

The MAUT and SAW Methods in Recruiting Employees at PT. Bengkel Sehat

Dea Ersavania¹, Muhammad Barkah Akbar²

^{1,2,3}Information Systems Study Program, Faculty of Engineering, Universitas Potensi Utama

ARTICLE INFO	ABSTRACT
<p>Keywords: Employee Recruitment Determination, MAUT, SAW</p> <hr/> <p>Email : deaersavania353@gmail.com</p>	<p>The phenomenon that occurred at PT. Bengkel Sehat, namely the company does not have a system for recruiting employees with accurate data, in the manual process it is preceded by administrative selection of application files from prospective workers, this selection is selected by comparing application files between prospective workers who match the criteria. Errors often occur in inputting assessment data and calculating values based on the dimensions set at PT. Bengkel Sehat. PT. Bengkel Sehat does not use the Multi-Attribute Utility Theory (MAUT) and Simple Additive Weighting (SAW) methods in making decisions on hiring employees. The system design uses the PHP programming language and MySQL database. The minimum specifications for the computer used are dual core, 4GB RAM and 120GB hard drive. The method used in designing this application is blackbox testing. Black box testing is testing that is carried out only by observing the results of execution through test data and checking the functionality of the software. The results of this study are formMinimizing errors in inputting prospective employee assessment data can reduce the risk of errors in assessing prospective employee data and implementation against system decision support using the Multi-Attribute Utility Theory (MAUT) and Simple Additive Weighting (SAW) methods can provide users with more accurate decision values.</p> <hr/> <p>Copyright © 2022 JU-KOMI. All rights reserved is Licensed under a Creative Commons Attribution- NonCommercial 4.0 International License (CC BY-NC 4.0)</p>

INTRODUCTION

The development of technological science is a series of activities that are carried out continuously and aim to achieve a state or condition that is better than before. Along with the progress of science and technology, humans are required to work effectively and efficiently in order to achieve better, faster and more satisfying goals or results, because technology can help smooth the processing of data into information that is needed by all parties. , especially for the company's operational activities.

The phenomenon that occurred at PT. Bengkel Sehat, namely the company does not have a system for recruiting employees with accurate data, in the manual process it is preceded by administrative selection of application files from prospective workers, this selection is selected by comparing application files between prospective workers who match the criteria. Errors often occur in inputting assessment data and calculating values based on the dimensions set at PT. Bengkel Sehat. PT. Bengkel Sehat does not use the Multi-Attribute Utility Theory (MAUT) and Simple Additive Weighting (SAW) methods in making decisions on employee hiring.

Multi-Attribute Utility Theory is used to convert from some importance to a numerical value on a scale of 0-1 with 0 representing the worst choice and 1 being the best. This allows direct comparison of various sizes. That is, with the right tools, it's possible to compare apples to oranges. The end result is a ranking order of alternative evaluations that describes the decision makers' choices. (Agus Alim Muin; 2020: 207)

The system design uses the PHP programming language and MySQL database. The minimum specifications for the computer used are dual core, 4GB RAM and 120GB hard drive. The method used in designing this application is blackbox testing. Black box testing is testing that is carried out only by observing the results of execution through test data and checking the functionality of the software

METHODS

Research methodology is a set of rules, activities, and procedures used by actors of a scientific discipline. There are several procedures used in this study are as follows:

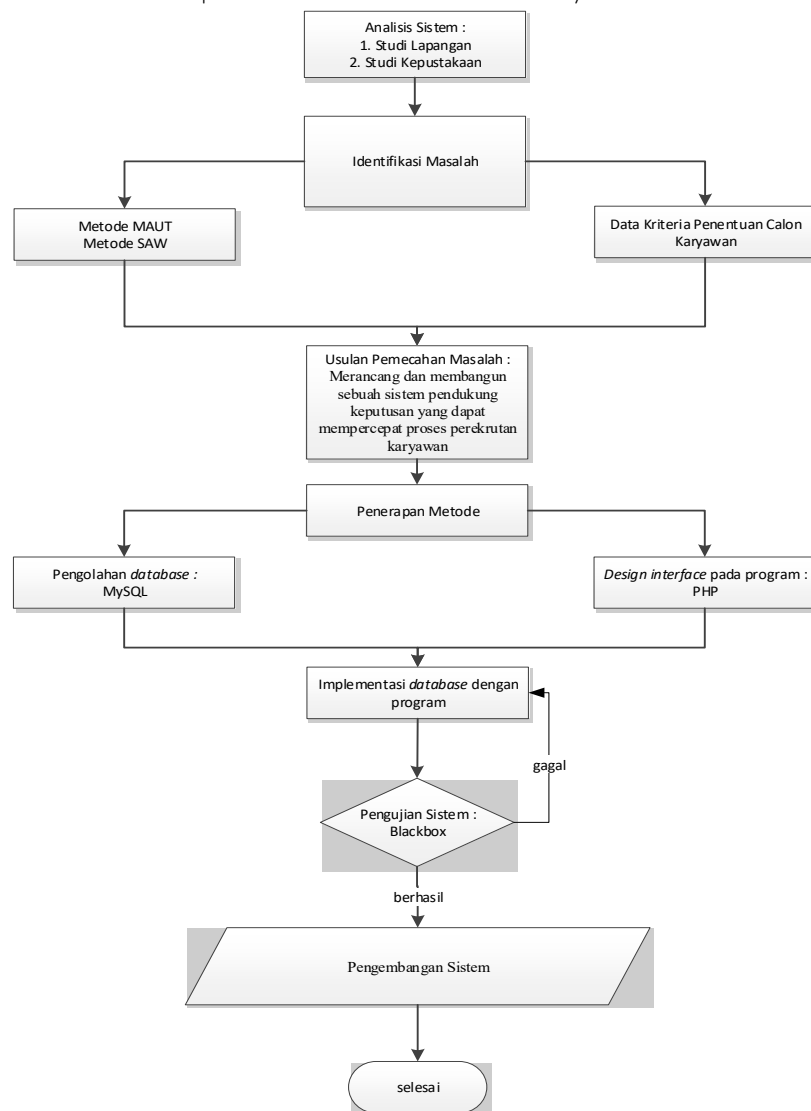


Figure 1. Design Procedure

The activities carried out at each stage are as follows:

a. System Analysis

The author conducted an analysis of the existing system regarding the determination of the Implementation of the Multiple Attribute Utility Theory Method (Multi-Attribute Utility Theory (MAUT) and Simple Additive Weighting (SAW)) in Determining Employee Recruitment at PT. Medan Bengkel Sehat using 2 research study methods, namely:

- 1) Field Study
- 2) Library Studies

b. Identification of problems

The problems found by researchers in conducting thesis research are as follows:

1. There is no system that can support companies in making employee selection decisions.
2. The implementation of decision support systems using the Multi-Attribute Utility Theory (MAUT) and Simple Additive Weighting (SAW) methods has not yet developed.

To answer the resolution of these problems, the researchers built a decision support system with system specifications including the following:

- 1) The data for system input is prospective employee data
- 2) The methods used to perform calculations in determining decisions are the Multi-Attribute Utility Theory (MAUT) and Simple Additive Weighting (SAW) methods.
- 3) The system will be designed using PHP and MySQL software as data storage media.

c. Proposed Problem Solving

The proposed problem solving to overcome problems with the existing system analysis is as follows:

1. Designing a system that can support the company in making employee selection decisions.
2. Designing a system that can store data, especially prospective employee data, in a large capacity.
3. Implementing a decision support system using the Multi-Attribute Utility Theory (MAUT) and Simple Additive Weighting (SAW) methods.

d. Application of the Method

The author implements the decision support system with the method *Multi-Attribute Utility Theory* (MAUT) and Simple Additive Weighting (SAW). Method is used to convert from some importance to a numerical value on a scale of 0-1 with 0 representing the worst choice and 1 being the best. This allows direct comparison of various sizes. That is, with the right tools, it's possible to compare apples to oranges. The end result is a ranking order of alternative evaluations that describes the decision makers' choices.

e. Database Implementation

Contains specifications for the designed tools, components, test equipment used and block diagrams of the equipment to be designed. The system design uses the PHP programming language and MySQL database. The minimum specifications for the computer used are dual core, 4GB RAM and 120GB hard drive.

System design is a stage in the form of drawing, planning and manufacturing by uniting several separate elements into a unified whole to clarify the shape of a system. Some of the steps that need to be done in the system design process are:

- 1) Analyzing the problems of the user (user), the goal is to get a deep understanding of the user's needs.

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- 2) Feasibility study, comparing alternative solutions to problems to determine the most appropriate solution.
 - 3) Design the system, make logical problem solving proposals.
 - 4) Design details, perform a detailed problem-solving system design.
 - 5) Its application is to move the program logic that has been made in the selected language, test the program, test the data and its output.
 - 6) Maintenance and evaluation of the system that has been implemented
- f. System Testing
 Contains the steps taken when testing the equipment as a whole, the quantities to be tested, and measures to assess whether the tool is working properly according to specifications.
- g. System Development
 Software that is difficult to deliver to companies will definitely experience changes. These changes can be due to errors because the software must adapt to the environment (peripherals or new operating systems) or because the company requires functional development.

RESULTS AND DISCUSSION

System analysis on running aims to identify and evaluate the implementation of the Multiple Attribute Utility Theory (MAUT) and SAW Methods in Determining Employee Recruitment at PT. Bengkel Sehat, as for the weaknesses in the system that is currently running at PT. Bengkel Sehat that is not yet developed PT. Bengkel Sehat does not use an application to make decisions on selecting the best quality prospective employees and there is no use of the Multiple Attribute Utility Theory (MAUT) Method and SAW in calculating the value of prospective employees.

MAUT & SAW Manual Calculations

a. Table of Criteria and Subcriteria

Table 1. Criteria

Criteria ID	Criteria Name	Criteria Weight
C1	Interview Results	30
C2	Experience as a Mechanic	20
C3	Last education	20
C4	Age	15
C5	Psychotest	15

The table of sub criteria from the Interview criteria can be seen in Table 2.

Table 2. Interview Data

Subcriteria	Weight
> 93	5
90 – 92	4
85 – 89	3
75 – 84	2
< 75	1

The sub-criteria table of work experience criteria can be seen in Table 3.

Table 3. Work Experience Data

Subcriteria	Weight
>3.5 Years	5
3 – 3.5 Years	4
2.5 – 2.9 Years	3
2 – 2.4 Years	2
< 2 years	1

The sub-criteria table of the Last Education criteria can be seen in Table 4.

Table 4. Latest Education Data

Subcriteria	Weight
SI	3
D3	2
SMA/SMK	1

The sub-criteria table of age criteria can be seen in Table 5.

Table 5. Age Data

Subcriteria	Weight
Age 19 - 22 Years	5
Age 23 - 26 Years	4
Age 27 - 30 Years	3
Age 31 - 32 Years	2
> 32 Years	1

The table of sub criteria from the Prikotest criteria can be seen in Table 6.

Table 6. Psychotest data

Subcriteria	Weight
> 93	5
90 – 92	4
85 – 89	3
75 – 84	2
< 75	1

b. Table of Prospective Employees / Alternate

Table 7. Alternate Table

Candidate name	Experience as a mechanic	Age (Years)	last education	Psychot est	INTERVIEW RESULTS
Tigor Manullang	2 – 2.4 Years	Age 23 - 26	SMA / SMK	90 – 92	85 – 89

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Candidate name	Experience as a mechanic	Age (Years)	last education	Psychot est	INTERVIEW RESULTS
Railam Silalahi	2 – 2.4 Years	Age 31 - 32	D3	90 – 92	75 – 84
Zainal Abidin Hsb	< 2 years	> 32	SMA / SMK	75 – 84	75 – 84
Robert Simorangkir	2.5 – 2.9 Years	> 32	SMA / SMK	75 – 84	85 – 89
Henry Targan	2.5 – 2.9 Years	Age 31 - 32	SMA / SMK	75 – 84	75 – 84
Albert M Siriringo	< 2 years	Age 31 - 32	SMA / SMK	90 – 92	> 93
Syamsul Bahri	2.5 – 2.9 Years	Age 31 - 32	SMA / SMK	75 – 84	< 75
Longser Sormin	2.5 – 2.9 Years	> 32	SMA / SMK	75 – 84	85 – 89
Baslin Sinaga	3 – 3.5 Years	Age 23 - 26	SMA / SMK	75 – 84	90 – 92
Heri Sutanto	< 2 years	Age 31 - 32	D3	85 – 89	90 – 92
Made Sutris	3 – 3.5 Years	> 32	SMA / SMK	75 – 84	85 – 89

DEATH Method Calculation

a. Decision matrix table

Table 8. Decision Table

Candidate Name	Experience As A Mechanical	Age	Last Education	Psychotes	Interview Results
Tigor Manullang	2	4	1	4	3
Railam Silalahi	2	2	2	4	2
Zainal Abidin Hsb	1	1	1	2	2
Robert Simorangkir	3	1	1	2	3
Henry Targan	3	2	1	2	2
Albert MSiriringo	1	2	1	4	5
Syamsul Bahri	3	2	1	2	1
Longser Sormin	3	1	1	2	3
Baslin Sinaga	4	4	1	2	4
Heri Sutanto	1	2	2	3	4
Made Sutris	4	1	1	2	3

b. Matrix Normalization Table

Table 9. Matrix Normalization Table

Candidate name	Experience as a mechanic	Age	last education	Psychotest	Interview results
Tigor Manullang	$(2-1) / (4-1) = 0.33$	$(4-1) / (4-1) = 1$	$(1-1) / (2-1) = 0$	$(4-2) / (4-2) = 1$	$(3-1) / (5-1) = 0.5$
Railam Silalahi	$(2-1) / (4-1) = 0.33$	$(2-1) / (4-1) = 0.33$	$(2-1) / (2-1) = 1$	$(4-2) / (4-2) = 1$	$(2-1) / (5-1) = 0.25$
Zainal Abidin Hsb	$(1-1) / (4-1) = 0$	$(1-1) / (4-1) = 0$	$(1-1) / (2-1) = 0$	$(2-2) / (4-2) = 0$	$(2-1) / (5-1) = 0.25$
Robert Simorangkir	$(3-1) / (4-1) = 0.67$	$(1-1) / (4-1) = 0$	$(1-1) / (2-1) = 0$	$(2-2) / (4-2) = 0$	$(3-1) / (5-1) = 0.5$
Henry Targan	$(3-1) / (4-1) = 0.67$	$(2-1) / (4-1) = 0.33$	$(1-1) / (2-1) = 0$	$(2-2) / (4-2) = 0$	$(2-1) / (5-1) = 0.25$
Albert M Siriringo	$(1-1) / (4-1) = 0$	$(2-1) / (4-1) = 0.33$	$(1-1) / (2-1) = 0$	$(4-2) / (4-2) = 1$	$(5-1) / (5-1) = 1$

Candidate name	Experience as a mechanic	Age	last education	Psychotest	Interview results
Syamsul Bahri	$(3-1) / (4-1) = 0.67$	$(2-1) / (4-1) = 0.33$	$(1-1) / (2-1) = 0$	$(2-2) / (4-2) = 0$	$(1-1) / (5-1) = 0$
Longser Sormin	$(3-1) / (4-1) = 0.67$	$(1-1) / (4-1) = 0$	$(1-1) / (2-1) = 0$	$(2-2) / (4-2) = 0$	$(3-1) / (5-1) = 0.5$
Baslin Sinaga	$(4-1) / (4-1) = 1$	$(4-1) / (4-1) = 1$	$(1-1) / (2-1) = 0$	$(2-2) / (4-2) = 0$	$(4-1) / (5-1) = 0.75$
Heri Sutanto	$(1-1) / (4-1) = 0$	$(2-1) / (4-1) = 0.33$	$(2-1) / (2-1) = 1$	$(3-2) / (4-2) = 0.5$	$(4-1) / (5-1) = 0.75$
Made Sutris	$(4-1) / (4-1) = 1$	$(1-1) / (4-1) = 0$	$(1-1) / (2-1) = 0$	$(2-2) / (4-2) = 0$	$(3-1) / (5-1) = 0.5$

c. Matrix Normalization Configuration

With the formula: $U(x) = x - (x_i^-) / (x_i^+) - (x_i^-)$

Information :

x: Alternate Weight Value

x_i^+ : Maximum Value

x_i^- : Minimum Value

Table 10. Matrix Normalization Configuration Table

Candidate name	Experience as a mechanic	Age	last education	Psychotest	Interview results
Tigor Manullang	$0.33 * 20 = 6.6$	$1 * 15 = 15$	$0 * 20 = 0$	$1 * 15 = 15$	$0.5 * 30 = 15$
Railam Silalahi	$0.33 * 20 = 6.6$	$0.33 * 15 = 4.95$	$1 * 20 = 20$	$1 * 15 = 15$	$0.25 * 30 = 7.5$
Zainal Abidin Hsb	$0 * 20 = 0$	$0 * 15 = 0$	$0 * 20 = 0$	$0 * 15 = 0$	$0.25 * 30 = 7.5$
Robert Simorangkir	$0.67 * 20 = 13.4$	$0 * 15 = 0$	$0 * 20 = 0$	$0 * 15 = 0$	$0.5 * 30 = 15$
Henry Targan	$0.67 * 20 = 13.4$	$0.33 * 15 = 4.95$	$0 * 20 = 0$	$0 * 15 = 0$	$0.25 * 30 = 7.5$
Albert M Siriringo	$0 * 20 = 0$	$0.33 * 15 = 4.95$	$0 * 20 = 0$	$1 * 15 = 15$	$1 * 30 = 30$
Syamsul Bahri	$0.67 * 20 = 13.4$	$0.33 * 15 = 4.95$	$0 * 20 = 0$	$0 * 15 = 0$	$0 * 30 = 0$
Longser Sormin	$0.67 * 20 = 13.4$	$0 * 15 = 0$	$0 * 20 = 0$	$0 * 15 = 0$	$0.5 * 30 = 15$
Baslin Sinaga	$1 * 20 = 20$	$1 * 15 = 15$	$0 * 20 = 0$	$0 * 15 = 0$	$0.75 * 30 = 22.5$
Heri Sutanto	$0 * 20 = 0$	$0.33 * 15 = 4.95$	$1 * 20 = 20$	$0.5 * 15 = 7.5$	$0.75 * 30 = 22.5$
Made Sutris	$1 * 20 = 20$	$0 * 15 = 0$	$0 * 20 = 0$	$0 * 15 = 0$	$0.5 * 30 = 15$

SAW Method Calculation

a. Decision Matrix

Table 11. Decision Matrix

Ama Candidate	Experience As A Mechanical	Age	Last Education	Psychotes	Interview Results
Tigor Manullang	6.6	15	0	15	15
Railam Silalahi	6.6	4.95	20	15	7.5
Zainal Abidin Hasibuan	0	0	0	0	7.5
Robert Simorangkir	13.4	0	0	0	15
Henry Targan	13.4	4.95	0	0	7.5
Albert Monang Siriringo	0	4.95	0	15	30
Syamsul Bahri	13.4	4.95	0	0	0
Longser Sormin	13.4	0	0	0	15

Ama Candidate	Experience As A Mechanical	Age	Last Education	Psychotes	Interview Results
Baslin Sinaga	20	15	0	0	22.5
Heri Sutanto	0	4.95	20	7.5	22.5
Made Sutris	20	0	0	0	15

b. Normalized Matrix

Table 12. Normalized Matrix

Candidate name	Experience as a mechanic	Age	last education	Psychotest	Interview results
Tigor Manullang	6.6/20	15/15	0/20	15/15	15/30
Railam Silalahi	6.6/20	4.95/15	20/20	15/15	7.5/30
Zainal Abidin Hasibuan	0/20	0/15	0/20	0/15	7.5/30
Robert Simorangkir	13.4 / 20	0/15	0/20	0/15	15/30
Henry Targan	13.4 / 20	4.95/15	0/20	0/15	7.5/30
Albert Monang Siriringo	0/20	4.95/15	0/20	15/15	30/30
Syamsul Bahri	13.4 / 20	4.95/15	0/20	0/15	0/30
Longser Sormin	13.4 / 20	0/15	0/20	0/15	15/30
Baslin Sinaga	20/20	15/15	0/20	0/15	22.5/30
Heri Sutanto	0/20	4.95/15	20/20	7.5/15	22.5/30
Made Sutris	20/20	0/15	0/20	0/15	15/30

c. Ranking

Formula : $x * \text{Criteria Weight}$

Table 13. Ranking

Candidate name	Experience as a mechanic	Age	last education	Psychotest	Interview results
Tigor Manullang	0.33*20	1*15	0 * 20	1*15	0.5*30
Railam Silalahi	0.33*20	0.33*15	1*20	1*15	0.25*30
Zainal Abidin Hsb	0 * 20	0 * 15	0 * 20	0 * 15	0.25*30
Robert Simorangkir	0.67*20	0 * 15	0 * 20	0 * 15	0.5*30
Henry Targan	0.67*20	0.33*15	0 * 20	0 * 15	0.25*30
Albert M Siriringo	0 * 20	0.33*15	0 * 20	1*15	1*30
Syamsul Bahri	0.67*20	0.33*15	0 * 20	0 * 15	0 * 30
Longser Sormin	0.67*20	0 * 15	0 * 20	0 * 15	0.5*30
Baslin Sinaga	1*20	1*15	0 * 20	0 * 15	0.75*30
Heri Sutanto	0 * 20	0.33*15	1*20	0.5*15	0.75*30
Made Sutris	1*20	0 * 15	0 * 20	0 * 15	0.5*30

So the results are obtained

Table 14. Result

CANDIDATE NAME	SCORE	RANKING	INFORMATION
Baslin Sinaga	57.50	1	Accepted
Heri Sutanto	54.95	2	Accepted
Railam Silalahi	54.05	3	Accepted
Tigor Manullang	51.60	4	-
Albert Monang Siriringo	49.95	5	-
Made Sutris	35.00	6	-
Longser Sormin	28.40	7	-
Robert Simorangkir	28.40	7	-
Henry Targan	25.85	8	-
Syamsul Bahri	18.35	9	-
Zainal Abidin Hasibuan	7.50	10	-

The calculation above is a combination of the MAUT and SAW methods. The process of calculating the MAUT method is in stages 1, 2 and 3. The results from stage 3 in the MAUT method are followed by the SAW method in stages 4, 5 and 6.

Discussion

Based on the final results of the calculation then Baslin Sinaga, Heri Sutanto, Railam Silalahi, was selected as an employee who passed the selection for the position of Mechanic

Results display

1. Display Input Data Prospective employees

A series of activities when an event occurs on the data form for prospective employee categories can be seen in Figure 2:

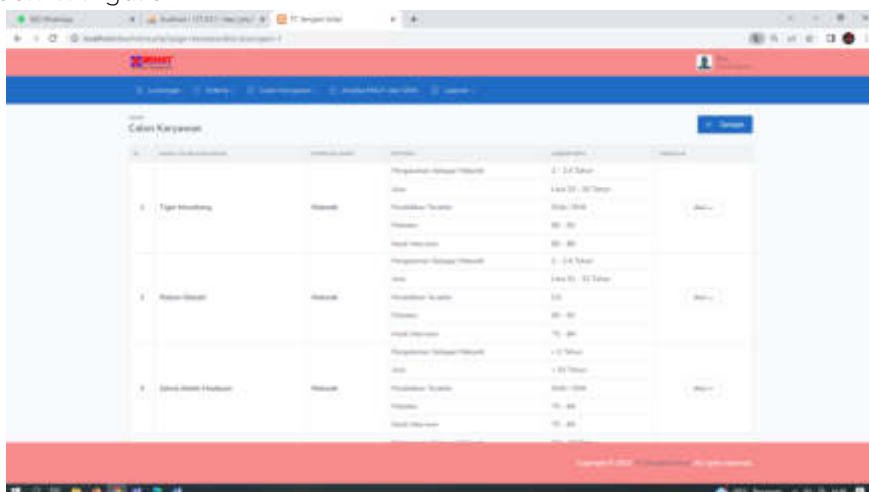


Figure 2. Data input for prospective employees

2. Analysis View

A series of activities when an event occurs on the data analysis form can be seen in Figure 3:

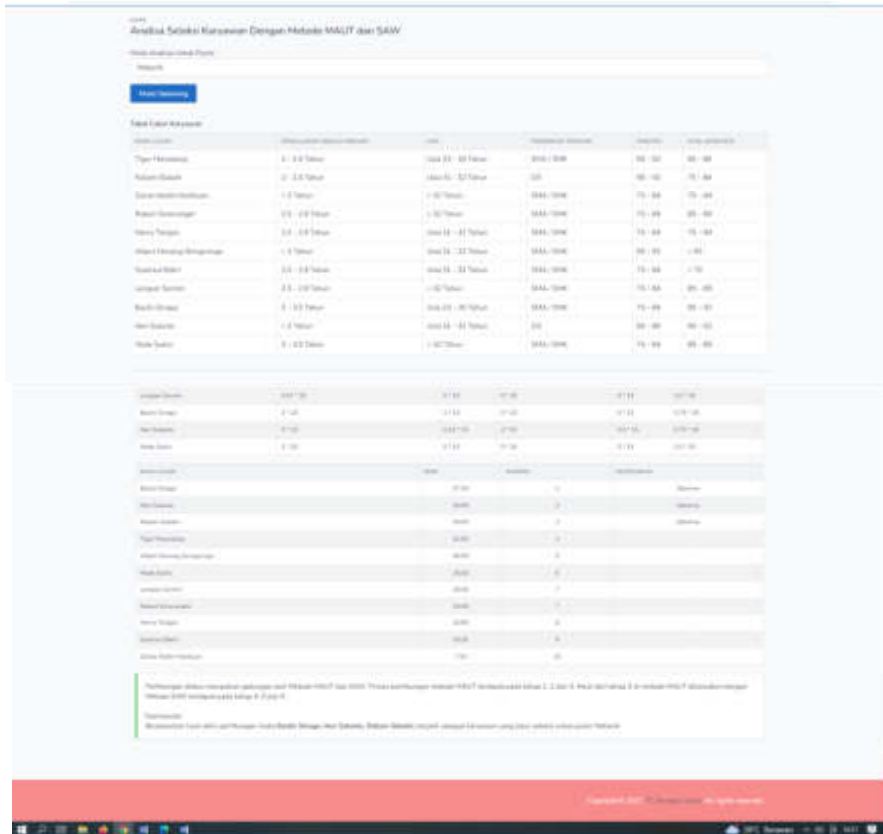


Figure 3. Analysis Display

3. Display View the Prospective Employee Report

A series of system performance carried out in viewing information about prospective employee reports can be explained in Figure 4:

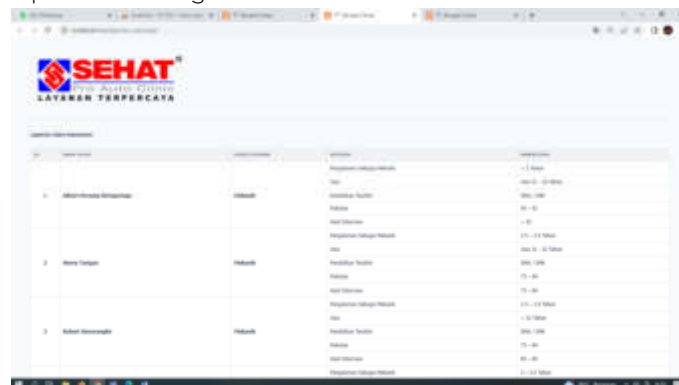


Figure 4. Display of Viewing Prospective Employee Reports

4. Display View the Decision Analysis Report

A series of system performance carried out in viewing information regarding the decision analysis report can be explained in Figure 5:

