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SISTEM PENDUKUNG KEPUTUSAN PENERIMAAN KARYAWAN BARU MENGGUNAKAN METODE AHP AND SAW

DECISION SUPPORT SYSTEM FOR NEW EMPLOYEE ACCEPTANCE USING AHP AND SAW METHOD

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ABSTRACT

The acceptance of employees in every company is an activity that always takes place in a certain period or incidentally. This research provides a solution by developing a system using the application of AHP and SAW methods. The system development method is the waterfall model. Research results show that The decision support system for hiring employees at PT Naufal Indo Raya using AHP and SAW methods was developed using the web. And the results of applying AHP and SAW methods as employee hiring methods in the developed system have the same results in the evaluation process or of classification. Based on this system, Wahyu is known to have received the top rank with an overall score (AHP) of 917.1373 and a Vi(%) (SAW) value of 96.39%. And in third place was obtained by Rudi with an aggregate value (AHP) of 870.6369 and a Vi(%) (SAW) value of 92.65%

Keywords: Decision support system, AHP method, SAW Method, New Employee Acceptance

INTRODUCTION

Human resources (HR) are an important asset in the company because HR is the driving force behind the management of the company. HR really determines quality in terms of the business because doing a good business strategy in carrying out the business processes of the business requires an ability to act quickly and accurately and requires innovative ideas. Human Resources (HR) is the most important element for the organization, without the human element as an employee, the goals of the organization will not be achieved as planned (Ischak, 2018). This is what quality human resources in terms of education, age and health do in a company.

The development of technology at present is very rapid, this can be seen from the progress of information technology and other technologies that are becoming more and more developed and sophisticated. Much of the use of computers is now the majority, not in ancient times computers were not for everyone, and it is inversely proportional today. With the rapid pace of technology, a system, methodology, strategy, and software are needed to aid the operations of organizations, businesses, and educational institutions.

PT Naufal Indo Raya is a company engaged in the implementation of services for the construction of commercial buildings, executors for the construction of commercial buildings, executors for the construction of waterways, ports, dams and other water resources infrastructure, executors for the construction of drinking water and sewage treatment plants and buildings, waste treatment, executor for the construction of highways (except viaducts), railways and airport runways, and executor for the construction of air bridges, tunnels and subways. PT Naufal Indo Raya, which is located at Jalan Seto No. 92 Tegal Sari II Medan Area Medan City district, every year there is always recruitment of employees. In the selection of employees of PT Naufal Indo Raya, several criteria have been defined and have become a reference for hiring employees. The greater the number of employees, the more complex the diversity of employees. Therefore, it is necessary to have a decision support system, in order to shorten the selection

time and improve the quality in determining the best candidates.

The acceptance of employees in each company is an activity that is always carried out in a certain period or incidentally. According to Gomes (1995), recruitment is the process of finding, finding and attracting candidates for employment in and through an agency (Saputra, 2019). This recruitment process requires decision-making as well as other decision-making processes in different contexts (Ischak, 2018). As part of the hiring, a number of candidates volunteer by providing all the required documents and they can also be tested in writing or by interview. The selection of these future employees sometimes becomes difficult when there are many candidates from diverse backgrounds and the acceptance criteria set are sometimes complex and sometimes contradictory. Such a context creates a decision-making atmosphere that requires precise, fair and quick calculation between the many candidates. The selection of employees in a company will be considered when the candidates have experience and expertise respectively. On the company side, there is also no system to support a decision in the selection of employee recruitment, the selection of future employees always uses a handwritten system, there are many criteria and sub-criteria in selection of employees and it takes a long time to do an evaluation.

This system can be used as a tool to assist in making a decision in a structured situation, not many people know the correct outcome for the decision to be taken (Astika, 2018). Decision making is a systematic approach to a problem experienced. From the description of decision making above, it can be concluded that decision making is a process of selecting the best alternative from several alternatives (Oktaviani, 2018). Knowledge-based systems or knowledge management that are used to support decision-making in an organization or industry. It can also be said to be a computer system that digests information into data to make decisions on specific semi-structured problems (Fauzan, 2017).

Of the many procedures in the SPK, one of them is the Simple AHP and SAW procedures (Wahyudi, 2020). The purpose of a decision support system (DSS) is, among other things, to support making decisions in the process of making a decision using alternatives obtained from the results of data processing, which have information and model design. The characteristic of this SPK is that it supports all organizational activities supporting several decisions that interact with each other, there are two components, namely data and models that are constant (Setiadi, 2019). Research on decision support systems includes conducting research on acceptance of journalists with data in the form of 5 alternatives and 5 criteria that result in a decision in the form of the 5th alternative that is elected as a journalist, the conclusion obtained is that the decision support system is quite helpful in making it easier to determine new journalists and has processes the process of solving it is quite simple (Muharsyah, 2018).

Of course, this process is difficult to do manually, either by individuals or through committee meetings, etc. this calculation requires an algorithm that automatically classifies each potential employee according to established criteria, even if the criteria may be contradictory, the algorithm must be able to make fair, complete and fast decisions. Then can then provide recommendations to management. To solve these problems, there is a solution which is to use AHP and SAW methods. AHP is a method that has a hierarchical structure and is able to simplify a problem from the complexity of the criteria based on various alternative options. According to Herly Nurrahmi, et al, Analytical Hierarchy Process (AHP) is a decision support model developed by Thomas L. Saaty which can describe complex multi-factor or multi-criteria problems into a hierarchy (Nurrahmi, 2019). AHP also takes into

account the validity up to the tolerance limit of the consistency level of the selection criteria, so it is able to provide more consistent results than other methods. In this study, the AHP method was combined with the SAW method. SAW is the best known and widely used method in finding optimal alternatives from certain alternatives and criteria. SAW is also known as the weighted addition method (Ihsan & Luaha, 2022). The SAW method recognizes the existence of 2 (two) attributes, namely the criteria for benefits and the criteria for costs (Nandes, 2021).

Defining the SAW method is often also known as the weighted sum method (Sari, 2018). This method plays a role in finding the weighted sum of each criterion against the alternatives. And Then according to (Hutahaean & Badaruddin, 2020) the simplest decision-making method in the completion step is the Simple Additive Weighting Method (Hutahaean & Badaruddin, 2020). Starting from the problems that exist, the author proposes a research on the hiring of new employees at PT Naufal Indo Raya. With a combination of 2 different methods, namely AHP as the weighting criterion and SAW as the alternative ranking, this research should be a solution for companies to determine the right choice of new employees so that they can really get maximum benefits while employees are working in the company.

A decision support system (DSS) or decision support system (DSS) is a system capable of providing problem solving skills and communication skills for problems with semi-structured and non-structured conditions. structured (Taufiq, Permana, Cahyanto, & Adha, 2018). A decision support system (DSS) can also be interpreted as a system capable of providing problem solving skills and communication skills for problems with semi-structured and unstructured conditions (Sasongko, Astuti, & Maharani, 2017).

This system is used to help decision makers in semi-structured situations and unstructured situations, where no one knows for sure how decisions should be made. Therefore, we need a system capable of selecting employees during recruitment, where the processing is automatic, so that the evaluation is fast and accurate. The researchers therefore took the research object with the title “Decision Support System for New Employee Acceptance at PT Naufal Indo Raya using Analytical Hierarchy Process (AHP) and Simple Additive Weighting Methods (SAW)"

RESEARCH METHOD

Research framework

The system development method is the waterfall model. The waterfall model is a system development technique. The cascade is also known as the linear sequential model and the classical cycle. This cascade provides sequential software steps. In Figure 1, the Waterfall model is shown:

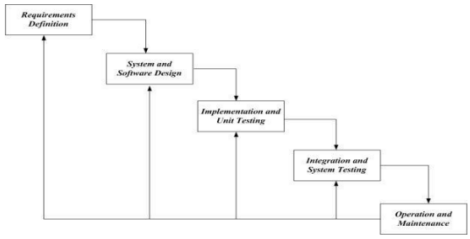

Figure 1. Waterfall Model

Here are the steps of the waterfall model, namely:

a. Analyse of needs
   At this stage, the system developer needs communication aimed at understanding the software expected by the user and the limitations of the software. This information can usually be obtained through interviews, discussions or direct surveys. The information is analyzed to obtain the data required by the user.
b. System design
   The specification of the requirements from the previous step will be studied in this phase and the system design will be prepared. The system design helps define the hardware and system

requirements and also helps define the overall system architecture.

c. Implementation
At this stage, the system is first developed in small programs called units, which are integrated in later stages. Each unit developed and tested for its functionality is called a unit test.

d. Integration and testing
All units developed in the implementation phase are integrated into the system after testing each unit. After integration, the entire system is tested for any failures or errors.

e. Operation and maintenance
The final stage of the waterfall model. Software completed, run and perform maintenance. Maintenance includes fixing errors that were not found in the previous step. Improved implementation of system units and increased system services as new requirements.

Then, for data collection, the authors use various techniques to obtain the necessary data, including:

a. Observation (direct observation)
In this approach, the author goes directly to the location of the research to make direct observations, examine problems that arise during the process, and assess the current course of the recruitment process for new employees.

b. Interview
In this approach, the author directly interviews the authorized officials of PT Naufal Indo Raya on topics related to research, in particular the recruitment process and the problems that arise.

c. Literature review
Using this approach, the authors search for theories in journals, books, the internet, and other sources that support this research on how to build applications, system development techniques, and more.

Discussion plan

PT Naufal Indo Raya is a company engaged in the implementation of services for the construction of commercial buildings, executors for the construction of commercial buildings, executors for the construction of waterways, ports, dams and other water resources infrastructure, executors for the construction of drinking water and sewage treatment plants and buildings, waste treatment, executor for the construction of highways (except viaducts), railways and airport runways, and executor for the construction of air bridges, tunnels and subways. The problem at PT Naufal Indo Raya is that the employee selection always uses a handwriting system, there are many criteria and sub-criteria in the employee selection and it takes a long time to do an assessment. Based on these problems, the researcher proposes a decision support system website for hiring employees at PT Naufal Indo Raya using two methods of Analytical Hierarchical Process (AHP) and Simple Additive Weighting (SAW). The stages of the research plan are as follows:

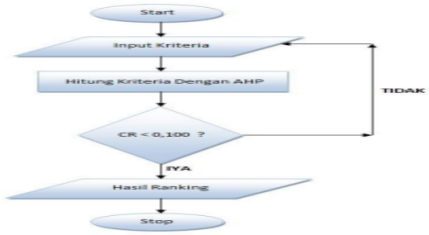

Figure 2. The Stages in The Research Plan

In the figure above, the first step is to prepare the criteria and alternative data inputs. The criteria and alternative data entry steps to matrix normalization for both methods are the same. After going through the normalization process, calculations are performed using the AHP method. Then the end result is the ranking of the calculations that have been performed. Then, in the following method, a system similar to the SAW method will be designed. Regarding

the system to be developed, it can be seen from the following flowchart:

Figure 3. Saw Method Calculation Flowchart

Based on Figure 3. The SAW method calculation flowchart above, the first step in the SAW method calculation is to take several samples of potential new employees, and then enter the names of the potential new employees. the next step is to determine the criteria for potential new employees. each criterion has a symbol and a weighting value. Then, after having received a weighting value, the criteria receive a percentage weighting value of the criteria c1 to n. so that if all the percentage weights of the criteria are added together, it will produce a weighted percentage value of 1. And then the next step is to determine the cost or benefit of each criterion. After that, we create an alternative table and enter the weight values for each candidate. After entering the weight values for each candidate, we then proceed to the normalization step. And from the results of the normalization produce the final value of the normalization. then the final normalization results are sorted from largest value to smallest value. After the two calculated values of the two methods, the two values will be analyzed in comparison.

RESULTS AND ANALYSIS

Based on the system design performed in this study, it is known that this research produces a web-based system with the application of AHP and SAW methods as a decision support system to determine new beneficiary employees.

System analysis

Before the system you want to build is developed, weighting and criteria are applied as indicators for further evaluation. The weighting is the absolute value of each criterion. After that, assimilation was carried out using AHP and SAW methods.

Table 1. Alternative Sample

Alternative Samples
A1
A2
A3
A4
A5

The table above is intended to display a list of samples used later in system testing.

Tabel 2. Criteria

Criteria	Variable
work ability	C1
interpersonal skills	C2
work experience	C3
Education	C4
Motivation	C5
Loyalty	C6

The table above is intended to provide the criteria used to further determine the selection of new employees. This criterion was found in several journals that served as references in this study.

Tabel 3. Criteria Weighting

Criteria	Rating weight
work ability	80
interpersonal skills	75
work experience	80
education	90
motivation	85
loyalty	78

The table above is the weighting of the criteria which will be used later for the weighting matrix of each criterion.

System view

Login Page

This page is the initial view of the system under construction. Administrators and users will be prompted for a username and password to use the system.

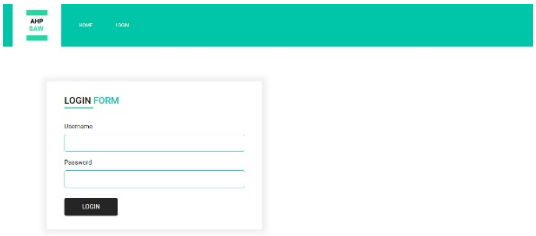

Figure 4. Login Page

Employee data entry page

On this page, the user can enter the code and name of the employee who wants to be evaluated using this developed system.

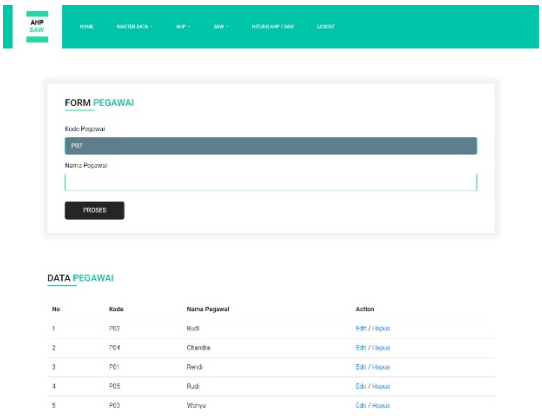

Figure 5. Employee data entry page

Criteria data entry page

On this page, the user can enter the code and the criteria which will be used as an indicator for the evaluation later.

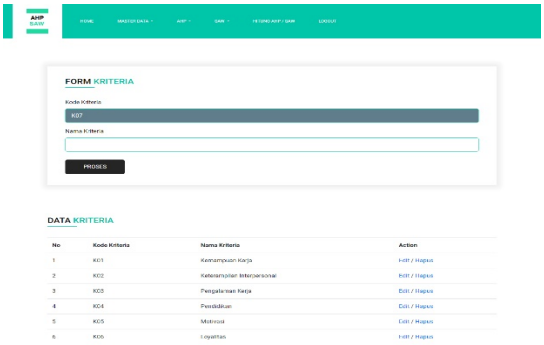

Figure 6. Criteria data entry page

Evaluation weight entry page

On this page, users can enter the weight of the evaluation of each of the criteria that have been entered previously.

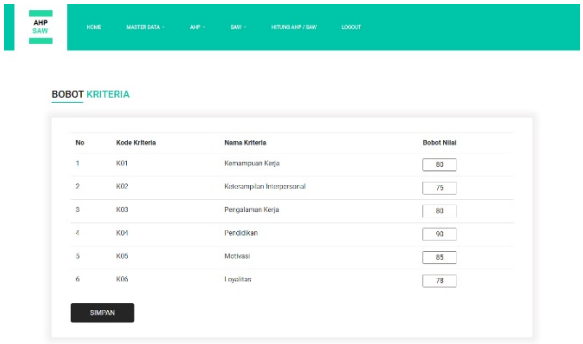

Figure 7. Evaluation weight entry page

Criteria Matrix Page

On this page, an evaluation matrix will be displayed for each criterion whose value has been entered

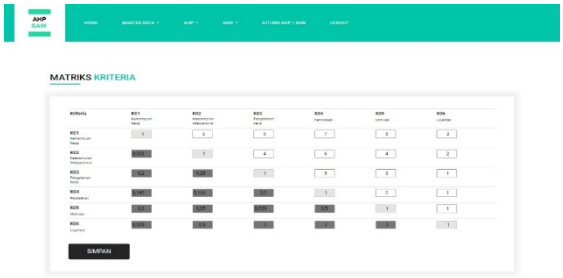

Figure 8. Criteria Matrix Page

Employee Rating Entry Page

On this page, users can enter values for each of the criteria used in the evaluation indicators. Once the data has been entered, the data can be saved by clicking on the Save button

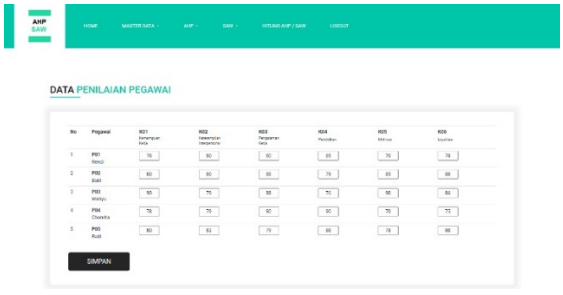

Figure 9. Employee Rating Entry Page

Calculation page using AHP

On this page you will see several processes used to perform calculations with AHP. Some of these processes include criteria weighting data, employee assessment data, matrices between criteria,

priority weighting criteria and aggregate values for each employee.

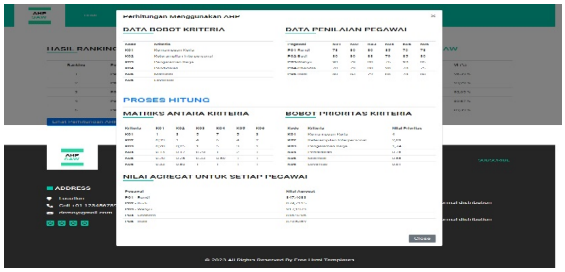

Figure 10. Calculation page using AHP

Calculation page using SAW

On this page, we will see several processes used to perform calculations with SAW. Some of these processes such as criteria weight data, employee evaluation weight data, employee evaluation data and Vi calculation results.

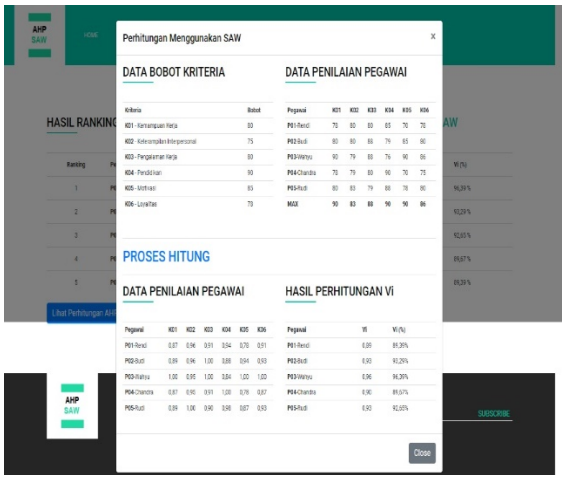

Figure 11. Calculation page using SAW

Ranking results page

This page displays ranking results using the AHP and SAW methods. Based on the developed system, both methods are known to have the same ranking results for the samples used as test subjects in this study. Based on this system, Wahyu is known to have received the top rank with an overall score (AHP) of 917.1373 and a Vi(%) (SAW) value of 96.39%. In second place was obtained by Budi with an aggregate value (AHP) of 874.7115 and a Vi(%) value (SAW) of 93.29%. And in third place was obtained by Rudi with an aggregate value (AHP) of 870.6369 and a Vi(%) (SAW) value of 92.65%.

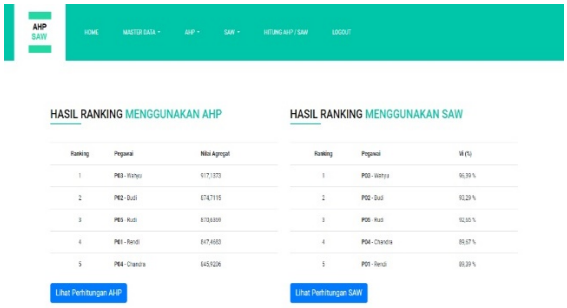

Figure 12. Ranking results page

CONCLUSION

The decision support system for hiring employees at PT Naufal Indo Raya using Analytic Hierarchy Process (AHP) and Simple Additive Weighting (SAW) methods was developed using the web. And the results of applying Analytical Hierarchy Process (AHP) and Simple Additive Weighting (SAW) methods as employee hiring methods in the developed system have the same results in the evaluation process or of classification. Based on this system, Wahyu is known to have received the top rank with an overall score (AHP) of 917.1373 and a Vi(%) (SAW) value of 96.39%. In second place was obtained by Budi with an aggregate value (AHP) of 874.7115 and a Vi(%) value (SAW) of 93.29%. And in third place was obtained by Rudi with an aggregate value (AHP) of 870.6369 and a Vi(%) (SAW) value of 92.65%

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