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Application of Analytical Hierarchy Process (AHP) Methods in Decision Making of Lecturer Performance Determination on the Utilization of Online Learning in Polytechnic Media Kreatif

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Abstract

In the development of technology, decision making is something that will be done by all humans in life. Making a decision is not an easy matter because every decision made and carried out by someone must consider a risk to be borne. Decision Support System (DSS) is a system which utilizes the use of computers in every decision-making process. The achievement of the learning objectives that have been set or have just been achieved depends on the ability of human resources (lecturers) in carrying out their duties. To be able to recognize the ability and potential of a lecturer for his work, a university must have an assessment system to support decisions in determining the performance of a lecturer. The purpose of this research is to obtain a method that has a high accuracy value with the analytical hierarchy process (AHP) method so that a high accuracy and fast method is obtained to determine the performance of lecturers in the use of online learning. The result of this research is obtained criteria to produce a solution in determining the performance of lecturers such as criteria, attendance, performance, opportunity, and integrity.

Keywords
DSS; online learning; AHP; assesment

I. Introduction

In the world of education, the impact of the industrial revolution is forcing educational institutions to apply technological advances (Dalimunte, 2014). With the presence of the industrial revolution, learning can be done not only in the classroom but can be carried out online. Halkinik also forces teachers to be creative in delivering their teaching materials (Utami, 2011).

The success of the learning objectives that have been set or that will be achieved previously depends on the skills of human resources (lecturers) in carrying out the tasks that have been given and targeted. To be able to recognize the ability and potential of a lecturer for his work, a university must have an assessment system to support decisions in determining lecturer performance so that if there is a lack of professionalism of a lecturer, then it is the obligation of the university to facilitate lecturers can take part in training to improve professionalism or what we usually know as lecturer performance (Khasanah et al., 2019).

Information technology innovation is a development for information processing, including preparing, obtaining, combining, storing, and controlling information to produce high quality information and obtain important dynamic information. Or on the other hand, it is often referred to as a Decision Support System (DSS). DSS (Decision Support System) is a system that utilizes computer support in the process of deciding. One of the goals of a Decision Support System is to provide managerial assistance to solve a problem. In Decision

Support Systems, various methods can be used, such as the Simple Additive Material (SAW), Artificial Neural Network (ANN), Technique for Order By Similarity (TOPSIS) and the Analytical Hierarchy Process (AHP) method (Haryanto et al., 2019). The progress of a nation can only be achieved through structuring good education. (Nurjanah, 2020). The school needs to be given trust to organize and take care of itself according to environmental conditions (Musdiani, 2019).

Based on the background of the problem above, so the author is interested in analyzing of case study lecturers in the animation study program with the title "Application of Analytical Hierarchy Process (AHP) in Decision Making in Determining Lecturer Performance on the Utilization of Online Learning in Creative Media Polytechnic".

This deficiency arises due to the lack of attention of educational personnel printing institutions that pay attention to these skills (Waluyandi, 2020). Pohan (2020) states that at school, from elementary to secondary school or even college, students undergo, practice, and experience the learning process of various knowledge and skills. Learning is essentially a cognitive process that has the support of psychomotor functions (Arsani, 2020).

II. Review of Literature

2.1 Decision Support System (DSS)

Definition of Decision Support System (DSS) according to Kusrini in Gunawan (2015) is an interactive information system which provides information, modeling, and manipulating information. And according to Alter in Gunawan (2015) the definition of a Decision Support System (DSS) is a system which is used to help make a decision in semi-structured and unstructured circumstances, where no one knows for sure how the decision was made. A decision support system (DSS) created to support answers to problems or to evaluate opportunities is called a decision support system application. Decision support system applications are used in a decision making. The computer-based decision support system application CBIS (Computer Based Information System) is more flexible, interactive, and adaptable which can be developed to support the solution of a specific unstructured management problem.

2.2 Analytical Hierarchy Process (AHP)

The Analytical Hierarchy Process (AHP) was developed in 1970 by Thomas L. Saaty. AHP is an MCDM method as a structured tehnique to assiste the community in determining the priority of several criteria by conducting pairwaise comparisons of each criterion (Setiawan et al., 2020). The main tool of AHP is a functional hierarchy , where each level is formed from spesific elements that are not related to each other.

2.3 Performance

Performance is an inspiration and capacity to complete a task or work (Ritongga, 2013). An individual must have a certain level of readiness and capacity. A person's abilities and abilities are not strong enough to achieve something without a reasonable understanding of what to do and how to do it. A real behavior shown by everyone in the implementation of work carried out representing their duties in the organization is also called performance. To achieve the goals of an organization employee performance is very important.

Performance evaluation is a method of estimating an individual's commitment to the organization. The important value of evaluating a performance is to determine the level of responsibility or personal commitment that is communicated when carrying out the tasks that are the responsibility of the individual.

Every company to be able to develop and progress always requires employees who have reliable performance. To realize reliable employee performance, it takes variables that influence so that employees are triggered to improve their performance. Among these variables can be felt that the satisfaction obtained while working and the culture of the organization has a good role in the growth and development of employee performance.

Organizations generally believe that to achieve excellence must strive for the highest individual performance, because basically individual performance affects the performance of a team or work group and ultimately affects overall organizational performance. Performance appraisal of employees is usually based on job descriptions that have been prepared by the company. Thus, the good and bad performance of employees is seen from their ability to carry out tasks in accordance with the work that has become their responsibility (Purba, 2020).

III. Research Methods

3.1 Research Stages

Globally, the main stages of this research method are divided into four stages, namely, the preparation stage, the data collection stage, the data processing stage, and the data testing stage. The following is the flow of the research stages:

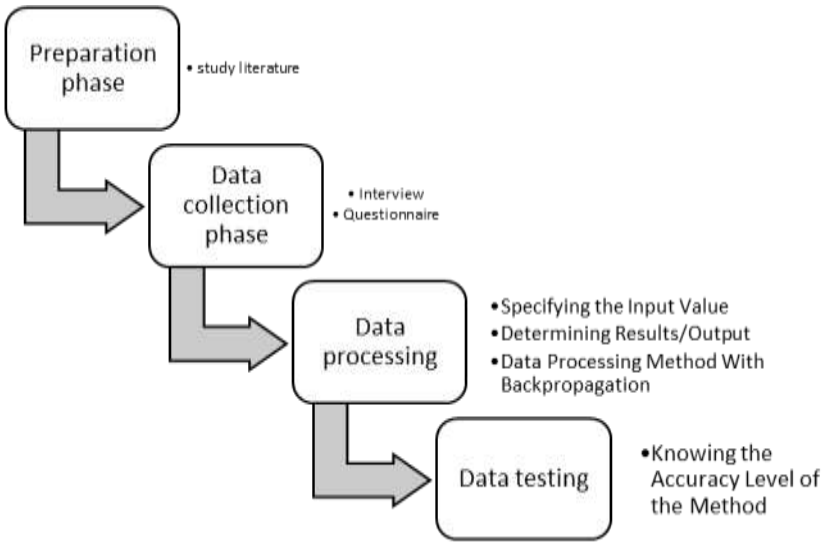

Figure 1. *Research Phase Flow*

From the picture of the flow of the research stages above, it can be described at each stage as follows:

a. Preparation Stage

This stage starts from the problem assessment, as well as conducting a literature study on similar research that has been done.

b. Data Collection Stage

In this research, data collection was carried out by interviewing the Head of the Animation Center and observing the online learning process in the Animation study program as well as filling out questionnaires.

c. Data Processing Stage

The data processing stage is divided into three stages, among others: determining the value of the input (input), determining the result or output (output), and data processing methods.

1. Determine the Input Value (input)

Before processing or processing data, at this stage it begins by preparing input values by determining criteria. In this study, there are four criteria that become indicators of lecturer performance assessment. The four criteria are absenteeism, performance, opportunity, and integrity.

2. Determine the Result/Output (Output)

After determining the input value, the next step is to determine the desired result or output from the lecturer's performance assessment. In this study determine three results of performance decisions achieved by lecturers, namely very satisfactory, quite satisfactory, and not yet satisfactory. The results will be a reference in providing solutions to the performance of lecturers. The following are the rules or conditions for the results of the decisions and the solutions obtained:

1. If the criteria for performance, opportunity, kabsensik and integrity are in the category of very good (A), will you get a preference for the subject.
2. If the value of the criteria for performance, 0 opportunity, absence and integrity is in the good category (B) then will p get a preference for the subject
3. If the value of the criteria for performance, popportunity, discipline and integrity is in the adequate category of (C) then will you get training for discussing material & communication, training in teaching techniques, training for taught subjects and training for motivation.
4. If the value of the criteria for performance, popularity, discipline and integrity is in the poor category (D), then you will get a review from the head of the study program.
5. If you assess the performance criteria are sufficient (C), then you will receive technical training and teaching & training in colleges that you can afford
6. If you assess the criteria for poor performance (D) then you will get a review from the head of the study program.
7. If the value of the opportunity criteria is sufficient (C) then you will receive training in teaching techniques.
8. If you assess the criteria for opportunity as poor (D) then you will get a review from the head of the study program
9. If you score enough absenteeism criteria (C), you will receive motivation and discipline training
10. If the assessment criteria for absenteeism are poor (D), they will receive a review from the head of the study program.
11. If the score of the integrity criteria is sufficient (C) the grave will receive technical training in discussing lectures and communication.
12. If you assess the integrity criteria as poor (D) then you will get a review from the head of the study program.
13. If the lecturer gets a (D) or bad score in one of the criteria, he will get a review from the head of the study program (review is only for bad grades).

3.2 Data Testing Phase

In this step, the data is tested, namely the data from the assessment results by the questionnaires represented by the four criteria above. Before testing the data (data testing),

data training (data training) is carried out which has already been determined directly by the input and output values. Then the data is trained by Analytical Hierarchy Process (AHP).

IV. Discussion

Data processing using the AHP method:

The stages that are passed are as follows:

1. The first step is compiling a pairwise comparison matrix of these criteria

Table 1. Pairwise Comparison Matrix

Sub kriteria	***Performance***	***Opportunity***	***Attendance***	**Integrity**
Performance	1	3	5	7
Opportunity	1/3	1	3	4
Attendance	1/5	1/3	1	2
Integrity	1/7	¼	1/2	1

2. The second step is to add up each column

Table 2. Column Matrix Sum

Sub kriteria	***Performance***	***Opportunity***	***Attendance***	**Integrity**
Performance	1	3	5	7
Opportunity	0,333	1	3	4
Attendance	0,2	0,333	1	2
Integrity	0,143	0,25	0,5	1
Sum	**1,676**	**4,583**	**9,5**	**14**

3. The third step divides the aij value of each column by the number of column values to get the normalized matrix value.

Table 3. Normalization Matrix

Sub kriteria	***Performance***	***Opportunity***	***Attendance***	**Integrity**
Performance	0,597	0,654	0,526	0,5
Opportunity	0,199	0,218	0,316	0,286
Attendance	0,119	0,073	0,105	0,143
Integrity	0,085	0,054	0,053	0,071

4. The fourth step is to calculate the priority weight value of the criteria. To calculate the priority weight, that is by adding up the normalized matrix for each row that has been obtained and then dividing it by the number of elements from each row. The number of elements per row = 4 is as follows:

Performance Criteria : (0,597 + 0,654 + 0,526 + 0,5) / 4 = 0,569

Opportunity Criteria : (0,199 + 0,218 + 0,316 + 0,286)/ 4 = 0,255

Attendance Criteria: (0,119 + 0,073 + 0,105 + 0,143) / 4 = 0,11

Integrity Criteria : (0,085 + 0,054 + 0,053 + 0,071) / 4 = 0,066

Table 5. Priority Weight Value

Sub kriteria	***Performance***	***Opportunity***	***Attendance***	**Integrity**	**Sum of Row**	**Eigen vector**
Performance	0,597	0,654	0,526	0,5	2,277	0,569
Opportunity	0,199	0,218	0,316	0,286	1,019	0,255

Attendance	0,119	0,073	0,105	0,143	0,44	0,11
Integrity	0,085	0,054	0,053	0,071	0,263	0,066

Based on the above calculations, the priority weights for each criterion are obtained, which are as follows:

Performance = 0,569

Opportunity = 0, 255

Attendance = 0,11

Integrity = 0,066

After obtaining the priority weight, it is necessary to calculate the consistency ratio. The consistency value should not be more than 0.1 (10%) if the assessment has been carried out with consistency.

5. The fifth step is to calculate the maximum eigenvalue (λmax) multiplying the eigen value of each element with the aij value in the pairwise comparison matrix and then adding up all the values for each row.

Table 5. Multiply *Eigen Value*

Sub	***Performance***	***Opportunity***	**Absensi**	**Integritas**
Performance	0,569 x 1	0,255 x 3	0,11 x 5	0,066 x 7
Opportunity	0,569 x 0,333	0,255 x 1	0,11 x 3	0,066 x 4
Absensi	0,569 x 0,2	0,255 x 0,333	0,11 x 1	0,066 x 2
Integritas	0,569 x 0,143	0,255 x 0,25	0,11 x 0,5	0,066 x 1

Table 6. Sum Multiply Eigen Value

Sub Kriteria	***Performance***	***Opportunity***	**Absensi**	**Integritas**	**Jumlah**
Performance	0,569	0,765	0,55	0,462	2,346
Opportunity	0,189	0,255	0,33	0,264	1,038
Absensi	0,114	0,085	0,11	0,132	0,441
Integritas	0,081	0,064	0,055	0,066	0,266

Divide the sum value of each row by the eigen value

$\lambda 1 = \frac{2,346}{0,569} = 4,123$

$\lambda 2 = \frac{1,038}{0,255} = 4,070$

$\lambda 3 = \frac{0,441}{0,11} = 4,009$

$\lambda 4 = \frac{0,266}{0,066} = 4,030$

The results of the division that have been obtained are then added and averaged so that max will be obtained.

$$\lambda max = \frac{\lambda 1 + \lambda 2 + \lambda 3 + \lambda 4}{n}$$

$$\lambda max = \frac{4{,}123 + 4{,}070 + 4{,}009 + 4{,}030}{4}$$

$$\lambda max = 4{,}058$$

1. The sixth step is to calculate the value of the consistency index (CI)

$$CI = \frac{\lambda \max - n}{n - 1}$$

$$CI = \frac{4{,}058 - 4}{4 - 1} = 0{,}019$$

2. The seventh step is to calculate the consistency ratio.

$$CR = \frac{CI}{RI} = \frac{0{,}019}{0{,}9} = 0{,}021$$

The order of the matrix for this matrix is 4 so the value of the Random Index (RI) used is 0.9. Because CR = 0.021 < 0.1 , then the assessment for problems with these criteria is consistent.

V. Conclusion

The results of the reseach are :

1. The criteria used in the decision support system to determine the performance of lecturers consist of 4 criteria and for each criterion has a weight and rating of very good, good, sufficient and bad.
2. For the determined weight, using the AHP (Analytical Hierarchy Process) method or comparison in pairs against the criteria used to determine the performance of lecturers in the use of online learning. If the weight and value of lecturers in the use of online learning is higher, it will get a good solution

References

Arsani, et.al. (2020). Differences in Motivational Orientation in Physical Education in terms of Gender Differences. Budapest International Research and Critics in Linguistics and Education (BirLE) Journal Vol 3 (3): 1428-1434.

D, Utami. 2011. Efektifitas Animasi Dalam Pembelajaran, Manajemen Ilmu Pembelajaran 7(1): 44-52 D, Utami.

Edward, Y.R., and Purba, K. (2020). The Effect Analysis of Emotional Intelligence and Work Environment on Employee Performance with Organizational Commitment as Intervening Variables in PT Berkat Bima Sentana. Budapest International Research and Critics Institute-Journal (BIRCI-Journal) Vol 3 (3): 1552-1563.

Fausett, Laurene. 1994. Fundamental of Neural Network, Prentice Hall Inc.

Gunawan, S. 2015. Sistem Pendukung Keputusan Pemilihan Guru Terbaik Pada SMA Negeri Kutacane Dengan Menggunakan Metode SAW. Pelita Informatika Budi Darma: 143-148.

Haryanto, Deri, et al. 2019. Perancangan Sistem Pendukung Keputusan Penentuan Penerimaan Beasiswa Menggunakan Metode Artificial Neural Network (ANN) di Institut Teknologi Telkom Purwokerto. Conference on Electrical Engineering, Telematics, Industrial Technology, and Creative Media 2019: 104-114.

Jong Jek Siang. 2004. Jaringan Syaraf Tiruan & Pemrogramannya Menggunakan MATLAB. Yogyakarta: ANDI.

Khasanah et al. 2019. Penerapan AHP Dalam Penggambilan Keputusan Penentuan Kinerja Dosen Dalam Pemanfaatan Pembelajaran Daring Di STMIK XYZ. Seminar Nasional Teknologi Komputer &Sains. Januari 2019: 845 – 850.

Kusumadewi, Sri. 2004. Membangun Jaringan Syaraf Tiruan Menggunakan MATLAB & EXCEL LINK. Yogyakarta: Graha Ilmu.

Musdiani, Mardhatillah, and Khausar. (2019). Analysis the Role of Headmaster in Applying Quality of Education in Primary School Districts, Aceh Barat. Budapest International Research and Critics in Linguistics and Education (BirLE) Journal Vol 2 (3): 27-35.

N, Dalimunthe dan H. Wibisono. 2014. Analisis Penerimaan Sistem E-Learning SMK Labor Pekanbaru Dengan Menggunakan Technology Acceptance Model (TAM), J. Sains Dam Teknologi Indonesia 11(1): 111-117.

Nurjanah, S. (2020). The Development of the Assurance Relevance Interest Assessment Satisfaction (Arias) Collaborative Jigsaw Collaborative Learning Model in Writing News Text Class 8 Junior High School State 06 Medan. Budapest International Research in Linguistics and Education Sciences (BirLE).P.583-590.

Purba, K., and Sudibjo, K. (2020). The Effects Analysis of Transformational Leadership, Work Motivation and Compensation on Employee Performance in PT. Sago Nauli. Budapest International Research and Critics Institute-Journal (BIRCI-Journal) Vol 3 (3): 1606-1617.

Ritonga, S. K. 2013. Sistem Informasi Penilaian Kinerja Karyawan Menggunakan Metode Technique for Others Reference bu Similarity (TOPSIS). Pelita Informatika Budi Darma: 141-147.

Saragih, S.H. 2013. Penerapan Metode Analitycal Hierarchy Process (AHP) Pada Sistem Pendukung Keputusan: 82-88.

Setiawan, Arifin, Wiedo Ananto, dan Totok Soehartanto. 2020. Implementasi Metode Analytic Hierarchy Process dalam Pemilihan Radar Udara 3D: 49-54.

Pohan, A.M., Asmin, and Menanti, A. (2020). The Effect of Problem Based Learning and Learning Motivation of Mathematical Problem Solving Skills of Class 5 Students at SDN 0407 Mondang. Budapest International Research and Critics in Linguistics and Education (BirLE) Journal Vol 3 (1): 531-539.

Waluyandi, F., Trihastuti, R., and Muchtarom, M. (2020). Implementation of Parental Involvement in Learning Civic Education. Budapest International Research and Critics in Linguistics and Education (BirLE) Journal Vol 3 (4): 1686-1695.