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JURNAL INFOKUM, Volume 10, No.1, December 2021 ISSN : 2302-9706

Decision Support System Determining the Best Private Universities Using the Analytical Hierarchy Process Method (Case Study: LLDIKTI Area I North Sumatra)

Dewi Wahyuni[1], M. Rhifky Wayahdi[2]
Battuta University
dhewiqchan@gmail.com, muhammadrhifkywayahdi@gmail.com

Article Info
Received : 28 Novemver 2021
Revised : 08 December 2021
Accepted : 17 December 2021

Abstract

Private Universities (PTS) are an option to continue post-graduate education, especially in the city of Medan. Quality private universities are very influential in carrying out education. In order to be easy to compete in the wrong world of work such as accepting new workers and especially in increasing career paths, PTS accreditation is very influential in the world of work as one of the requirements for evaluating job application administration files because a good PTS must have good accreditation. Determining PTS in this Medan city is not easy, because there are many PTS in this Medan city. There are too many private universities in existence, making it difficult to choose PTS manually, and the results of the selection are sometimes inaccurate and become a problem in selecting the best PTS. Decision Support System (DSS) is a system that can assist a person in making accurate and targeted decisions. The method used in this Decision Support System uses the Analytical Hierarchy Process (AHP). This method was chosen as one of the best alternatives because it is able to find and select which are the best private universities based on the specified criteria.

Keywords: private colleges, decision support systems, AHP

1. Introduction (time new Roman, bold, 11)

The world of education has experienced continuous evolution. One of the triggering factors is the increasingly fierce competition between universities[1]in producing the best graduates. Higher education is one of the institutions that contribute to educational activities in Indonesia, of course, must be able to adapt in the face of several developing trends, including the Society 5.0 trend[2]. In addition, they compete to provide the best educational services to attract prospective students[3]. Universities must also take strategic steps in order to stay ahead in all fields[4] because quality is the most important factor to produce quality standards in making decisions[5].

A decision support system is generally defined as a system that is capable of producing solutions or handling problems[6]. Decision Support System (DSS) is a system that can assist a person in making decisions more effectively and efficiently[7]. DSS aims to provide information, guide, predict and direct information users to make better decisions[8]. The decision support system makes it easy to determine which PTS to choose[9]. To appreciate this, it is necessary to give an award. The reward system is one of the important elements and as a motivator for the best performance[10].

The AHP method is used as the best alternative in determining the PTS. The Analytical Hierarchy Process (AHP) method is a method that has a hierarchical structure and provides convenience in simplifying a problem from complex criteria with various alternative options available.[11]. The AHP method is also used to find the weight value based on the existing assessment criteria[12]. AHP itself can assist in determining priorities and allow mathematical calculations of several criteria by conducting pairwise comparison analysis of each of the predetermined criteria.[13][14]. This method turns complex problems into structured ones[15].

2. Method

The steps and process of Process Hierarchy Analysis (AHP):

1. Defining problems and setting goals. If AHP is used to select alternatives or set alternative priorities, at this stage the development of alternatives is carried out.
2. Arrange problems into a hierarchy so that complex problems can be viewed from a detailed and measurable side.
3. Prioritization for each problem element in the hierarchy. This process generates the weight or contribution of the element to the achievement of the goal so that the element with the highest weight has priority for handling. Priority is generated from a pairwise comparison matrix between all elements at the same hierarchical level.
4. Perform consistency testing on comparisons between elements obtained at each level of the hierarchy.

3. Results and Discussion

Hierarchical arrangement by setting goals that the overall system targets at a limited level.

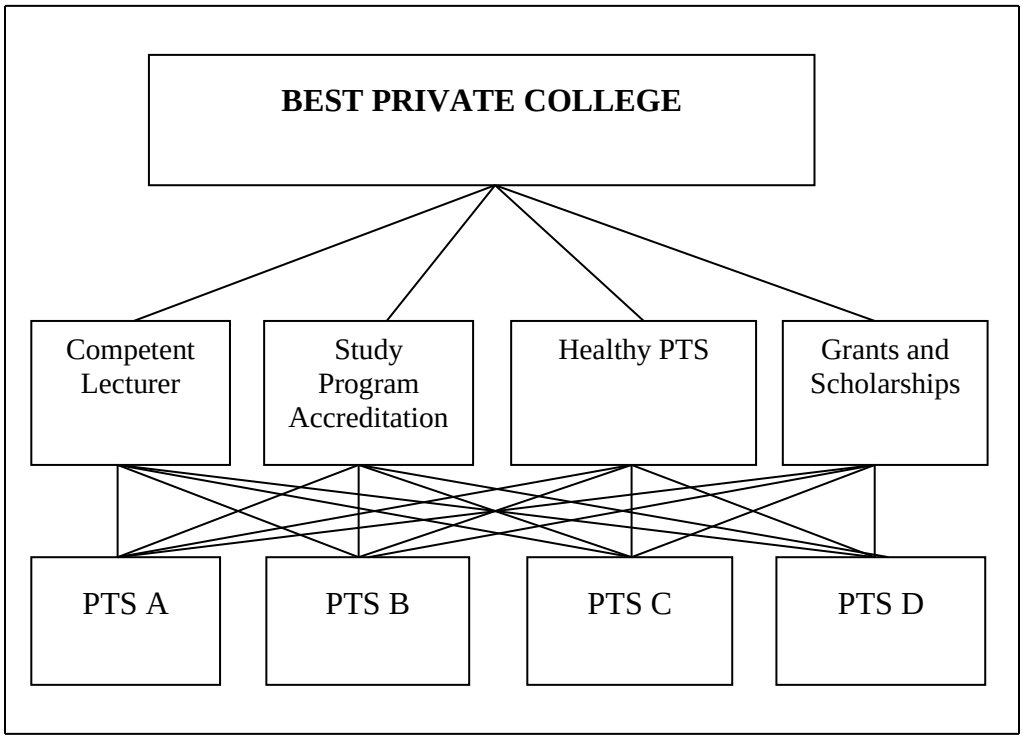

Figure 1. AHP Hierarchical Structure

The following data are needed to support this research in determining the best private universities in the Kopertis Area I.

Table 1. PTS data

No. Reg	PTS name	Address	Year	PTS type	phone
001	PTS A	Jl. Krakatoa Medan	12 -04-1976	University	0617772111
002	PTS B	Jl. BC. King of Medan	07-06-1961	University	0617800006
003	PTS C	Jl. Field Fishing	31-11-1957	University	0617833330
004	PTS D	Jl. BC. King of Medan	04-01-1965	University	0617666990

PTS Determination Procedures include:

Table 2. PTS Penilaian Assessment Data

PTS name	Competent Lecturer	Study Program Accreditation	Healthy PTS	Grants and Scholarships
PTS A	25 lecturers	A	Healthy	There is
PTS B	15 lecturers	B	Healthy	There is
PTS C	18 lecturers	B	Not healthy	There is
PTS D	15 lecturers	C	Not healthy	There is

To build a Decision Support System in Determining the Best Private Universities with the AHP (Analytical Hierarchy Process) method, there is a flowchart of the AHP system.

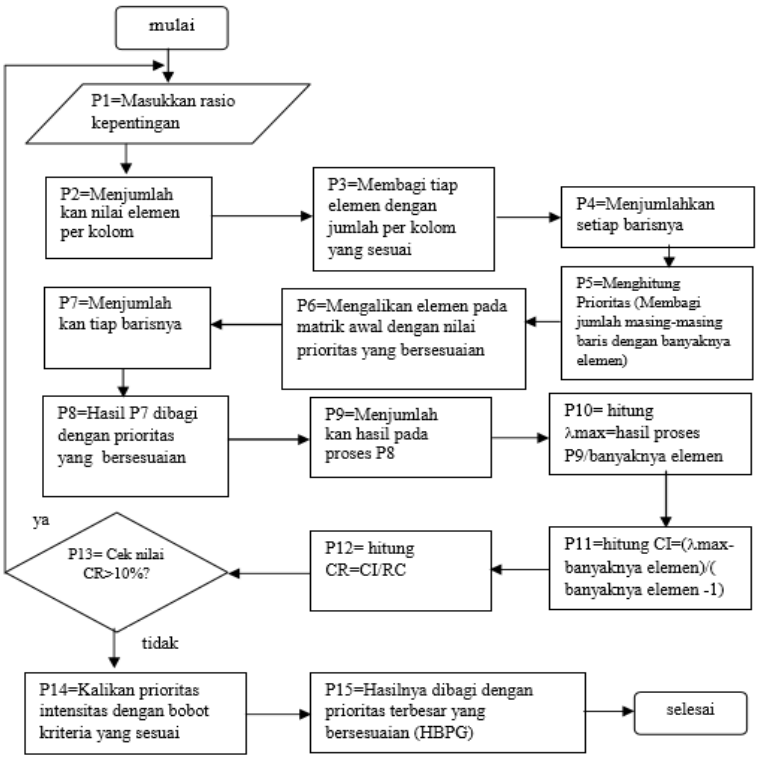

Figure 2. AHP Flowchart

The functionality of the designed application system will be described in the form of a use case diagram.

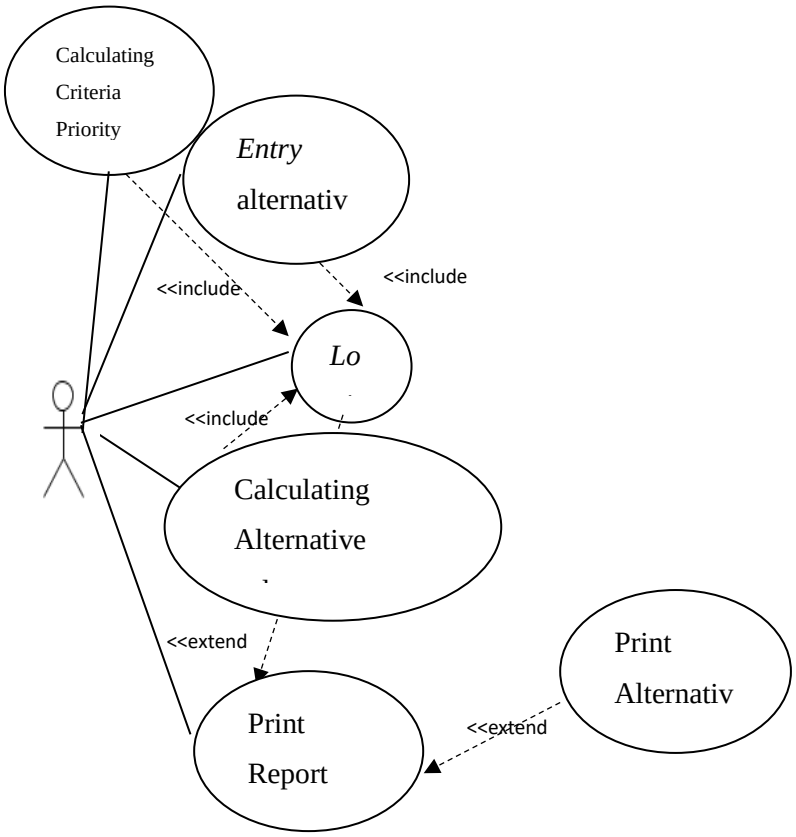

Figure 3. Use Case Diagram

This interface design is the main form that connects with other forms and is the interface to start the process.

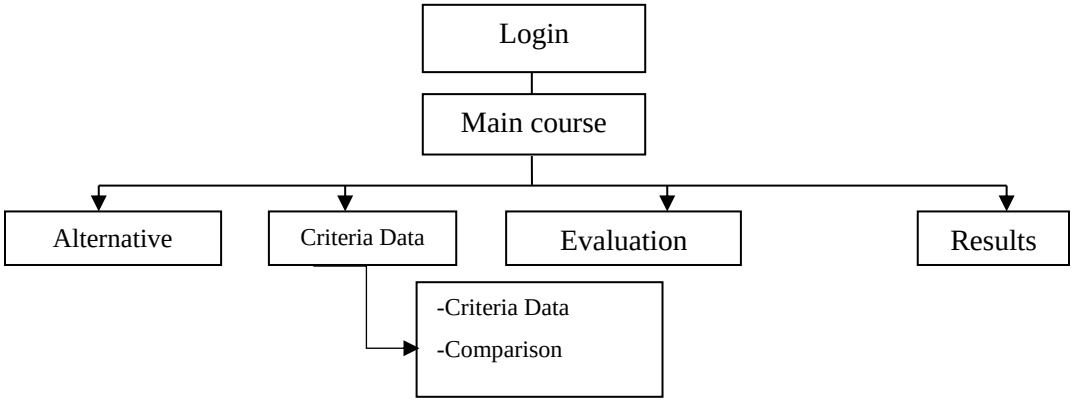

Figure 4. Main Menu Interface Design

Caption :

1. AHP assessment criteria

There are 4 stages that must be analyzed in the AHP section of this assessment criteria:

a. Input assessment criteria and set of pairwise comparison matrices
b. Calculate the value of the criteria matrix
c. Calculate the total value per line
d. Calculate Consistency Ratio

2. Calculate Priority Subcriteria
   In this section, because there are 4 criteria used to select the best technician, the priority calculation of the existing sub-criteria is carried out, namely: Competent Lecturer Sub-criteria, Study Program Accreditation sub-criteria, Healthy PTS sub-criteria and Grants and Scholarships sub-criteria. From these 4 criteria, the AHP assessment criteria will be calculated, namely:
   a. Calculating the priority of sub-criteria from criteria
   b. Create a criterion value matrix
   c. Determine the sum matrix of each row
   d. Consistency ratio calculation
3. Calculate the priority of PTS data results, namely: inputting PTS data and entering predicate values (good, sufficient and less) for all sub-criteria then calculating the matrix of results obtained from calculating the priority value of the criteria multiplied by the priority value of the sub-criteria, to get the results of the technician's assessment. Furthermore, from the results of the assessment, PTS will be obtained which have the opportunity to become the best PTS in the city of Medan.

File used as a place to store data that has been inputted, so that the data stored in the file will be collected into a single file that makes it easier to search and retrieve information. The following files will be used in making decisions to determine the best PTS.

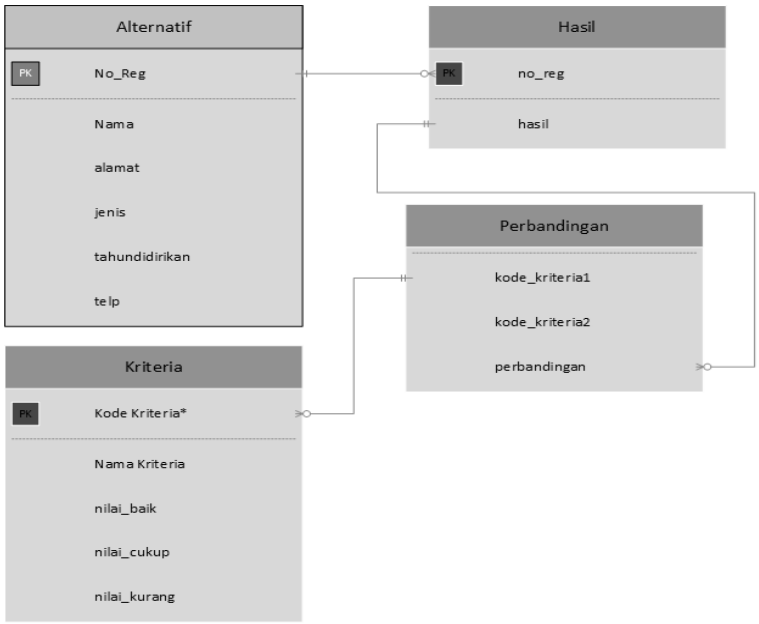

Figure 5. Table Relation

The Alternative Data Input menu is a display that is useful for inputting alternative data.

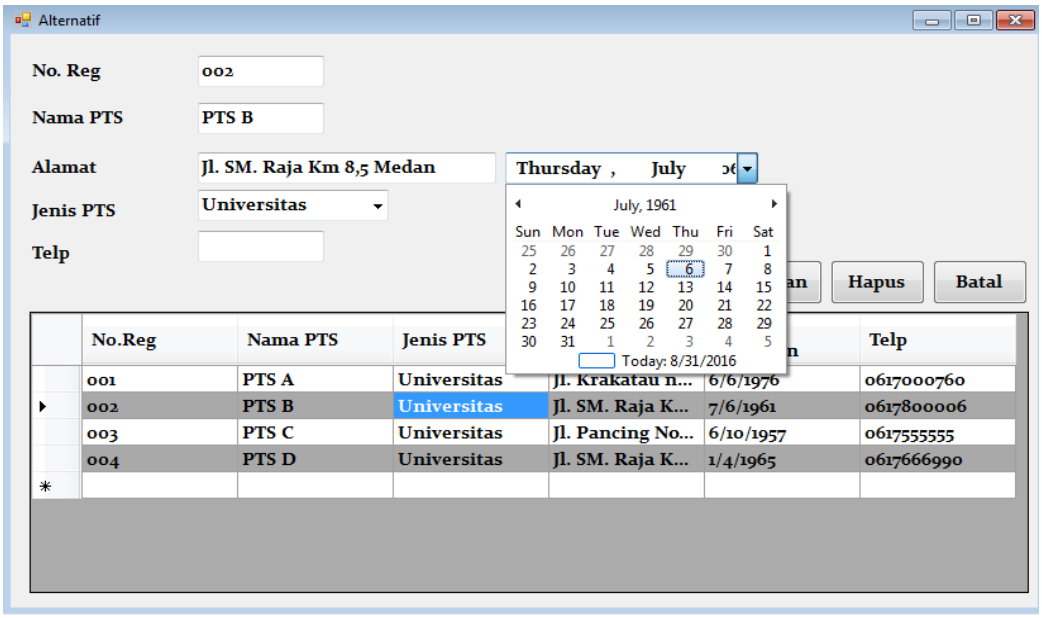

Figure 6. Alternative Data Input Menu

On the Alternative Data Input menu there is a menu:

1. Save, which serves to store the data that has been inputted.
2. Delete is to perform the process of deleting incorrect or unimportant data.
3. Cancel is to cancel the process to be carried out.

The Criterion Value Data Input menu is useful for inputting PTS Criteria value data.

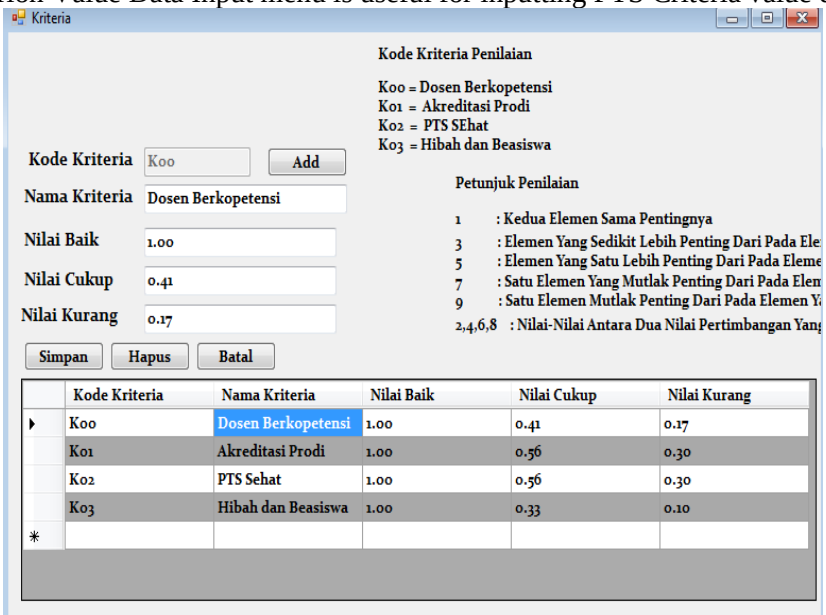

Figure 7. Data Input Menu PTS Criteria Values

On the PTS Criteria Value Data Input Menu there is a menu:

1. Save, which serves to store the data that has been inputted.
2. Delete is to perform the process of deleting incorrect or unimportant data.
3. Cancel is to cancel the data that has been inputted.

The Comparison Value Input menu is useful for inputting criteria comparison values.

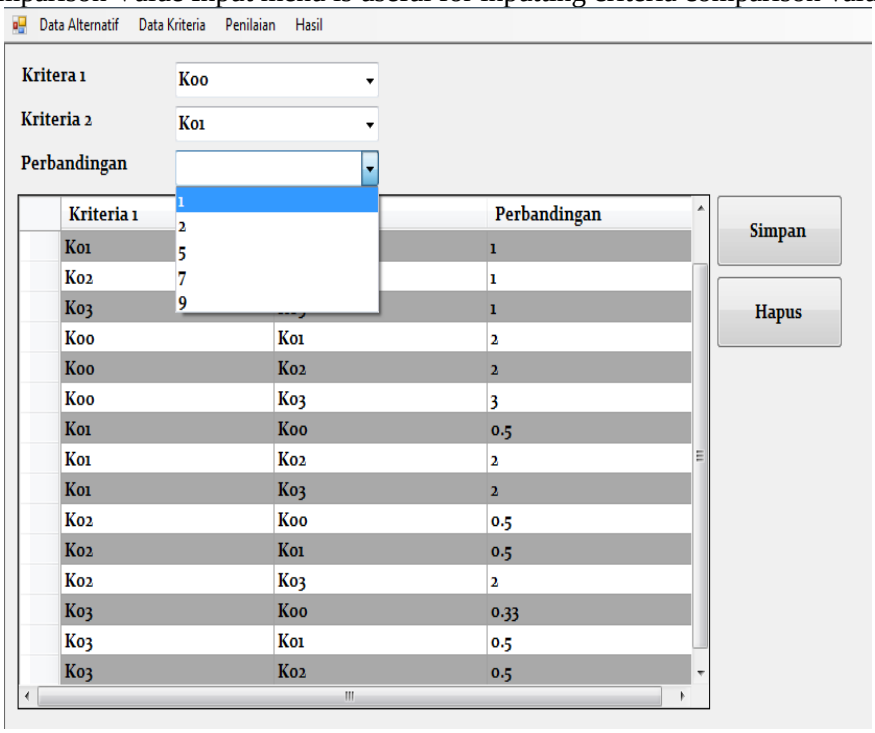

Figure 8. Input Menu Value Comparison Criteria

In this Criteria Comparison Value Input Menu there is a menu:

1. Save function to perform the input data storage.
2. Cancel function to cancel the process of storing the input data.

The report on the results of the decision from this decision support system is to display the final calculation results from processing the data obtained on the assessment form with the aim of getting PTS that can have quantity and quality values in working conditions.

LAPORAN ALTERNATIF PEMILIHAN PTS

No. Reg	Nama PTS	Jenis PTS	Alamat	Tahun didirikan	Telp	Hasil
001	PTS A	Universitas	Jl. Krakatau no 09 Mec	06/06/1976	0617000760	1.00
002	PTS B	Universitas	Jl. SM. Raja Km 8,5 Mi	07/06/1961	0617800006	0.75
004	PTS D	Universitas	Jl. SM. Raja Km 9,1 Mi	01/04/1965	0617666990	0.44
003	PTS C	Universitas	Jl. Pancing No. 30 Mec	06/10/1957	0617555555	0.41

Figure 9. Decision Result Report

4. Conclusions

Based on the description of the results of research in the field, several conclusions can be drawn:

1. The criteria must be in accordance with the decision-making system that runs at Kopertis Area I North Sumatra.
2. The method used in this decision support system is basically a method that accumulates decisions on the basis of fulfilling certain criteria. The assessment criteria are made quantitative to facilitate the calculation.
3. The decision support system for determining the best PTS at the North Sumatra Kopertis Area I is expected to support the process of determining a higher quality, transparent, fast PTS and the availability of a database for the North Sumatra Kopertis Area I.

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