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Decision Support System to Determine List of Drug Crimes in the Legal Territory of North Sumatra by Using the AHP (Analytical Hierarchy Process) Method

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ABSTRACT

Decision making is a key part of activities and information executives are not enough, data that is inaccurate and unable to analyze problems is a problem that occurs indecision making. Law is the most important system in implementing a series of institutional forces. To take a final decision whether a defendant is guilty or not for drug crime requires quite a long time so that in making a decision, a judge really needs as much information as possible. The Analytical Hierarchy Process (AHP) method has advantages in terms of decision making and accommodation processes for both qualitative and quantitative attributes for the decision making process of Analytical Hierarchy Process (AHP) which is also able to produce results that are more consistent, easily understood and used.

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1. INTRODUCTION

Decision making is a key part of executing activities [1]. Managers, employees, students and every human being in his life. A common problem in decision making is insufficient information. Too many are inaccurate, unable to analyze problems and many others [2]. The process of investigating a crime is a process to dig up facts about what has happened in order to determine whether an action is a crime or not [3] [4]. In the investigation process, investigators use various information to obtain clarity of a case [5]. The investigation is carried out according to the method regulated in the law in order to find and collect evidence which with that evidence makes clear about the criminal act that occurred and in order to find the suspect. Broadly speaking, the investigation procedure consists of planning an investigation, organizing, and carrying out an investigation [6].

Investigation processes that require accurate and real-time decision making can be assisted by a Decision Support System. DSS is usually developed with a multi-criteria analysis method. The Analytical Hierarchy Process (AHP) is a multi-criteria analysis method that can be used in the DSS development process. This method is widely used in the case of multi-criteria selection because it has

advantages such as flexibility, the ability to check uncertainty, clarifying the importance of each element/criteria, and minimizing biases/judgments that are biased [7] [8] [9].

In the legal world, especially in the judiciary that occurs in the Courts in Indonesia, the law is the most important system in the implementation of a series of institutional powers. In making a decision, it takes a presiding judge in the trial which serves as the main key in making decisions in a case. Where the judge's decision must always be based on a letter of delegating the case which contains all charges for the guilt of the defendant. This research was conducted in a criminal place in the city of Medan, especially in the city of Lubuk Pakam, to take a final decision whether or not a defendant is guilty of a drug crime. In particular criminal cases, that to complete one such case requires quite a long time, it can take weeks or even months and it may take up to a year before only one case can be resolved in court. So that in making decisions, a judge really needs as much information as possible. . In this decision-making process the author uses the Analytical Hierarchy Process (AHP) method. This is because this method has advantages in terms of the decision-making process and accommodation for both qualitative and quantitative attributes. In addition, the Analytical Hierarchy Process (AHP) decision-making system is able to produce results that are more consistent, easy to understand and easy to use [10] [11] .

Analytical Hierarchy Process is one method to assist decision makers in making decisions in accordance with predetermined criteria or conditions, and the decision making criteria are various criteria [12] [13] [14]. The Analytical Hierarchy Process (AHP) method is multi-criteria because it uses many criteria in the preparation of a priority decision support system. In addition to its multi-criteria nature, the AHP method is also based on a logical and structured process, because the prioritization is carried out using a logical and structured procedure. These activities are carried out by representative experts who set the priorities [15] [16] [17].

The Analytical Hierarchy Process method is one of the decision-making methods that can help human thinking. This method was developed by Thomas L. Saaty in the early 1970s. The thought process of this method is to form a numerical score to develop alternative ways of making each decision where the decision is matched with the decision maker's criteria [18].

2. RESEARCH METHODS

Several research methods were carried out by the author in order to collect the data needed for research needs. Among them is by way of observations made by the author directly at the research site. For more details below, the authors explain the research methods that the authors use, namely: correlational; evaluation; survey; case study; basic theory.

2.1 Problem Solving Analysis with AHP Method

The sequence of problem solving steps in this study are:

1). Determine the types of criteria for the list of drug crimes. Where the criteria used are as follows:
   1). User (K1)
   2). Dealer (K2)

2). Determining the Scale for Criminal List Data
   The following are the scoring rules that will be given to calculate the value of each candidate:
   1). User
   2). Dealer

2.2 AHP Procedure

In general, the steps that must be taken in using AHP for solving a problem are as follows:

a. Defining the problem and determining the desired solution, then compiling a hierarchy of the problems encountered.
b. Determining the priority of elements
   1). The first step in determining the priority of elements is to make a pair comparison, which is to compare elements in pairs according to the given criteria.

2). The pairwise comparison matrix is filled in using numbers to represent the relative importance of an element to other elements.

c. Synthesis

The considerations for pairwise comparisons are synthesized to obtain overall priorities. The things that are done in this step are:

1). Sum the values of each column in the matrix
2). Divide each value from the column by the corresponding column total to obtain a normalized matrix.
3). Add up the values of each row and divide by the number of elements to get the average value.

d. Measuring Consistency

In decision making, it is important to know how good the consistency is because we don't want judgmental decisions with low consistency. The things that are done in this step are as follows:

1). Multiply each value in the first column by the relative priority of the first element, the value in the second column by the relative priority of the second element and so on.
2). Sum each row.
3). The result of the row sum is divided by the corresponding relative priority element.
4). Add the quotient above by the number of elements present, the result is called max.

e. Calculate the Consistency Index (CI) with the formula:

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

Where:

n = number of elements.

Calculate the Consistency Ratio (CR) with the formula:

$$CR = CI/RC \quad \ldots\ldots (2)$$

Where:

CR = Consistency Ratio
CI = Consistency Index
IR = Random Consistency Index

Check hierarchy consistency. If the value is more than 10%, then the data judgment assessment must be corrected.

3. RESULTS AND DISCUSSION

3.1 System Implementation

a. Main Menu Form

The main menu form is the interface that is used as the main form. This main form will always be displayed when the program is run. For more details can be seen in Figure 1:

Figure 1. Main course

The main menu consists of three menu sections, namely:

1). Data Input Menu, the data input menu consists of three sub menus, namely:
   a) Sub menu input data of prospective participants
      Displays the form of input data for prospective participants where the data will be inputted and stored in the program database.
   b) Sub menu input data value of prospective participants.
      Displays the value data input form for prospective participants where the value data will be inputted and stored in the program database.
   c) Rating sub menu
   d) Displays an assessment form where data on the value of prospective participants will be inputted and stored in the program database.

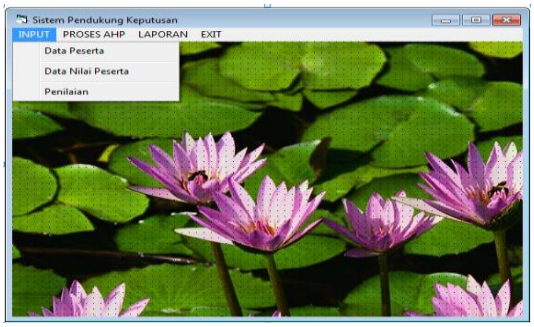


Figure 2. Data input menu

2). Menu Process Analytical Hierarchy Process (AHP), the AHP process menu consists of two sub menus, namely:
   a) The sub menu determines the priority of the criteria
   b) Displays forms to find the priority value of the criteria using the AHP process.
   c) The sub menu determines the sub-priority of the sub-criteria
      Displays forms to find sub-priority sub-criteria values using the AHP process.

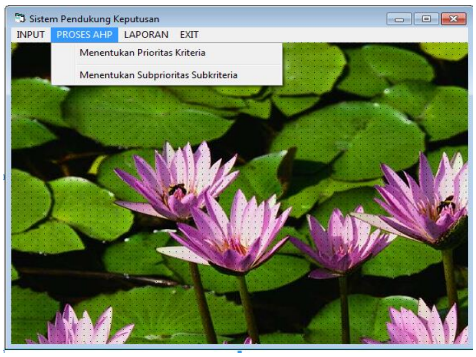


Figure 3. AHP Process Sub Menu

3). Report menu, the report menu consists of three report sub menus, namely:
   a) Sub menu of prospective participant data report
      Displays data reports of all prospective quiz participants at SMA Negeri 1 Simpang Kiri.
   b) Sub menu of decision reports for all prospective Participants
      Displays a report on the decisions of all prospective quiz participants at the SMA Negeri 1 Simpang Kiri level.
   c) Sub menu of participant's decision report who passed the selection
   d) Displays reports on the decisions of participants who passed the selection at SMA Negeri 1 Simpang Kiri.

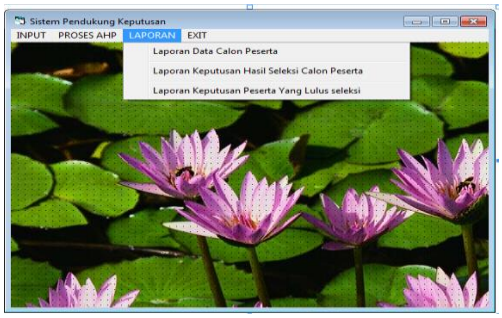


Figure 4. Report Sub Menu

4). Exit Menu

This menu is useful for exiting the program as a whole.

b. Participant Candidate Data Input Form

The data input of prospective participants is used to save data of prospective participants to the database. The data in the database can be displayed again on the form as shown in Figure 5 below:

Figure 5. Input Prospective Participant Data

c. Scoring form

The assessment input is used to display the value of the prospective participant then converted to a numerical value that is guided by the AHP process and saved to the database. The data in the database can be displayed again on the form as shown in Figure 6 as follows:

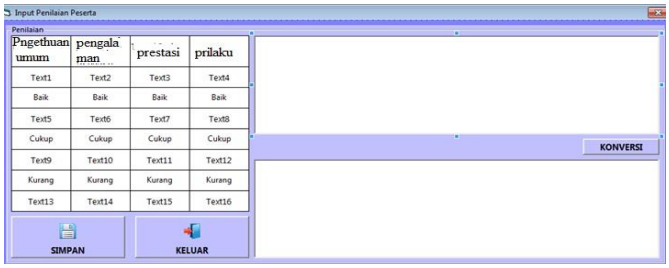


Figure 6. Enter Participant Value

d. AHP (Analytical Hierarchy Process) Process Form

The AHP process form is used to input and save value data to a database that has previously been carried out by the AHP process. The data in the database can be displayed again on the existing form.

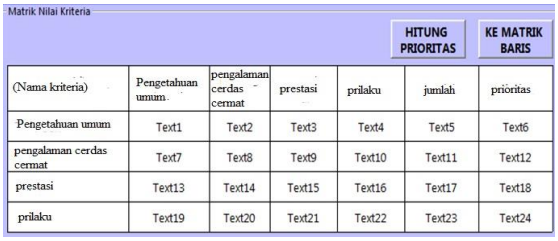
1). Determining the priority of the criteria, determining the priority of the criteria consists of four steps, namely:

a) Determine the value of the pairwise comparison matrix

Comparative assessment between one criterion and another is carried out at this stage. The results of the assessment can be seen in Figure 7 below:

Figure 7. Determining Paired Matrix Values

b) To determine the criterion value matrix, the criterion value matrix is obtained from the row-column values in the pairwise comparison matrix divided by the number of each column in the pairwise comparison matrix. The results of the assessment can be seen in Figure 8 as follows:



(Nama kriteria)	Pengetahuan umum	pengalaman cerdas cermat	prestasi	prilaku	jumlah	prioritas
Pengetahuan umum	Text1	Text2	Text3	Text4	Text5	Text6
pengalaman cerdas cermat	Text7	Text8	Text9	Text10	Text11	Text12
prestasi	Text13	Text14	Text15	Text16	Text17	Text18
prilaku	Text19	Text20	Text21	Text22	Text23	Text24

Figure 8. Determining the Criteria Value Matrix

c) Determine the sum matrix of each row
This step is done by multiplying the priority value in the criterion value matrix with the criteria value in the pairwise comparison matrix.

2). Determining the sub-priority of the sub-criteria, determining the sub-priority of the sub-criteria consists of four steps for each criterion, namely:

a. Determining the value of the pairwise comparison matrix is carried out for each criterion, namely the value of the row-row rule, the value of general knowledge, the value of Height, and Weight. The value of the pairwise comparison matrix on the line-up rule values can be seen in Figure 9 below:

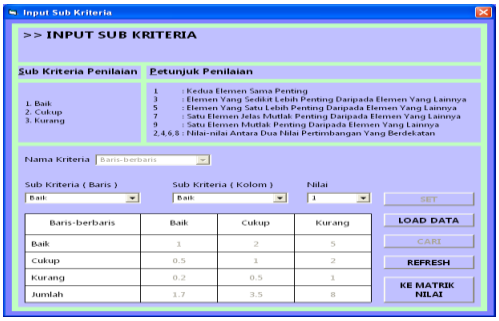


Figure 9. Determining the Value of Pairwise Comparison Matrix

e. Report

The report form is used to print reports by first entering data on the data input form, then the data is displayed from the report form.

1). Decision Report of Participants Who Passed the Selection, is used to print the decision report of participants who passed the selection, by first inputting the value of the prospective participant on the menu form for the data input of the value of the candidate participant. The data is displayed from the participant's decision report form who passed the selection based on the highest score obtained by the participant. The report on the decision scores of participants who passed the selection can be seen in Figure 10 below:

Figure 10. Decision Report Form of Participants who Passed the Selection

4. CONCLUSION

From the analysis and discussion that has been carried out, it can be concluded that; the method of selecting criminal candidates is determined from the value of users and dealers. In the selection of narcotics criminal candidates, the Analytic Hierarchy Process (AHP) method can assist in making decisions on several alternatives that must be taken with the criteria being considered. With the construction of a decision-making application system for selecting criminal candidates, it can make it easier for the police to select a list of narcotics crimes.

The decision support system for determining the level of salary increase is designed using the Unified Modeling Language (UML) with Microsoft Visual Basic 2008 (VB.Net) programming language and Microsoft Access 2007 database.

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