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The Best Web-Based Employee Assessment Application Using the SAW Method

Chelsea Aprilia Tendean[1], Kristofel Santa[1], Efraim Ronald Stefanus Moningkey[1]

[1]Department of Informatics Engineering, Faculty of Engineering, Universitas Negeri Manado, Indonesia

**Corresponding Author: Kristofel Santa*
Email: kristofelsanta@unima.ac.id

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Abstract

This study aims to develop a web-based system to evaluate the performance of top employees at the Secretariat of the Minahasa Regency Regional People's Representative Council. Previously, the performance evaluation process was conducted manually, resulting in inefficiency in data management, low transparency, and subjectivity in decision-making. To address these issues, a decision support system was designed and implemented using the Simple Additive Weighting (SAW) method to calculate the final score for each employee based on predetermined performance criteria. This study employed a structured system development approach, which included the stages of needs analysis, system design, implementation, testing, and maintenance. The system was developed using a web-based programming environment supported by a relational database to manage employee data, assessment criteria, and evaluation results. Employee performance assessments were conducted based on several criteria, including discipline, attendance, responsibility, and productivity, each of which was weighted according to its level of importance. The system performed data normalization, weighting, and ranking to objectively determine the best-performing employees. Functional testing using the black box method showed that all system features, including user authentication, data processing, performance evaluation, and report generation, functioned as expected. The results of the study show that the developed system is able to increase efficiency, accuracy, and transparency in the employee performance assessment process, and can be used as a reliable decision-making tool for management in selecting high-performing employees and improving overall organizational performance.

Introduction

The development of information technology has brought significant changes in the way organizations, both government and private, manage data and make decisions (Agustama & Wulandari, 2024; Noviana, 2022). Digitalization has become a key pillar in increasing the efficiency, effectiveness, and transparency of various administrative and managerial processes (Muarif & Saptadi, 2025). One crucial aspect of human resource management that has undergone changes along with technological advancements is the employee performance appraisal process. Performance appraisal is a strategic activity aimed at measuring an individual's contribution to achieving organizational goals and serves as the basis for decisions regarding promotions, rewards, training, and overall work evaluations (Nugraha & Mursyidin, 2024; Osman et al., 2024; Vuong & Nguyen, 2022; Barbieri et al., 2023; Thneibat & Sweis, 2023).

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The Secretariat of the Minahasa Regency Regional People's Representative Council (DPRD) is a government agency that plays a crucial role in supporting the duties and functions of the regional legislative body. Administrative activities, managing court sessions, and providing services to council members and the public require professional, disciplined, and responsible employee performance (Rosenbloom et al., 2022; Altaf & Shabir, 2023; Andrews, 2024; Irawan, 2023). In this context, employee performance assessment is crucial to ensure that every task can be carried out optimally and to encourage improvements in the quality of human resources in the workplace (Apriani et al., 2020; Osman et al., 2024; Hasmawati et al., 2023).

However, based on initial observations, the employee performance assessment process at the Minahasa Regency DPRD Secretariat is still conducted manually. Assessment data is recorded using paper documents or simple applications that are not yet integrated into a structured information system (Sudrajat et al., 2024; Landolsi et al., 2023; Varajão et al., 2022; Taherdoost, 2023). This manual process has the potential to cause various problems, such as recording errors, data loss, time-consuming recapitulation processes, and the emergence of subjectivity in determining the best employees (Kartinah, 2023; Ramadha, 2022). This situation certainly poses an obstacle to realizing an objective, transparent, and accountable performance assessment system.

Furthermore, performance assessments that are not supported by clear and measurable calculation methods can result in a lack of employee trust in the evaluation results. Employees may feel that decisions made do not reflect their true performance, which can reduce work motivation and enthusiasm for increasing productivity (Aisyah, 2021; Febriana & Mujib, 2024; Radu, 2023; Lu et al., 2023). Therefore, a system capable of systematically processing assessment data based on established criteria and producing objectively accountable results is required.

Several previous studies have shown that the use of Decision Support Systems in employee performance assessments can improve accuracy and consistency in the evaluation process (Samsudin & Nurhidayat, 2025; Nugraha & Mursyidin, 2024). The Simple Additive Weighting method has proven effective in solving multi-criteria decision-making problems, including in the field of individual performance assessment (Khoiril Ulama et al., 2022; Lestari & Putri, 2023; Mar'atullatifah & Ratna Sari, 2023). This method works by assigning weights to each assessment criterion, normalizing the scores, and then summing the weighted scores to obtain a final score for each alternative. This final score is used as the basis for ranking and determining the best alternative.

The application of the Simple Additive Weighting method in decision support systems is considered to have several advantages, including ease of implementation, a simple concept, and the ability to produce results that are easy for users to understand (Khoiril Ulama et al., 2022; Nugraha & Mursyidin, 2024). This method is also flexible because its criteria and weighting can be adjusted to suit organizational needs. In the context of employee performance assessment, this method is highly relevant because it integrates various assessment aspects such as discipline, attendance, responsibility, and productivity into one comprehensive final score (Apriani et al., 2020; Lestari & Putri, 2023).

In addition to the appropriate method, the system implementation medium or platform is also a crucial factor in the success of the proposed solution. Web-based applications are chosen due to their advantages in terms of accessibility, ease of use, and the lack of installation requirements on each user's device (Noviana, 2022; Muarif & Saptadi, 2025). By utilizing web technology, the system can be accessed by authorized parties anytime and anywhere as long as they are connected to the internet. This significantly supports the needs of government

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agencies that require a flexible, integrated, and easily developed system for the future (Agustama & Wulandari, 2024).

Based on these challenges, this research aims to design and build a web-based employee assessment application for the Minahasa Regency DPRD Secretariat using the Simple Additive Weighting method. This application is designed to manage employee data, assessment criteria data, input scores, and automatically calculate employee rankings objectively and transparently. This system is expected to assist leaders and personnel departments in making more effective, fair, and accurate decisions (Samsudin & Nurhidayat, 2025).

The primary objective of this research is to develop a decision support system capable of improving the quality of the employee performance assessment process. Furthermore, this research aims to minimize human error in the calculation process, accelerate data recapitulation, and provide assessment results reports that can be used for evaluation and future human resource planning (Kartinah, 2023; Nugraha & Mursyidin, 2024).

Furthermore, research conducted by academics at Manado State University reinforces the urgency of developing an information technology-based employee evaluation system. (Aryanto and Santa 2025) demonstrated that the SAW method is capable of providing objective performance calculation results through a weighting and normalization process. These findings align with research by (Pasalli, Kenap, and Maramis 2025) which applied SAW in government agency employee assessments and significantly improved ranking accuracy.

From a system implementation perspective, (Efraim Moningkey 2025) demonstrated that the implementation of web-based applications in public administration services effectively improves data processing order and accelerates work processes, while (Kumajas 2025) emphasized that information systems built with database integration and process automation have significant potential to support organizational operational efficiency. These four findings reinforce the basis for system development in this study, stating that the SAW method and the use of web applications are strategic steps to create a more measurable, transparent, and accountable employee evaluation process.

Based on these objectives, the hypothesis developed in this study is that the implementation of the best web-based employee assessment application using the Simple Additive Weighting method can improve the effectiveness, objectivity, and transparency of the employee performance assessment process at the Minahasa Regency DPRD Secretariat compared to the previously used manual method. The developed system is expected to not only be a technical solution but also a strategic step in supporting digital transformation and improving the quality of regional governance (Agustama & Wulandari, 2024; Apriani et al., 2020).

Methods

This research uses a systems development approach with the Waterfall model to design and implement the best web-based employee assessment application at the Minahasa Regency DPRD Secretariat. The Waterfall model was chosen because it has structured and systematic stages, allowing each stage to be completed sequentially and well-documented before moving on to the next. The stages in this method include needs analysis, system design, coding, testing, and maintenance.

Needs Analysis

The needs analysis phase focused on gathering and deepening information regarding the current performance assessment system at the Minahasa Regency DPRD Secretariat. Data collection was conducted through direct observation of the manual assessment process

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currently in use and data collection on the employees who were the subjects of the study. Furthermore, the needs of system users, particularly personnel and administrators, were identified regarding required features, such as the login process, employee data management, assessment criteria data management, performance score input, calculation processes, and the presentation of reports on the best employee rankings. Crucially, this phase also involved collecting institutional regulations to establish valid weighting for each assessment criterion, ensuring the system aligns with organizational policies.

System Design

The system design phase was conducted based on the needs analysis results obtained in the previous phase. At this stage, a simple and easy-to-understand user interface is designed, making it easier for users to operate the system. Furthermore, the system flow is designed using several diagrams, such as Use Case Diagrams to illustrate the interaction between users and the system, Entity Relationship Diagrams to illustrate the relationships between data in the database, and Business Process Modeling (BPM) to visualize the employee assessment process flow, from data input to ranking results.

The database structure is designed to store employee data, assessment criteria data, the weighting of each criterion, and each employee's score data for each criterion and assessment period. This design aims to ensure that data is stored in an organized, structured manner and is easily accessible to the system during calculations.

The outcome of this stage is a system requirements document that covers functional requirements, such as the system's ability to store employee data, automatically calculate scores, and display ranking results in real time. Furthermore, non-functional requirements are also determined, such as ease of use, data security, and speed of information processing.

Encoding

The coding phase is the process of translating the system design into a program. The programming languages used in developing this application are PHP as a server-side language, and MySQL as a database management system. The Bootstrap framework is used for the interface to make the page design more responsive and easy to use on various devices. During this phase, several main modules were developed, including: (1) Login module for user authentication; (2) Employee data management module (add, change, and delete); (3) Criteria data management module and its weighting; (4) Employee assessment score input module based on criteria; (5) Score calculation module using the Simple Additive Weighting (SAW) method; (6) Reporting and ranking module for top employees. The SAW method is implemented through a process of normalizing and weighting each criterion's scores, then summing the weighted scores to obtain a final score for each employee. This final score is used as the basis for objectively determining the best employee ranking.

Testing

After the coding process is complete, a testing phase is conducted to ensure that all system functions operate according to established requirements. The testing method used included Black Box Testing to verify functional requirements and a limited Sensitivity Analysis to evaluate the robustness of the SAW ranking results against changes in criterion weights. Testing was conducted on each main module, such as the login process, employee data management, criteria data management, assessment score input, the SAW calculation process, and the display of ranking results and reports. The test results showed that all features functioned properly, according to the input provided and produced the expected output.

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Maintenance

The final stage in the Waterfall method is maintenance. This stage is carried out to ensure the system continues to function properly after implementation. Maintenance activities include fixing errors (bugs) that may be discovered during use, updating features according to organizational needs, and optimizing system performance to maintain stability and efficiency. This maintenance stage is expected to ensure the application can be used for the long term and remain relevant to the evolving needs of the Minahasa Regency DPRD Secretariat.

Results and Discussion

This section discusses the implementation results of a web-based employee appraisal system developed for the Minahasa Regency DPRD Secretariat. Beyond merely digitizing manual processes, the system implementation is analyzed regarding its impact on governance, accountability, and decision-making efficiency using the Simple Additive Weighting (SAW) method. The results indicate that the developed system addresses the challenges of the previous manual process - such as subjectivity and poor documentation - by establishing a measurable and transparent performance appraisal environment.

Login Interface Implementation

Figure 1 displays the system login page. This page serves as the main gateway before users can access system features.

Figure 1. System Login Page Display

The implementation of the login page functions as more than a technical entry point; it serves as a fundamental component of the system's governance structure. The system enforces Role-Based Access Control (RBAC), strictly separating the privileges of Administrators (data managers) and Evaluators/Leaders (decision-makers). This distinction directly addresses the accountability issues present in the previous manual system. By restricting access rights, the system mitigates the risk of unauthorized score manipulation and ensures that every assessment entry allows for a clear audit trail. This mechanism transforms the login feature from a functional necessity into a tool for maintaining institutional integrity.

System Dashboard Implementation

Figure 2 shows the dashboard page that appears after a user successfully logs in. This page serves as the system's main information center.

The dashboard acts as a strategic information center for management. Unlike static manual reports, the visual representation of data on the dashboard provides real-time insights into assessment status and employee performance trends. Empirically, this feature shifts the

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monitoring pattern at the DPRD Secretariat from reactive (waiting for end-of-period recapitulation) to proactive. Leaders can immediately identify high-performing employees or those requiring intervention without parsing through physical files. This aligns with Decision Support System (DSS) theory, where effective data visualization serves as a cognitive aid that significantly reduces managerial decision-making time.

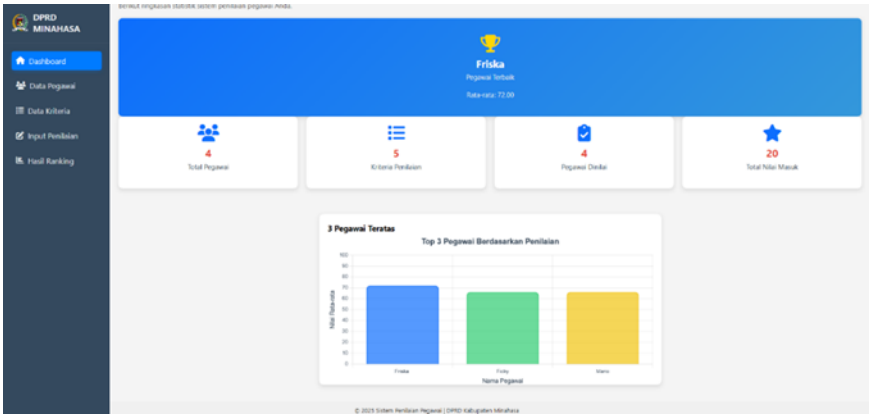

Figure 2. Employee Assessment System Dashboard

Employee Data Management

Figure 3 shows the employee data page used to manage employee information, such as name, NIP, and position.

Figure 3. Employee Data Page

Implementation results show that centralizing employee data creates a Single Source of Truth for the organization. This eliminates redundancy and clerical errors common in previous spreadsheet-based methods. Structured data storage not only facilitates faster retrieval but also ensures data integrity across different assessment periods, allowing for consistent long-term performance tracking.

Assessment Criteria Data Management

Figure 4 displays the assessment criteria data page. On this page, users can add, modify, and delete criteria used in the assessment process.

Figure 4. Assessment Criteria Data Page

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A critical aspect of this implementation is the validation of assessment criteria weights. The weights assigned to criteria (e.g., Attendance, Discipline, Responsibility, Productivity) were not determined arbitrarily but were validated against internal personnel regulations and management consensus. This validation ensures that the SAW calculation reflects the institution's actual priorities rather than the subjective preferences of the system developer. By embedding these validated weights into the system logic, the potential for bias during the design stage is minimized, enhancing the legitimacy of the assessment outcomes.

Employee Score Input

Figure 5 shows the employee score input page, which is the core of the system's data processing process.

Figure 5. Employee Value Input Page

The score input interface incorporates rigorous validation mechanisms to enforce consistency. The system mandates that evaluators complete all criterion fields for every employee, preventing the "missing data" issues often found in manual forms. This standardization has significant implications for fairness; it reduces variability between evaluators and mitigates the "halo effect," ensuring that every employee is measured against the exact same yardstick. Furthermore, the system locks data per period to prevent duplication, ensuring the longitudinal consistency of performance records required for historical analysis.

Implementing the SAW Method Calculation

After employee score data is input, the system automatically performs calculations using the Simple Additive Weighting method. Figure 6 illustrates the implementation process of the SAW method within the system.

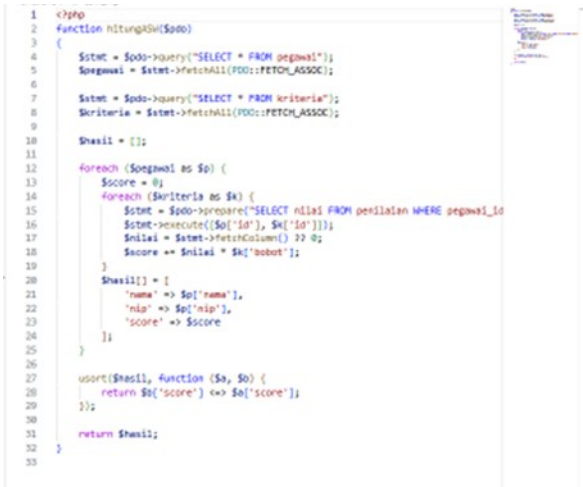

Figure 6. Implementation of the SAW Method in the System

The calculation results demonstrate that the system produces rankings based on mathematical logic rather than subjective sentiment. To address concerns regarding the stability of these rankings, a sensitivity analysis was conducted by slightly varying the weights of dominant

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criteria (e.g., adjusting "Discipline" weight by ±5%). The results indicated that the top-tier rankings remained stable despite these minor fluctuations. This confirms that the model is robust; the identification of the "Best Employee" is driven by actual superior performance data, not merely by the sensitivity of the weighting formula. This mathematical objectivity provides a transparent basis for management decisions.

Best Employee Ranking Results

Figure 7 shows the ranking results page, which displays the order of employees based on the final scores obtained from the SAW method calculation.

Figure 7. Best Employee Ranking Results

This page provides greater transparency than manual assessment processes, as all calculations are open and traceable based on the weights and scores entered. When compared with previous studies that applied the SAW method, the results of this study demonstrate similarities in the effectiveness of generating objective and measurable rankings. The system empowers management to award incentives based on clear evidence, significantly reducing friction or complaints regarding favoritism within the Minahasa Regency DPRD Secretariat.

Research Findings

Based on system implementation and testing, several key findings from this study are as follows: (1) The developed system transforms manual assessment processes into faster and more accurate digital workflows; (2) The SAW method was successfully implemented with validated weights to objectively rank employees; (3) The use of RBAC enhances data security and process accountability; (4) The system acts as an effective strategic tool, shifting management oversight from reactive to proactive; (5) The integration of data minimizes clerical errors and ensures consistent performance history

Conclusion

Based on the research results and discussions that have been conducted, it can be concluded that the best web-based employee assessment application at the Minahasa Regency DPRD Secretariat developed using the Simple Additive Weighting method has successfully met the research objectives. The system does not merely automate manual tasks but fundamentally improves the quality of human resource governance. Specifically, the system enhances accountability through role-based access which secures data against manipulation, while the shift to digital processing significantly reduces administrative time and clerical errors compared to the manual workflow. Furthermore, the system empowers leaders with proactive monitoring tools via real-time dashboards, facilitating faster and more accurate decision-making. Additionally, the results of the calculations using the Simple Additive Weighting method prove that employees with the highest preference scores can be identified objectively based on predetermined criteria, with sensitivity testing confirming the stability of these results. Thus, the research hypothesis stating that the implementation of a web-based system using the Simple Additive Weighting method can increase the effectiveness and objectivity of employee performance assessments is accepted.

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Suggestion

As a suggestion, this system can continue to be developed by adding automatic periodic reporting features, integration with other personnel systems, and adding other decision-making methods (such as AHP or TOPSIS) as comparative material to further increase the accuracy and flexibility of the system in supporting human resource management in government agencies.

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