=1}^{m} \left(D(a_i, C_j) \times W_j \right) \quad (2)$$

Table 22. Distance Score

NO	Alternative	C1	C2	C3
1.	A5	1.000	7.958	2.410
2.	A4	1.651	6.383	4.236
3.	A2	3.191	2.596	6.459
4.	A3	3.191	2.000	5.698
5.	A9	3.191	5.599	3.000
6.	A7	5.165	7.169	2.596
7.	A10	5.165	4.051	4.953
8.	A6	6.354	4.820	7.230
9.	A1	7.147	1.651	3.570
10.	A8	7.940	3.302	8.008
Weight		**0.38**	**0.34**	**0.28**

After getting the distance score, the next step is to calculate the competency criteria preference value by multiplying*distance score*Each criterion has its own weight. The formula for finding the preference value is as follows:

Formula : Vi= Value*Distance Score* $*W$Performing Ranking

Determining the final ranking results is done by combining the performance and competency preference values, then selecting the lowest value according to the ORESTE ranking method. This can be seen in Table 23, as follows:

Table 23. Final ranking results

NO	Alternative	Preference Value performance	Preference Value competence	Ranking Results	Ranking
1.	A1	4.558	4.277	4.417	4
2.	A2	5.531	3.904	4.718	6
3.	A3	5.722	3.488	4.605	5
4.	A4	4.527	3.983	4.255	1
5.	A5	4.975	3.761	4.368	2
6.	A6	4.512	6.078	5.295	9
7,	A7	4.840	5.127	4.984	7
8.	A8	6.242	6.382	6.312	10
9.	A9	4.816	3.956	4.386	3
10.	A10	5.642	4.727	5.185	8

Based on the ORESTE method, employees ranked 1–5 have the highest priority and are recommended for transfer to the nearest unit. Meanwhile, employees ranked 6 and above have a lower priority and can be considered for transfer out of town if necessary.

3.2. Login page

The first step to access the civil servant mutation system is to enter your NIP and password, then click the login button to gain access. The login page is shown in Figure 4.

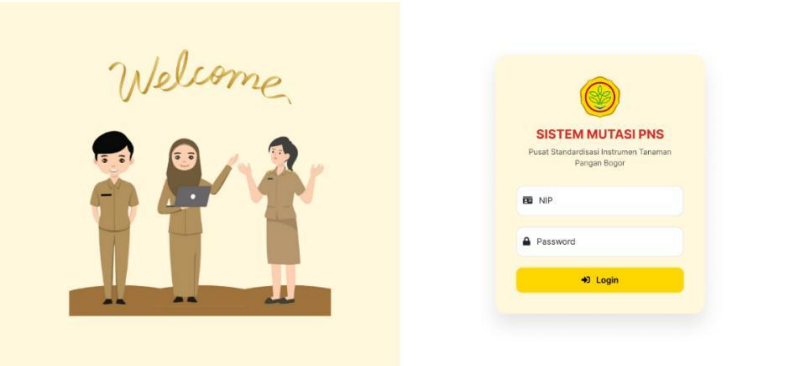

Figure 4. Login Page

3.3. Admin Dashboard Page

The dashboard displays a summary of total employees, the number of new transfer requests, and approved transfers, as well as a navigation menu for managing data and the transfer process. The admin dashboard page is shown in Figure 5.

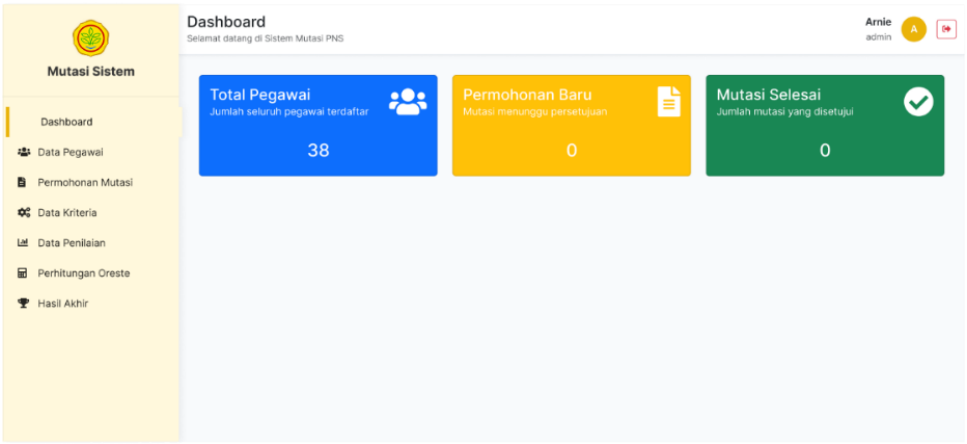

Figure 5. Admin Dashboard Page

Officer Dashboard

Displays a summary of important employee information, such as the number of assessments, transfer request status, and transfer results. At the bottom, you'll find personal information (name, NIP, position, length of service, education) and transfer request history. The employee dashboard page is shown in Figure 6.

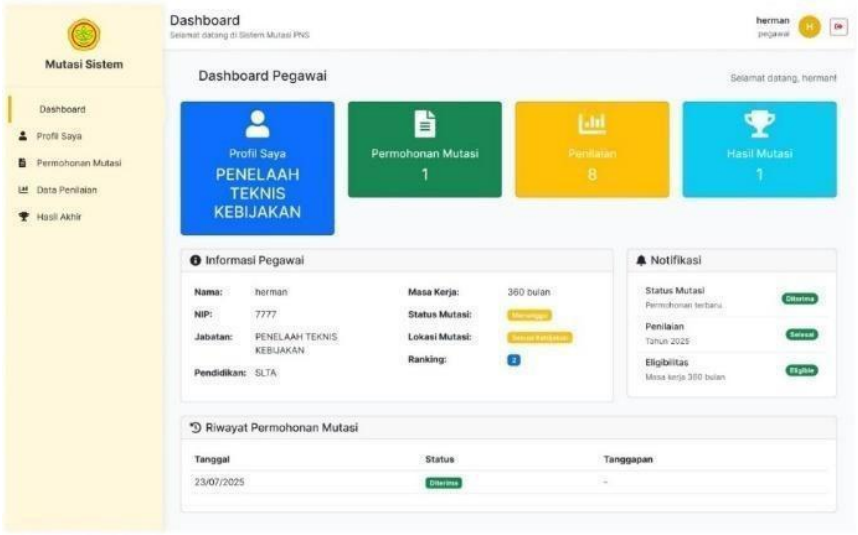

Figure 6. Employee Dashboard Page

3.4. The final result

Displays the final results of the transfer selection process based on a combination of performance and competency scores. The total results, the highest-scoring employee, the current rank, and the employee's transfer status are displayed. The results table details the final scores and the transfer location. The final employee results page is shown in Figure 7.

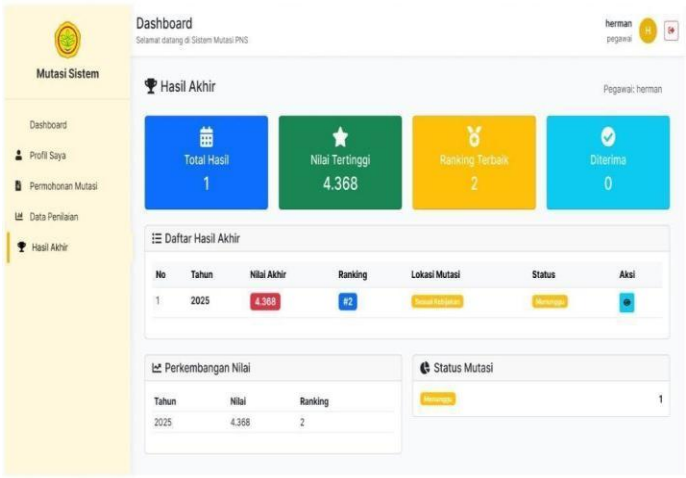

Figure 7. Final Results Page

This decision support system was designed to address issues with the civil servant transfer process at PSITP Bogor, which was previously carried out manually. This manual process often led to delays and calculation errors, necessitating a more efficient and accurate system.

The ORESTE method was chosen because it can process multiple criteria objectively. This system assesses employees based on two aspects: performance (service orientation, integrity, commitment, discipline, and cooperation) and competency (length of service, education, and age), each of which is weighted.

The value of each criterion is converted into Besson Rank, then calculated Distance Score and preference values. The final results show where the results of the performance and competency preference calculation values are combined, the results of which will be sorted from the lowest value will be in the first rank and will be transferred to the nearest location, while the highest value will be in the lowest rank and will be transferred to another city.

The system's interface is also designed to suit user roles, such as admin and center manager, to ensure security and ease of access. The system presents ranking results in reports that can be directly used for decision-making.

Overall, the ORESTE method-based system is able to increase objectivity, speed, and accuracy in the employee transfer process, as well as support more transparent and structured personnel management at PSITP Bogor.

4. Conclusion

This study successfully developed and implemented a web-based Decision Support System (DSS) utilizing the ORESTE method to determine civil servant mutations at PSITP Bogor. By converting evaluation criteria into Besson Ranks and executing Distance Score algorithms, the system minimizes subjectivity and manual calculation errors inherent in traditional spreadsheets. The findings confirm that the DSS provides accurate, objective, and transparent ranking recommendations, substantially decreasing data processing times and supporting fair personnel management in public sector institutions.

The research results show that the ORESTE method is capable of producing objective, transparent ranking results and reducing subjectivity in the transfer decision-making process. The system also accelerates data processing, minimizes manual calculation errors, and provides more accurate recommendations for employees eligible for transfer.

Thus, the application of the ORESTE method in this system can be an effective solution to support civil servant mutation decision-making and has the potential to be further developed and adapted in other government agencies.

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