
Decision Model Support in Determining Outstanding Lecturer using Analytical Method Network Process

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ABSTRACT

Higher education is a subsystem that includes a program of national education diploma, bachelor, masters, specialist and doctoral degrees held by college. universities are obliged to provide education, research and community service. One element in the administration of higher education are the lecturer. Lecturers are academic personnel responsible for planning and executing the learning process, assess learning outcomes, conduct coaching and training, and conduct research and community service. Based on the Law of the Republic of Indonesia Number 14 Year 2005 on Teachers and Lecturers, Article 51 Paragraph (1) Item b, the professor is entitled to promotions and awards in accordance with academic performance. This study used the ANP method (Analytical Network Process). By using Superdecision software. The criteria used in this study is the teaching, research and community service. The results of this research is the relationship between teaching, research and community service related to the outstanding faculty in the election where the percentages in selecting outstanding faculty teaching performance at the first level = 22%, Personality = 18%, Teaching = 21%, 21% Research = , Devotion community = 16%.

Keywords: ANP (Analytical Network Process), Outstanding lecturers, Super Decision

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1. Main text

Computer based Decision Support System (Computer Based Decision Support System) is the most appropriate choice to produce a decision making system that is truly better than just using intuition and normative rules. Higher Education Institutions in Indonesia are national education subsystems that include diploma, bachelor, master, specialist and doctoral programs organized by tertiary institutions. Higher education institutions are obliged to organize education, research and community service. One element in the administration of higher education is lecturers. Lecturers are academic staff who are tasked with planning and implementing the learning process, assessing learning outcomes, conducting mentoring and training, and conducting research and community service. Based on the Law of the Republic of Indonesia No. 14 of 2005 concerning Teachers and Lecturers, Article 51 Paragraph (1) Item b, states that lecturers are entitled to get promotions and awards in accordance with their academic performance.

Referring to the above thought, it is appropriate to give awards to lecturers who have achievements that are proud of by their tertiary institutions in the field of higher education. The awarding will encourage lecturers to perform more productively. Thus the increasingly productive achievements are expected to encourage the achievement of the goal of developing the higher education system in particular, and national development From the description above in choosing lecturers to excel in

an educational institution it is very difficult, because there are many lecturers who have the requirements in determining outstanding lecturers, by using a decision-making system, it will facilitate an educational institution in determining who lecturers really perform based on factors existing factors. In determining the decision support system, there are many methods that can be used to meet the needs of decision making, but in this study the authors chose the analytic network process (ANP), as a model used for decision making. The selection of this method is based on the accuracy in choosing lecturers who are able to accommodate the dependence between criteria and feedback between criteria criteria. ANP is a method of analysis in multivariate analysis that was developed to help get any factors that can influence a lecturer to be a lecturer that his college is proud of. The Analytical Network Process has previously been used in determining the best employees and determining employees in job promotions.

2. Methods

The decision support system was first put forward in the early 1970s by Michael S. Scott Morton in the term Management Decision System. Decision support system is a set of systems that are able to solve problems efficiently and effectively [1]. Computer-based decision support system (Computer Based Decision Support System) is a computer-based system designed to improve the effectiveness of decision makers in solving problems that are semi-structured and structured [2]

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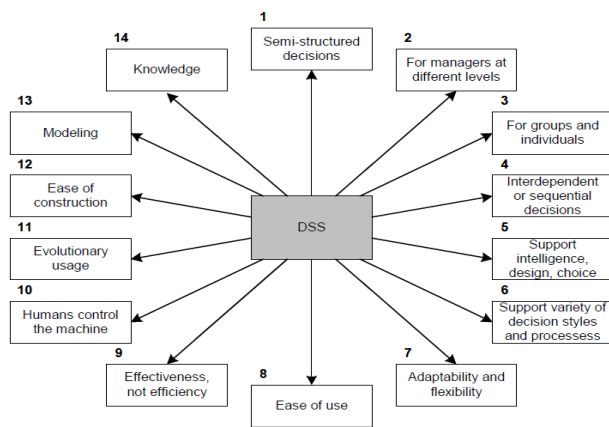


Figure 1. Characteristic and Ideal abilities from a DSS

The Analytic Network Process (ANP) is a generalization of the Analytic Hierarchy Process (AHP). The basic structure is the network of clusters and nodes that are contained in clusters [3]. Analytical Network Process (ANP) is the most comprehensive framework in analyzing decision making. The strength of the ANP method is that it can improve AHP weakness in the form of the ability to accommodate the interrelationships between criteria or alternatives [4]. Analytical Network Process (ANP) is a general theory used to derive composite priority ratios from individual ratio scales that reflect the relative measurement of the influence of interacting elements with regard to control criteria.

2.1. Flow using ANP

In general the steps that must be taken in using ANP are:

- Define the problem and determine the desired solution criteria.
- Determine the weighting of components from a managerial point of view.
- Make a pairwise comparison matrix that illustrates the contribution or influence of each element on each criterion. Comparisons are made based on the judgment of the decision maker by assessing the level of importance of an element.
- After gathering all pairwise comparison data and entering the inverse values and the value of one along the main diagonal, the priority of each criterion is sought and consistency tested.
- Determine the eigenvector of the matrix created in the third step.
- Repeat steps 3, 4, and 5 for all criteria.
- Create an unweighted super matrix by inserting all the eigen vectors calculated in step 5 into a super matrix.
- Creating a weighted super matrix by multiplying each content of unweighted supermatrix to the criteria comparison matrix (cluster matrix).
- Make a supermatrix limiting by raising the super matrix continuously until the numbers in each column in the same row are equal, then normalize the limiting supermatrix.
- Take the value of the alternative being compared then normalized to find out the final results of the calculation.

- Checking for consistency, the consistency ratio must be 10 percent or less. If the value is more than 10%, then the assessment of decision data must be improved

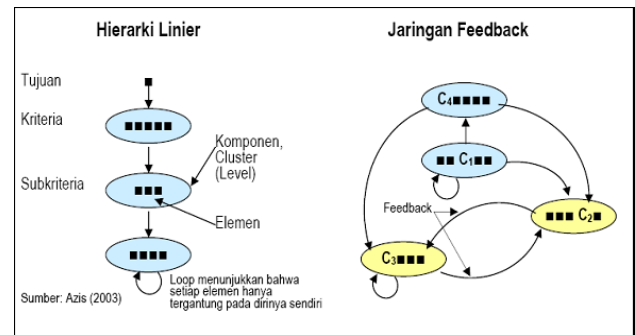


Figure 2. Comparison Linier Hierarki and FeedbackNetwork

This type of research belongs to the type of descriptive research that is a study that describes the actual situation in order to obtain facts that will be processed into data, and will continue to be made conclusions, which are built with the Analytical Network Process (ANP) approach. After that it is tested using one of the Super Decisions software version 2.0.8

Method The selection of respondents in ANP is based on a purposive sampling technique with the consideration that the respondent is an actor either an individual or an institution that is considered to understand the problems that occur and is part of the decision makers for this assessment. In this case the respondents chosen are the decision makers who are used to assessing lecturers and understand the existing criteria, in this campus the assessment team is the Assistant Chairperson (PUKET), Chair of the Department of Information Engineering (Head of IT Study Program) and Head of Divisi Human Resources (Kadiv SDM), Head of the Quality Control Central Division, Head of community service institutions, Head of research division

In the preparation of this study using questionnaires to obtain data information that will be used for calculations. By using the existing criteria in the company a questionnaire was made to determine priorities in determining lecturers who are entitled to achievement with ANP provisions. The provisions are the predetermined criteria consisting of the main criteria and factors in the criteria, alternatives are also added as a comparison sample. In this process included performance, personality, teaching, research, and devotion [5].

No	Kriteria	Faktor dalam Kriteria
1	Kinerja	Motivasi Kedisiplinan Prestasi Kemampuan Adaptasi
2	Kepribadian	Jujur Etika
3	Pengajaran	Mengajar Pembuatan Bahan Ajar Membimbing Membina
4	Penelitian	Karya Ilmiah

- Menyadur
- Karya Teknologi
- Penelitian Murni IT
- Terapan IT
- Pengembangan IT
- 5 Pengabdian
- Pelatihan
- Pelayanan
- Kaji Tindak

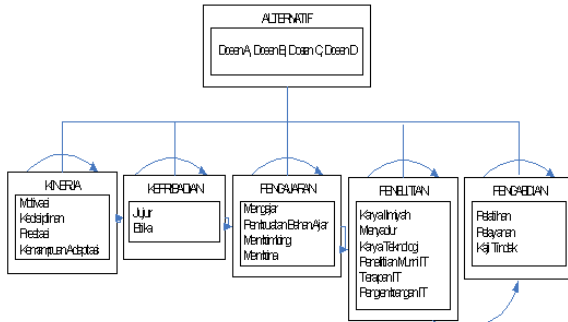


Figure 3. Model ANP on determine outstanding lecturer

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3. Result

Based on the results of the research the factors that influence the lecturer achievement in improving the quality of learning within the UNISMA Bekasi Campus. Respondents were given questionnaires as many as six: Assistant Chairperson (PUKET), Chair of the Department of Information Engineering (Head of IT Department), Head of Divisi Human Resources (Head of Human Resources Division), Head of the Central Quality Control Division, Head of the community service agency, Head of the research division, each questionnaire consisted of four lecturers, the questionnaire was distributed directly to the respondent by filling out the questionnaire. Based on the results of the comparison between alternatives in the existing criteria, a decision support model in determining the outstanding lecturers is shown in the figure below

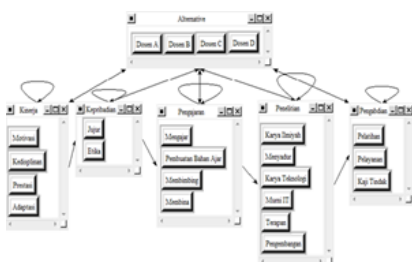


Figure 4. research results processed by superdision

Based on the research results processed by superdision software from all clusters, the following priorities are obtained:

Icon	Name	Normalized by Cluster	Limiting
No Icon	Dosen A	0.25934	0.120850
No Icon	Dosen B	0.24973	0.116374
No Icon	Dosen C	0.24279	0.113140
No Icon	Dosen D	0.24814	0.115630
No Icon	Etika	0.50000	0.043935
No Icon	Jujur	0.50000	0.043935
No Icon	Adaptasi	0.18828	0.022572
No Icon	Kedisiplinan	0.30988	0.037151
No Icon	Motivasi	0.23769	0.028496
No Icon	Prestasi	0.26415	0.031668
No Icon	Karya Ilmiah	0.19059	0.019990
No Icon	Karya Teknologi	0.19177	0.020114
No Icon	Menyadur	0.15592	0.016354
No Icon	Murni IT	0.18572	0.019479
No Icon	Pengembangan	0.13607	0.014272
No Icon	Terapan	0.13992	0.014676
No Icon	Kaji Tindak	0.26678	0.027804
No Icon	Pelatihan	0.43337	0.045166
No Icon	Pelayanan	0.29985	0.031251
No Icon	Membimbing	0.23180	0.027154
No Icon	Membina	0.21062	0.024673

Figure 5. Result priority outstanding lecturer

Based on the above priorities, for the performance criteria the most important priority is discipline that plays a role in determining outstanding lecturers, for personality criteria is honest, for teaching criteria is teaching, for research criteria it turns out that the most priority is the making of scientific works, while for community service criterion the most priority is training for the community around the campus because with the training for the campus community can prosper education around the campus environment. Comparison between each criteria is obtained as follows:

Inconsistency	Kinerja	Penelitian	Pengabdian	Pelayanan
Kepribadian	1.4493	1.0718	1.25	1.0493
Kinerja		1.06	1.26	1.0101
Penelitian			1.44	1.0718
Pengabdian				1.261

Figure 6. Comparison of Cluster

Based on the above priorities, it is found that the percentage of outstanding lecturer assessment is as follows

Performance = 22%
Personality = 18%
Teaching = 21%
Research = 21%
Community Service = 16%

While the results obtained from all alternatives entitled to get the title of outstanding lecturer are lecturer A,

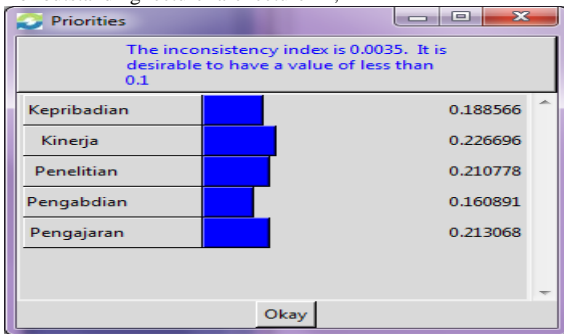


Figure 7. Priority Cluster

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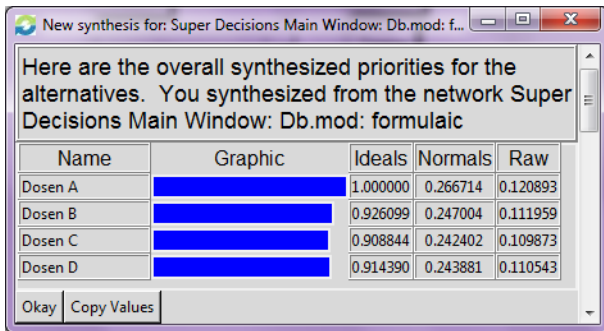


Figure 8. Result

Based on the results of the data processed in the super decision software using ANP method can provide accurate predictions in determining a decision and stable results. Networks in this method have a higher complexity with other types, due to the phenomenon of feedback from one cluster to another cluster even with the cluster itself. Each control in ANP does not need a hierarchical structure like the AHP method.

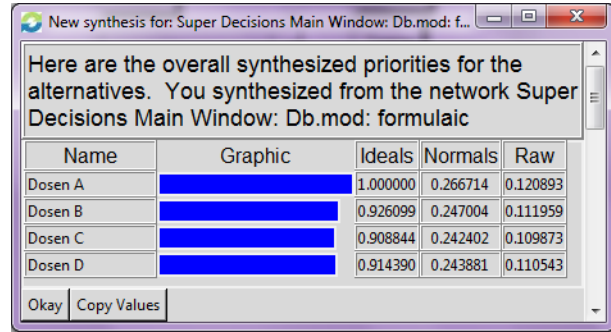


Figure 9. Graphic Result

Based on the comparative data above, it can be concluded that the selection using ANP is more accurate because using the ANP method can find out the different levels of criteria, and by using the ANP method, each criterion and sub criteria have interrelations or relationships.

Based on this research, the institute in the next few years can easily make decisions in determining outstanding lecturers without re-measuring the most priority factors, so ANP can help institutions to assess outstanding lecturers based on predetermined percentage criteria namely Performance = 22 %, Personality = 18%, Teaching = 21%, Research = 21%, Community Service = 16%.

4. Result

Based on the explanation in the previous chapters, the authors conclude that:

- Factors that can influence in determining the outstanding lecturers are performance, personality, teaching, research and community service. And who has the highest level of priority in assessing outstanding lecturers is performance.
- Based on the results of data analysis from the comparison of each cluster the percentage obtained is performance = 22%, Personality = 18%, Teaching = 21%, Research = 21%, Community Service = 16%.
- With the comparative system in determining the criteria related to the selection of outstanding lecturers, the institution can determine the exact and accurate lecturers.

REFERENCES

- [1] D. Andayati, "Sistem Pendukung Keputusan Pra-Seleksi Penerimaan Siswa Baru (PSB) On-Line Yogyakarta," J. Teknol., vol. 3, no. 2, pp. 145–153, 2010.
- [2] S. Eniyati and R. C. N. Santi, "Perancangan Sistem Pendukung Keputusan Penilaian Prestasi Dosen Berdasarkan Penelitian dan Pengabdian Masyarakat," J. Teknol. Inf. Din., vol. 15, no. 2, pp. 136–142, 2010.
- [3] T. L. Saaty and L. G. Vargas, "The Analytic Network Process," pp. 1–40, 2013.
- [4] L. W. Santoso, A. Setiawan, and J. R. Stanley, "Pembuatan Aplikasi Sistem Seleksi Calon Pegawai Dengan Metode Analytic Network Process (Anp) Di Pt X," no. February 2015, 2011.
- [5] DIKTI.2017. Pedoman Pemilihan Dosen Berprestasi. Kategori Sains Teknologi dan Sosial Humaniora

- [6] Turban Efraim, Jay E. Aronson, Ting-Peng Liang Decision Support Systems and Intelligent Systems. p. 574. 2008.
- [7] Neura Erika, dkk. 2009. Analytic Network Process (ANP) : an Approach to Estimate the Colombian Baby Diapers Market share. Colombia
- [8] Setiawan, S., & Rusdiansyah, R. (2016). PEMANFAATAN SISTEM PENDUKUNG KEPUTUSAN DALAM MENENTUKAN PROGRAM JAMINAN SOSIAL. Konferensi Nasional Ilmu Pengetahuan Dan Teknologi, 2(1), 7–INF.14. Retrieved from <http://konferensi.nusamandiri.ac.id/prosiding/index.php/knit/article/view/39Sze> S M 1969 Physics of Semiconductor Devices (New York: Wiley–Interscience)