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Application Of The Ahp Method In Decision Support System For Security Recruitment

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Abstract

PT Perkebunan Nusantara II (PTPN II) Sei Semayang, a state-owned enterprise (BUMN) engaged in palm oil and sugarcane production. Security officers play a crucial role in maintaining the company's security and productivity. Currently, the security officer recruitment process remains conventional, relying on subjective assessments based on several criteria. The aim of this study is to introduce a more structured, transparent, and objective approach to security officer recruitment. By implementing the Analytic Hierarchy Process (AHP) method, decisions in selecting prospective security officers can be made based on predetermined criterion weights. AHP enables decision-makers to identify, compare, and prioritize relevant criteria, addressing the complexity of selecting candidates who fit the established criteria. Through this approach, the study seeks to enhance efficiency and effectiveness in the security officer selection process, reduce the risk of errors in candidate selection, and improve overall company performance and security. It is hoped that the application of the AHP method in the decision support system for security officer recruitment at PTPN II Sei Semayang will assist the company in optimizing the selection process and supporting more data-driven decision-making.

Keywords: *PTPN II Sei Semayang, Security Officer Recruitment, AHP Method*

1. Introduction

A company or an institution is a place where the production of goods or services occurs. In a company, all the factors of production come together. Starting from labor, capital, natural resources, and entrepreneurship. To maintain security in a company requires a security officer or security. In the process of finding and attracting security personnel who have the potential to fill job vacancies, a qualified workforce is very influential on the company's progress performance, especially in the security sector. In the ever-evolving digital era, information technology has become an integral part of various aspects of life. In the context of recruiting security officers, the use of decision support systems can provide significant benefits in reducing subjectivity errors and increasing efficiency in the selection process. PTPN II Sei Semayang is a state-owned company engaged in producing palm oil and sugarcane. Security officers or security at PTPN II Sei Semayang, is one of the factors supporting the success of the company. They are tasked with securing the office, production site, and land which is the area of PTPN II Sei Semayang. To increase productivity, of course, companies need security officers who are quality, it is necessary to carry out the process of recruiting security officers. In the process of recruiting security officers at PTPN II Sei Semayang, the security section selects and selects the incoming applicant data one by one. If the data is complete, the security section will summon applicants to take part in the selection process. The large number of applicants makes security forces often experience difficulties in selecting prospective security officers. Therefore, this study aims to apply the AHP method in a security officer recruitment decision support system. By using this approach, it is hoped that the process of selecting and recruiting security officers can become more structured, transparent and objective. In addition, the use of the AHP method can also assist in identifying the best candidate who best fits the predetermined criteria, so as to be able to support effectiveness and efficiency in an entity's security operations.

2. Research Methods

2.1. Decision Support System (SPK)

A decision support system can be defined as an information system that helps identify opportunities to make decisions or provides information to assist decision making. There are several main benefits of decision support systems including:

1. Able to support complex problem solutions, has a fast response and allows changing problem scenarios to get solutions.
2. Able to quickly try out several strategies in different configurations.
3. Provides a new view in the learning process
4. Have communication facilities
5. Improve management control and performance
6. Savings from wrong decisions

7. Objective and consistent decisions
8. Increase management effectiveness

2.2. AHP Method

The Analytical Hierarchy Process (AHP) method is a method in decision analysis that is used to overcome the problem of selecting the best alternative by using a priority scale. This method allows decision makers to measure the relative value of several alternatives by comparing each alternative with predetermined criteria. AHP is used in situations where the decisions made involve many factors and criteria that are interrelated and have an impact on the final result.

2.3. AHP Method Algorithm

In general, the algorithm used in the process of working on the AHP method is as follows:

1. Create a comparison matrix, then each value in the first column is multiplied by the first relative priority, then the value in the second column is multiplied by the relative priority of the second element, and so on
2. Then each row is added up
3. The result of the sum of the rows is then divided by the relative priority elements
4. The results of the division are added up, then divided by the number of elements present, the result of this calculation is called λ max
5. After the λ max value is known, it can be determined what the CI value is. If the CI value is zero (0), then the matrix is said to be consistent. However, if the CI value obtained is greater than 0, then an inconsistency limit test has been applied
6. How to calculate the Consistency Index using the following formula:

$$CI=(\lambda \max - n) / n \quad (1)$$

Information :
n = the number of elements (matrix order)
If the value of CI = 0 is obtained, then the matrix can be said to be consistent. So there is no need to check the consistency ratio. However, if the CI value obtained is greater than 0 (CI > 0), then it is necessary to test the inconsistent limit in the next step.

How to calculate the Consistency Ratio (CR) using the following formula:
CR = CI / CR, where IR is the Random Consistency Index. The list of IRs can be seen in the following table:

Table 1: Consistency Ratio

Matrix Size	IR value
1	**0**
2	**0**
3	**0.58**
4	**0.90**
5	**1.12**
6	**1,24**
7	**1.32**
8	**1.41**
9	**1.45**
10	**1.49**

The last step is to check the consistency of the hierarchy. If the value is more than 10%, then the data judgment must be corrected. However, if the consistency ratio (CI/IR is less than equal to 0.1, then the calculation results are declared correct.)

2.4. Recruitment of Security Officers (Security)

The definition of recruitment of security officers (security) is the process of recruiting new workers in the field of security (security). Security officers are a group of officers formed by an agency/business entity and are tasked with carrying out physical security in the context of implementing security in their work environment (Regulation of the Head of the National Police of the Republic of Indonesia Number 24 of 2007 concerning Security Management Systems for Organizations, Companies and /or Government Agencies/Institutions, CHAPTER I, Article 1, Paragraph 6). A security officer can be in charge of the guard post alone or in a group, if in a group it means someone will lead it, be it the head of the security officer, the team commander (Danru) or a senior member (the elder).

2.5. Unified Model Language (UML)

According to Rosa, et al in the journal Daniel (2020: 5) (Vol: 8 Number: 1, June 2020), "UML is visual material for modeling and communicating about a system using diagrams and supporting texts. UML is only for modeling. UML consists of 13 kinds of diagrams grouped into 3 categories.

2.6. Database

According to Indrajani, in the journal Alvin Dwi Hardiansyah, et al (2020: 2) "a database is a collection of data that are logically interconnected and designed to obtain the data needed by an organization". Based on the understanding according to Indrajani, it can be concluded that a database is data that can be designed and integrated so that it can meet the needs of users in a company or organization.

2.7. MYSQL

According to Wahana, in the journal Randi V. Palit, et al (2015: 3) (Vol: 4 Number: 7, June 2015), MySQL is an open source database server which is quite popular. With its various advantages, this database software is widely used by practitioners to build a project. The existence of an API (Application Programming Interface) facility owned by MySQL, allows various computer applications written in various programming languages to access the MySQL database.

2.8. Flowchart

In the journal Arinda Lestari, et al (2015: 3) (Vol: 1 Number: 1, January 2020) says that a flowchart is a chart or chart that shows the flow in a program or system procedure logically. Flowcharts are used primarily as a communication and documentation tool when describing a flowchart.

2.9. Data Dictionary

(Puspitawati & Anggadani, 2011, p. 127) Broadly speaking, the data dictionary can be defined as follows: The data dictionary is an organizational list of all data elements in the complete system, with standard definitions so that users and system analysts will have the same understanding for input-output, storage components and calculations. The data dictionary is a fact about the data and information needs of an information system. At the time of design, the data dictionary was used for program design purposes (Pratama & Marshela, 2018).

3. Research Supporting Data

The research supporting data consists of the reference value data on the physical test and the criteria set by PTPN II Sei Semayang. The following are the data:

1. 12 Minute Running Value Data:

Table. 2 : Minute Running Value Data

Distance	value	(D)	(V)	(D)	(V)	(D)	(V)	(D)	(V)	(D)	(V)	(D)	(V)
1349	1	1666	16	1984	31	2301	46	2618	61	2936	76	3253	91
1371	2	1687	17	2005	32	2322	47	2639	62	2957	77	3317	94
1392	3	1708	18	2026	33	2343	48	2661	63	2978	78	3338	95
1413	4	1729	19	2048	34	2364	49	2682	64	2999	79	3369	96
1434	5	1750	20	2069	35	2386	50	2703	65	3021	80	3380	97
1455	6	1772	21	2090	36	2407	51	2725	66	3041	81	3401	98
1476	7	1793	22	2111	37	2428	52	2746	67	3062	82	3422	99
1497	8	1814	23	2132	38	2449	53	2767	68	3084	83	3444	100
1518	9	1836	24	2153	39	2470	54	2788	69	3105	84		
1539	10	1857	25	2174	40	2491	55	2809	70	3126	85		
1561	11	1878	26	2195	41	2513	56	2820	71	3148	86		
1582	12	1899	27	2216	42	2534	57	2851	72	3169	87		
1603	13	1920	28	2237	43	2555	58	2872	73	3190	88		
1625	14	1941	29	2259	44	2576	59	2893	74	3211	89		
1645	15	1962	30	2280	45	2597	60	2914	75	3232	90		

The values in the table above are the values that have been set by PTPN II Sei Semayang, in this test, participants will be asked to run for 12 minutes with a target of 3400 meters or about 8 times a football field lap. Meanwhile, a 12-minute run is used to determine a person's endurance and get the VO2 Max value, namely the maximum volume of oxygen (in milliliters) that the body can consume per minute per kilogram of body weight at maximum performance.

2. Pull-Up Value Data:

Table 3: Pull-Up Value Data

Movement	Value	Movement	Value
1	4	13	76
2	8	14	82
3	14	15	88
4	20	16	94
5	26	17	100

The values in the table above are the values that have been set by PTPN II Sei Semayang, a pull up is a movement that begins by hanging on to a horizontal stick then pulling the body up until the chin passes over the stick and back down until the arms are straight. In doing pull ups, the attitude of the legs must be straight down and not swinging. Pull ups done in one minute and standard for men 10 times if you get more is a plus.

3. Push-Up Value Data:

Table.4: Push-Up Value Data

Movement	Value	Movement	Value	Movement	Value
1	3	16	32	31	70
2	4	17	34	32	73
3	5	18	36	33	76
4	6	19	38	34	79
5	7	20	40	35	82
6	9	21	42	36	85
7	11	22	44	37	88
8	13	23	46	38	91
9	15	24	48	39	94
10	17	25	50	40	97
11	19	26	52	41	100
12	21	27	58	42	100

The values in the table above are values that have been set by PTPN II Sei Semayang. This test relies heavily on hand muscle strength. Selection participants are expected to reach a maximum count within 60 seconds. The more, of course, the better. It should be noted that the value of 100 from the push-up test is 43 times.

4. Sit-Up Value Data:

Table 5: Sit-Up Value Data

Movement	Value	Movement	Value	Movement	Value
6	1	21	30	36	84
7	2	22	32	37	88
8	4	23	35	38	92
9	6	24	38	39	96
10	8	25	41	40	100

The values in the table above are values that have been set by PTPN II Sei Semayang. Sit up movements prioritize flexibility and abdominal muscle strength. The implementation of the test at this stage also has a maximum of 43 points in 1 minute.

There are 4 assessment criteria in the Security Officer Recruitment Decision Support System application using the Analytical Hierarchy Process (AHP) method:

1. 12 minute Run
2. Pull-Up
3. Push-Up
4. Sit-Up

3.1. Process Design

In the SPK process using the AHP method, problem solving using a flowchart is needed, this flowchart aims to see the flow of a system that will be built from the beginning of the system at start to finish. The following is a flowchart image:

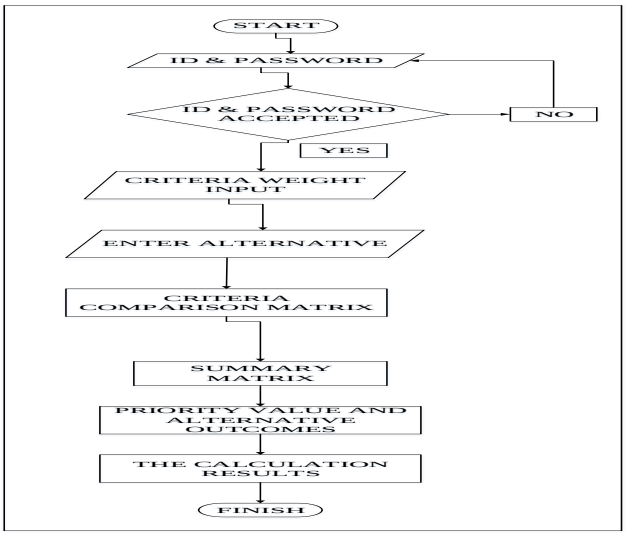

Fig.1 : Flowchart System

Information from Figure III.1 above is:

- When the admin opens the system, the admin must first log in by entering the ID & Password
- If the password is incorrect then the process returns to the beginning, and if it is correct then proceed to the next display
- Input the criteria value
- Enter alternatives
- Starting calculations with the AHP method, by multiplying the paired matrices with the criterion weights
- After doing the calculations, a value conclusion / ranking of the alternatives is produced
- Done

3.2. Analysis With AHP

PTPN II Sei Semayang in carrying out the process of recruiting security officers (security) determines 4 assessment criteria in the Security Officer Recruitment Decision Support System application using the Analytical Hierarchy Process (AHP)

Table 6: Criteria

Description	Criteria Name
C1	12 Minute Running
C2	Pull-up
C3	Push-up
C4	Sit-up

Table 7: Level of Interest

Weight	Description	Explanation
1	As important as	Two factors have the same influence on the target
3	Slightly More Important than	One factor is slightly more influential than the other factors
5	More Important than	One factor is more influential than other factors
7	Very Important from	One factor is more influential than other factors
9	Absolutely Very Important	One factor is far more influential than other factors
2,4,6,8	Value Analysis above	The opposite value of the condition above

Table 8: Criteria Comparison Matrix

Criteria	for Running 12 Minutes	Pull-ups	Push-ups	Sit-ups
for Running 12 Minutes	1	5.0	5.0	5.0
Pull-ups	0.2	1	3.0	3.0
Push-ups	0.2	0.3	1	1.0
Sit-ups	0.2	0.3	1.0	1
amount	1.6	6.7	10.0	10.0

Information:
The value 1 in the table above is the fixed value in the AHP method.
• A value of 5.0 in the table above means More important than.
• A value of 0.2 in the table above means a back comparison of the criteria.
• A value of 3.0 in the table above means Slightly more important than.
• A value of 0.3 in the table above means a criterion back comparison.
Then the matrix multiplication results are obtained as shown in the table below:

Table 9 : Priority Value Matrix Comparison of Criteria

Comparison	for Running 12 Minutes	Pull-up	Push-up	Sit-up	amount	Priority
for Running 12 Minutes	0.625	0.750	0.500	0.500	2.375	0.594
Pull-up	0.125	0.150	0.300	0.100	0.875	0.219
Push-up	0.125	0.050	0.100	0.100	0.375	0.094
Sit-up	0.125	0.050	0.100	0.100	0.375	0.094

Information:
The value in the 12 minute running table is 0.625 (this value is obtained from multiplying the weights in the first table x the total weight in the first table) 1 / 1.6 = 0.625. For the second table, you have the total weight in the second table, and so on until you reach the table last.
• Result of number of rows = 0.625 + 0.750 + 0.500+0.500 = 2.375
• Priority Result = 2.375/4= 0.594

Next, make the sum matrix for each row

Table 10 : Alternate Value Table

ID Alternative	12 Minute Run	Pull-up	Push-Up	Sit-up
Abdul Malik	80	78	86	80
Abrian Syahputra	80	80	90	85
Ade Muklis	80	80	85	80
Agus Setiawan	80	80	85	85

Anggi Pratama	75	75	80	80
Chandara Gunawan	76	77	85	85
Jumadi	79	77	80	85

Table 11: Table of Average Alternative Values

ID Alternative	Mark
A001	81
A002	83.75
A003	81.25
A004	82.5
A005	77.5
A006	80.75
A007	80.25

Table 12: Comparison of Alternatives

Name	Abdul Malik	Abrian Syahputra	Ade Muklis	Agus Setiawan	Anggi Pratama	Chandara Gunawan	Jumadi
Abdul Malik	1	0.2	1.0	0.2	3.0	2.0	2.0
Abrian Syahputra	5.0	1	3.0	3.0	3.0	3.0	3.0
Ade Muklis	1.0	0.3	1	0.2	3.0	2.0	2.0
Agus Setiawan	5.0	0.3	5.0	1	3.0	2.0	2.0
Anggi Pratama	0.3	0.3	0.3	0.3	1	0.3	0.3
Chandara Gunawan	0.5	0.3	0.5	0.5	3.0	1	2.0
Jumadi	0.5	0.3	0.5	0.5	3.0	0.5	1
Amount	**13.3**	**2.7**	**11.3**	**5.7**	**19**	**10.8**	**12.3**

Information:
- Value 1 is the fix value
- 1.0 is equally important
- A score of 2.0 means closer to slightly more important than
- A value of 0.2 has a meaning close to not more important than
- A score of 3.0 means slightly more important than
- A value of 0.3 means slightly not more important than
- A score of 5.0 means more important than
- A value of 0.5 means no more important than

Table 13: Comparison Between Alternative

Name	Abdul Malik	Abrian Syahputra	Ade Muklis	Agus Setiawan	Anggi Pratama	Chandara Gunawan	Jumadi
Abdul Malik	0.075	0.070	0.088	0.035	0.153	0.185	0.163
Abrian Syahputra	0.375	0.349	0.265	0.523	0.153	0.278	0.244
Ade Muklis	0.075	0.116	0.088	0.035	0.153	0.185	0.163
Agus Setiawan	0.375	0.116	0.441	0.174	0.153	0.185	0.163
Anggi Pratama	0.025	0.116	0.029	0.058	0.051	0.028	0.024
Chandara Gunawan	0.038	0.116	0.044	0.087	0.169	0.093	0.163
Jumadi	0.038	0.116	0.044	0.087	0.169	0.046	0.081

Information:
The value in the alternative comparison table is obtained by dividing the alternative weight value and the number of alternative weights, for example: 1 / 13.3 = 0.075.

Table 14: Comparison Value of Alternatives and Criteria

ID Alternatif	Criteria			
	12 Minute Run	Pull-Up	Push-Up	Sit-Up
	0.594	0.219	0.094	0.094
A001	0.110	0.110	0.110	0.110
A002	0.312	0.312	0.312	0.312
A003	0.116	0.116	0.116	0.116
A004	0.230	0.230	0.230	0.230
A005	0.047	0.047	0.047	0.047
A006	0.101	0.101	0.101	0.101
A007	0.083	0.083	0.083	0.083

Information:
The priority value between alternatives is obtained by adding the alternative weight values then dividing the number of alternatives, for example:
0.075 + 0.070 + 0.088 + 0.035 + 0.160 + 0.185 + 0.075 = 0,688 / 7

Table.15 : Final Results

Alternatif	Criteria				
	12Minute Run	Pull-up	Push-Up	Sit-up	The Final Results
Abdul Malik	0.065	0.024	0.010	0.010	0.110
Abrian Syahputra	0.185	0.068	0.029	0.029	0.312
Ade Muklis	0.069	0.025	0.011	0.011	0.116
Agus Setiawan	0.136	0.050	0.022	0.021	0.230
Anggi Pratama	0.028	0.010	0.004	0.004	0.047
Chandara Gunawan	0.060	0.022	0.010	0.009	0.101
Jumadi	0.049	0.018	0.008	0.009	0.084

Table 16: Ranking

ID Alternatif	Alternatif	Mark	Rangking
A001	Abrian Syahputra	0.312	1
A002	Agus Setiawan	0.230	2
A003	Ade Muklis	0.116	3
A004	Abdul Malik	0.110	4
A005	Chandara Gunawan	0.101	5
A006	Jumadi	0,084	6
A007	Anggi Pratama	0,047	7

4. Conclusion

From the results of the analysis that has been carried out by researchers, the conclusions can be drawn in this study are as follows:
1. With this decision support system for recruiting security officers, the recruitment process becomes more efficient in applying weights between criteria
2. with this system the selection of security officers is more structured and the selected candidate is the best

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