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Decision Support System For Work Training Selection At Department Of Labor Asahan AHP Method

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ABSTRACT

The increasingly rapid development of information technology has significantly impacted various sectors, including the government sector. One area of government that greatly requires information technology support is the management of job training programs organized by the Asahan Regency Manpower Office. In its implementation, the number of job training applicants often exceeds the available quota, necessitating an appropriate Decision Support System process. The AHP method is a multi-criteria decision-making method capable of breaking down complex problems into a hierarchical structure consisting of objectives, criteria, and alternatives. However, to date, no systematic analysis has been conducted on the selection of training applicants. This study aims to apply the Analytical Hierarchy Process (AHP) method to a Decision Support System as a basis for prioritizing job training participants based on predetermined criteria. The data used in this study include prospective job training participants and the assessment criteria used by the Asahan Regency Manpower Office, such as education, age, work experience, and income. Data were collected through observation, interviews, and literature review using a decision support system approach. The results of this study indicate that Nurhayati received the highest Preference Score (Yi) of 0.8462, placing her in first place, followed by Andi Saputra with a Preference Score (Yi) of 0.8157 and Dewi Sartika with a Preference Score (Yi) of 0.7620. The conclusion of this study is that the application of the Analytical Hierarchy Process (AHP) method can significantly contribute to accurate decision-making.

INTRODUCTION

The rapid advancement of information technology has had a significant impact on various sectors, including the government sector (Pendidikan, 2024). The use of information technology has become a key factor in improving the effectiveness and efficiency of public services (Siburian & Harahap, 2024). One area of government that is in great need of information technology support is the management of job training programs, which aim to improve the quality of human resources and reduce unemployment rates (Iqbal et al., 2022). To ensure these objectives are optimally achieved, a job training participant selection process that is appropriate, objective, and transparent and that is scientifically and professionally accountable is required (Setiawan & Nasution, 2022).

Job training is a program organized by the Department of Labor to improve the skills and competitiveness of the workforce (Syahputri et al., 2022). In practice, the number of applicants for job training often exceeds the available quota, making a fair and appropriate participant selection process essential (Supriyatna et al., 2024). A well-designed selection process is critical to the program's success, as selected participants must truly meet the criteria and needs of the training being offered (Kaunan et al., 2023).

A Decision Support System (DSS) is a computer-based system designed to assist decision-makers in solving semi-structured and unstructured problems (Syahputra & Anwar, 2024). A DSS is capable of processing data, information, and decision models to generate alternative solutions that can serve as the basis for decision-making (Ginting & Puspasari, 2025). With a DSS, the decision-making process can be carried out more quickly, accurately, and systematically, while reducing subjectivity in assessments. A DSS also allows for the electronic recording and documentation of evaluation results, thereby facilitating audits and data analysis.

One method that can be used in DSS is the Analytical Hierarchy Process (AHP). The AHP is a multi-criteria decision-making method capable of breaking down complex problems into a hierarchical structure consisting of objectives, criteria, and alternatives (Priyadi et al., 2025). Through a pairwise comparison process, the AHP method can determine the relative importance of each criterion, resulting in more objective and measurable decision priorities. This method also allows for the systematic evaluation of various alternatives, making decisions more transparent, accurate, and fully accountable.

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At the Asahan Regency Manpower Office, the job training selection process is still conducted through manual document review and criteria assessment. Assessments of aspects such as educational level, age, work experience, and socioeconomic status are carried out by comparing applicants' data one by one without using a calculation system based on a specific method. This situation causes the selection process to take a relatively long time, especially when there are a large number of applicants.

Furthermore, subjectivity can arise when determining the weight of each criterion or when comparing applicants with nearly identical characteristics. Without measurable weighting standards and consistency tests, decisions rely heavily on the individual judgments of the selection committee members. This has the potential to lead to inconsistencies in evaluation results and makes it difficult for agencies to account for their decisions transparently in the event of an evaluation or audit. If the selection process continues to be conducted manually, the agency risks experiencing time inefficiencies, inconsistencies in assessment, and difficulties in documenting and evaluating selection results. Therefore, a system is needed that can support the selection process in a systematic, measurable, and objective manner.

Given these issues, the implementation of a Decision Support System based on the Analytical Hierarchy Process (AHP) method is a relevant solution for optimizing the selection process for job training participants at the Asahan Regency Manpower Office. With this system, the selection process is expected to be conducted systematically and accurately, ensuring that the selected participants truly meet the established criteria and are able to make an optimal contribution to improving the quality of human resources in Asahan Regency.

LITERATURE REVIEW

Several previous studies have demonstrated that Decision Support Systems (DSS) play an important role in improving the quality of decision-making processes, particularly in situations involving multiple criteria and large datasets. DSS can reduce subjectivity and increase efficiency by providing structured and systematic evaluation mechanisms (Syahputra & Anwar, 2024) ; (Barfar et al., 2021). The Analytical Hierarchy Process (AHP) method is widely used in DSS because of its ability to decompose complex problems into hierarchical structures and perform pairwise comparisons to determine the relative importance of criteria (Priyadi et al., 2025). Previous studies have shown that AHP is effective in various selection processes, such as employee recruitment, scholarship selection, and decision-making in public services, as it produces more consistent and transparent results.

Furthermore, several researchers have applied the AHP method in government and organizational contexts, indicating that this method can improve accuracy and accountability in decision-making. For example, the implementation of AHP in employee selection and beneficiary determination has proven to provide objective weighting and ranking of alternatives based on predefined criteria (Putra & Prayitno, 2021). Compared to manual selection processes, the use of DSS with AHP significantly reduces processing time and minimizes inconsistencies in evaluation (Iqbal et al., 2022). Therefore, integrating AHP into a DSS is considered a relevant and effective approach to support the selection of job training participants, ensuring that decisions are based on measurable criteria and aligned with organizational needs.

METHOD

This study was conducted through several systematic stages to ensure that the developed system meets the research objectives and addresses the identified problems effectively. Each stage plays an important role in guiding the research process, starting from problem identification to system implementation. The stages include problem identification, data collection, data analysis, system design, system development, system testing, and system implementation.

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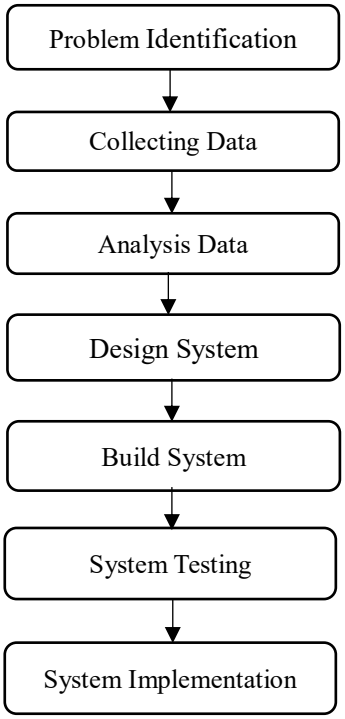

Figure 1. Stage of Research

This study employs a quantitative method with the following steps:

Problem Identification

The problem identified in this study is that the selection process for vocational training participants at the Asahan Regency Manpower Office is not yet optimal. The selection process, which is still conducted manually, has the potential to lead to subjectivity, takes a relatively long time, and is inefficient in identifying participants who meet the training program's criteria. Furthermore, the lack of an integrated decision support system means that the decision-making process is not yet functioning optimally.

Collecting Data

The data used in this study include information on prospective job training participants and the assessment criteria used by the Asahan Regency Manpower Office, such as education, age, work experience, and selection results. Data collection was conducted using several methods, including direct observation, interviews with relevant parties, and a literature review to establish a relevant theoretical foundation

Anlysis Data

The data analysis phase involves processing the collected data to identify system requirements and determine evaluation criteria and weights. In this phase, the data is analyzed using the Analytical Hierarchy Process (AHP) to determine the priority weights for each criterion used in the selection process for job training participants.

Design System

In this phase, a system is designed using the design model (Erni Rouza et al., 2023). The model is a representation of the solution that illustrates the output of the processes within the developed system. The model was designed using UML (Unified Modeling Language), specifically by creating use case diagrams, class diagrams, activity diagrams, and sequence diagrams, as well as ERDs and flowcharts to illustrate the system's workflow and the design of the database and user interface (Syafina & Harahap, 2023).

Build System

The system development phase involved implementing the design results into a web-based Decision Support System (DSS) application. The system was developed using the PHP programming language and a MySQL database, and is supported by XAMPP and Visual Studio Code software (Samiah et al., 2023).

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System Testing

After the system was fully developed, testing was conducted to ensure that all system functions operated as designed. The testing method used was black-box testing, with the aim of testing the system's functionality and ensuring that the output results were consistent with the research objectives (Barfar et al., 2021).

System Implementation

The tested system was then implemented at the Asahan Regency Manpower Office as a tool to assist in the selection process for job training participants. This phase aimed to evaluate the system's performance under real-world conditions (Putra & Prayitno, 2021).

RESULT

Analysis Data

The input data for this study were obtained from the Asahan Regency Manpower Office and consisted of data on prospective job training participants, along with the criteria used in the selection process. These data served as the basis for the evaluation and decision-making process to determine which participants were eligible to enroll in the job training program.

Table 1. Training Participant Data

No	Name	Income	Work Experience	Level of Education	Age
1	Ahmad Fauzi	Rp1.500.000	2 years	SMA	20 yo
2	Siti Aisyah	Rp3.700.000	0 years	SMP	18 yo
3	Rudi Hartono	Rp2.100.000	4 years	SMK	22 yo
4	Dewi Sartika	Rp1.500.000	0,8 years	D3	23 yo
5	Muhammad Rizki	Rp2.400.000	2 years	SMK	27 yo
6	Nurhayati	Rp900.000	0 years	SMP	21 yo
7	Andi Saputra	Rp3.500.000	5 years	S1	33 yo
8	Fitri Handayani	Rp2.300.000	2 years	D3	28 yo
9	Eko Prasetyo	Rp1.700.000	0,7 years	SMA	24 yo
10	Yuni Kartika	Rp280.000	0 years	SMA	19 yo

Design System

A use case diagram illustrates how an actor uses or interacts with a system, where an actor is a person or user who interacts with the system (Siska Narulita et al., 2024). A use case diagram illustrates the processes performed by an actor on a system. The system processes designed using a use case diagram are shown in Figure 1 below.

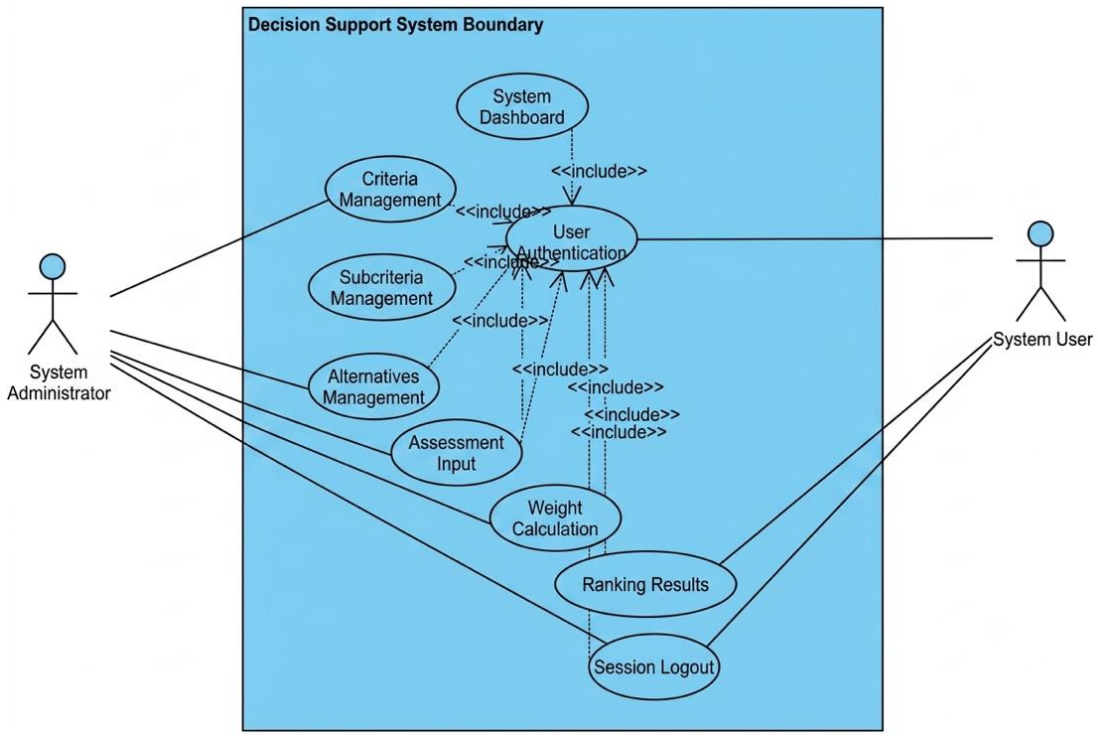

Figure 2. Design System

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Figure 2 illustrates the interaction between system actors and the decision support system. The Admin is responsible for managing criteria, alternatives, and performing AHP calculations. The Head of Department (Kepala Dinas) can view ranking results and reports. The diagram shows the main processes including login, data input, weight calculation, ranking results, and report generation.

Implementation System

Interface implementation is the stage of translating the system's visual design into application pages that users can use to interact with the system. This stage presents the results of the implementation of each main page of the perfume recommendation decision support system. The purpose of interface implementation is to ensure that the system has a user-friendly, visually appealing interface that facilitates user interaction with the application.

Login Page

The Login screen serves as the starting page for accessing the system, where users enter their usernames and passwords according to their respective access rights in order to log in to the system.

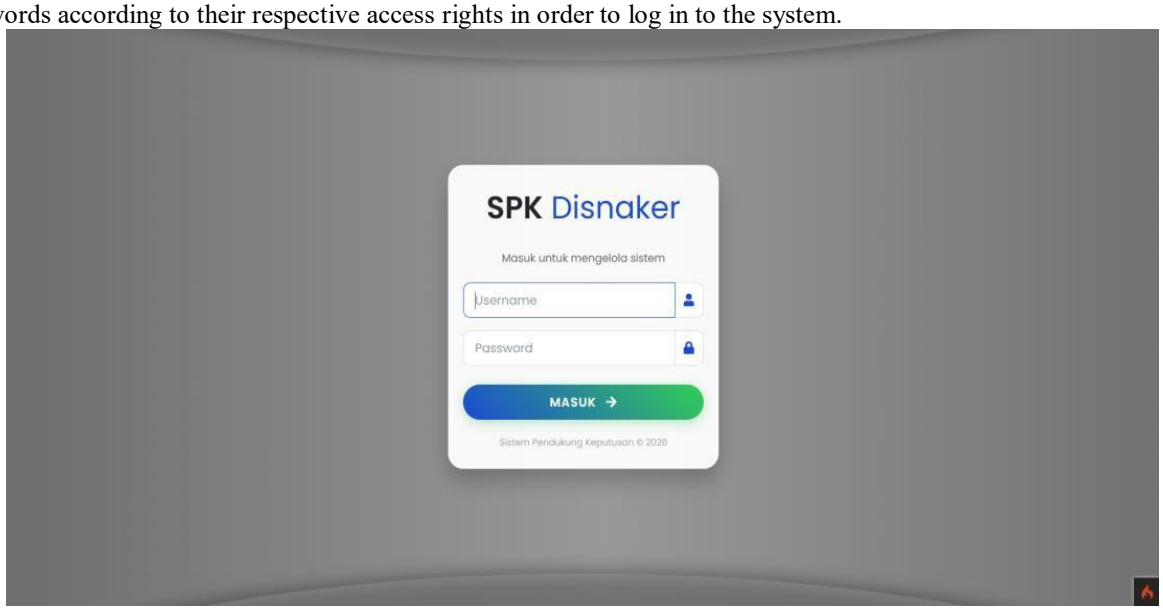

Figure 3. Login Page

Dashboard Admin

The admin dashboard displays a summary of key information, such as criteria data, sub-criteria, alternative data, and AHP weightings, and serves as a central hub for decision outcomes.

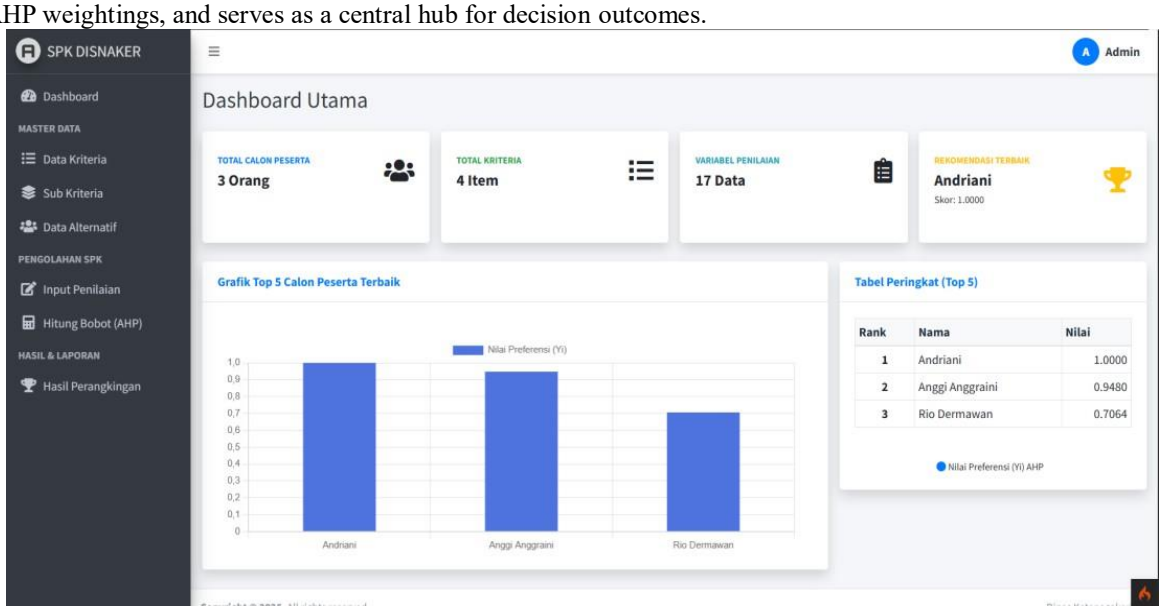

Figure 4. Dashboard Admin

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Criteria Page

The criteria view is used to manage the criteria that influence and are interrelated with one another in determining a final decision.

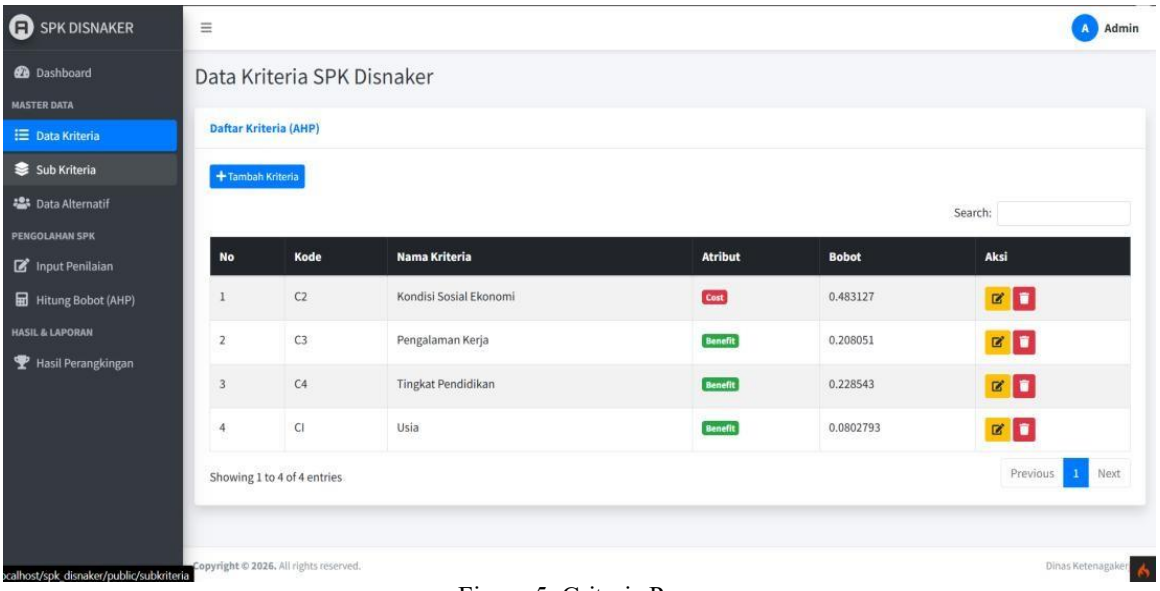

Figure 5. Criteria Page

Alternative Page

The item data view is used to manage information on prospective training participants at the Asahan Regency Manpower Office.

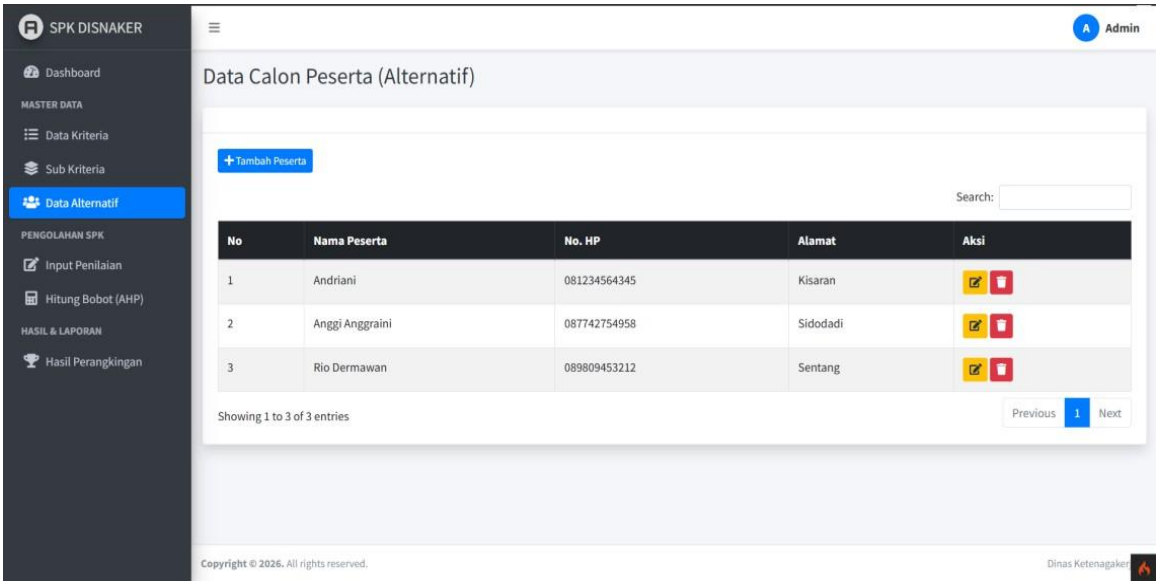

Figure 6. Alternative Page

Analysis AHP

The AHP Analysis view is used to compare criteria against one another; the more important and dominant a criterion is, the higher its value will be.

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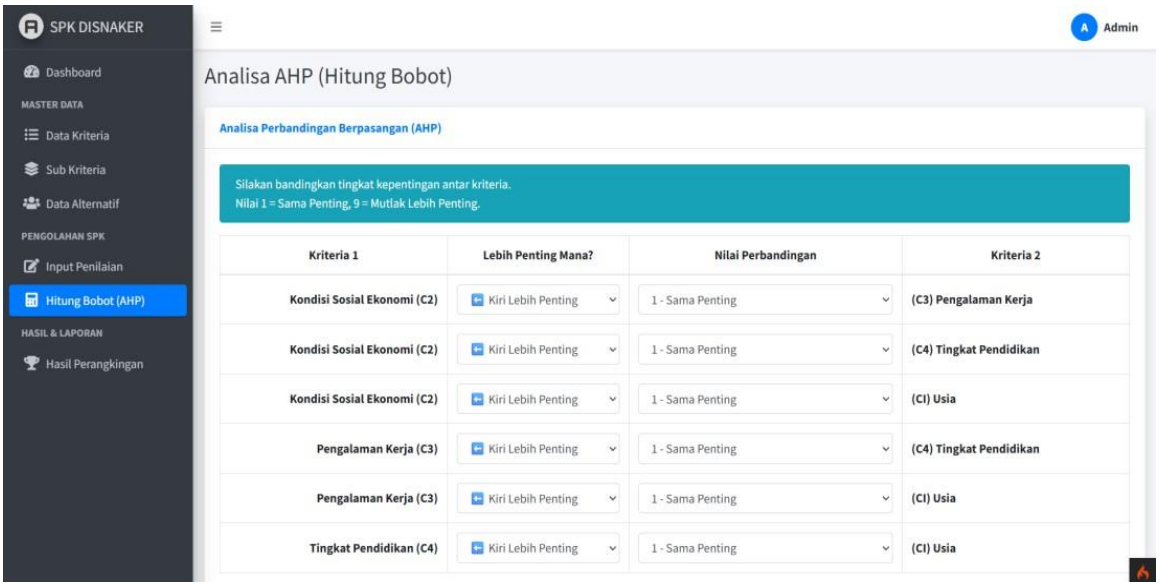

Figure 7. Analysis AHP

Figure 7 illustrates the AHP analysis process used to determine the priority weight of each criterion. In this stage, pairwise comparisons are conducted between criteria to evaluate their relative importance in the decision-making process. Each criterion is compared using a predefined scale to produce a comparison matrix. The system then normalizes the matrix and calculates the priority weights (eigenvectors) for each criterion. After that, a consistency test is performed to ensure that the comparisons made are logically consistent. If the consistency ratio (CR) meets the acceptable threshold, the calculated weights are used in the next stage. This process ensures that the decision-making is objective, structured, and based on measurable criteria.

Rank Result

The Ranking Results View is used to view the ranking results and matrix combinations of predefined values.

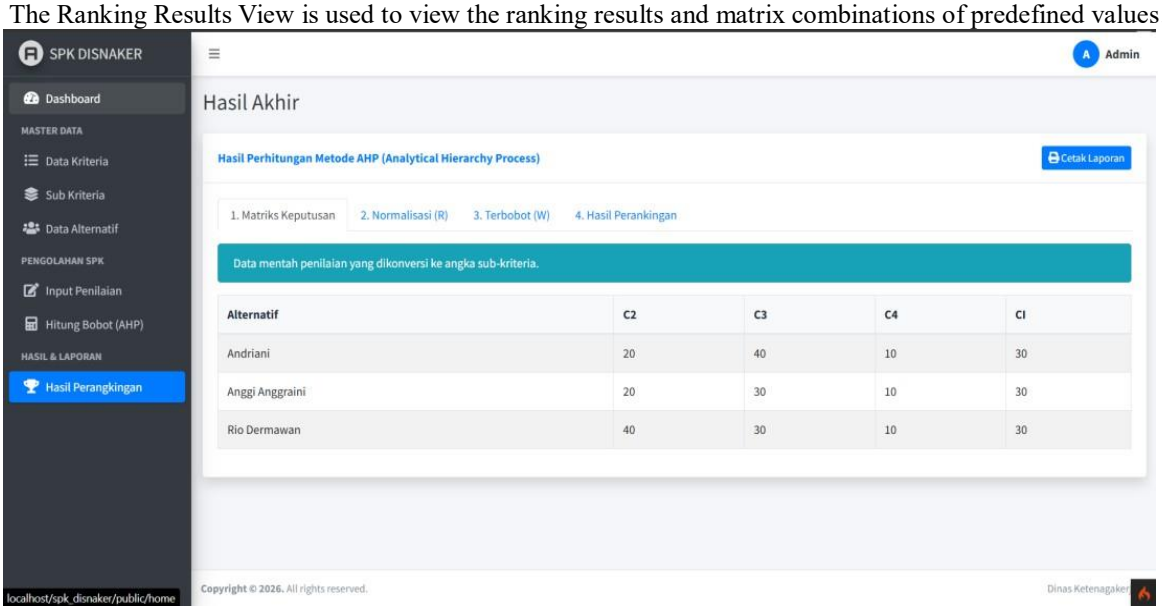

Figure 8. Rank Result Page

Figure 8 shows the ranking results generated by the system after completing the AHP calculation process. In this stage, each alternative (candidate) is evaluated based on the weighted criteria obtained from the previous AHP analysis. The system calculates the final preference value for each alternative by combining the weights of all criteria with the corresponding alternative scores. These results are then sorted in descending order to determine the ranking of candidates. The candidate with the highest score is considered the most eligible for selection. This process ensures that the final decision is based on a comprehensive and objective evaluation.

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Report

The Report Print View is the view that administrators will use to generate reports for the Head of the Department of Labor.

No	Nama Calon Peserta	Nilai (Yi)	Keterangan
1	Nurhayati	0.8462	LAYAK MENDAPAT REKOMENDASI
2	Andi Saputra	0.8157	LAYAK MENDAPAT REKOMENDASI
3	Dewi Sartika	0.7620	LAYAK MENDAPAT REKOMENDASI
4	Fitri Handayani	0.7619	LAYAK MENDAPAT REKOMENDASI
5	Ahmad Fauzi	0.7028	LAYAK MENDAPAT REKOMENDASI
6	Rudi Hartono	0.6843	LAYAK MENDAPAT REKOMENDASI
7	Eko Prasetyo	0.6396	LAYAK MENDAPAT REKOMENDASI
8	Muhammad Rizki	0.6396	LAYAK MENDAPAT REKOMENDASI
9	Yani Kartika	0.3920	-
10	Siti Aisyah	0.2500	-

Figure 9. Report

Figure 9 illustrates the report generation process produced by the system. After the ranking process is completed, the system automatically compiles the results into a structured report format. The report contains important information such as candidate data, criteria evaluation results, and final rankings. This report can be accessed and printed by the administrator to be submitted to the Head of the Department. The reporting process ensures that all decision results are well-documented, transparent, and can be used for evaluation and accountability purposes.

DISCUSSION

The results of the study indicate that the implementation of the proposed system provides significant improvements compared to the previous manual or semi-computerized approach. Before the system was implemented, data processing, recording, and reporting were conducted manually, which often led to inefficiencies, data redundancy, and a higher risk of errors. In contrast, after the implementation of the system, all processes become more structured, integrated, and automated.

The system enhances operational performance by enabling faster data processing, improving data accuracy, and simplifying report generation. Users are able to access information in real time, which supports better decision-making. In addition, the system reduces the possibility of data loss and minimizes human error due to automation. Furthermore, based on the evaluation results, the system demonstrates improved effectiveness in handling core business processes. The comparison between the conditions before and after implementation shows that the system successfully addresses the previously identified problems, particularly in terms of efficiency, accuracy, and data management. Overall, the implementation of the system proves to be effective and aligns with the research objectives, providing a practical solution to improve system performance and organizational productivity.

CONCLUSION

Based on the research conducted, it can be concluded that the training participant selection management information system that was designed and developed has successfully assisted the Asahan Regency Manpower Office in making decisions that align with the needs of training participants. The Decision Support System can help consider all aspects of interrelated criteria to produce a decision support system that is highly precise and accurate in meeting training needs. The developed system makes a significant contribution in terms of comparing scores that greatly influence the ranking results; this will certainly facilitate collaboration with the agency's future decisions in line with more effective and sustainable long-term needs.

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