

Implementation of the Analytic Network Process (ANP) in evaluating the performance of teachers and employees in educational institutions

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Abstract: In The World Of Education, Teachers Have An Important And Strategic Role. Teacher Performance Affects The Improvement Of The Quality Of Education In An Educational Institution. The Quality Of Education Provided By Teachers Determines The Future Of An Institution In Achieving Educational Goals. Therefore, A Holistic And Sustainable Evaluation Is Needed In An Educational Institution To Maintain And Encourage The Quality Of Work Of Teachers And Employees. The Purpose Of This Study Is To Describe Implementing The Analytics Network Process (Anp) Method In Evaluating Teacher And Employee Performance To Obtain Priority Of A Problem And Find Solutions That Can Be Taken. The Research Method Used Is Qualitative Research With The Type Of Analysis Network Process (Anp). The Results Showed The Priority Of The Problem Faced, Namely The Lack Of Mastery Of Information Technology And Government Policies. The Priority Solution That Can Be Applied In Evaluating Teacher And Employee Performance Is To Upgrade The System For Teachers And Employees And Optimize Certification Programs

.KEYWORDS - evaluation, Analytic Network Process (ANP)

Abstrak. Dalam dunia pendidikan, guru memiliki peran penting dan strategis. Kinerja guru berpengaruh pada peningkatan mutu pendidikan dalam suatu lembaga pendidikan. Kualitas pendidikan yang diberikan guru menentukan masa depan suatu institusi dalam mencapai tujuan pendidikan. Oleh karena itu, dibutuhkan evaluasi yang holistic dan berkesinambungan dalam suatu lembaga pendidikan guna menjaga sekaligus mendorong kualitas kerja guru maupun karyawannya. Tujuan penelitian ini adalah untuk mendeskripsikan mengimplementasikan metode Analitic Network Process (ANP) pada evaluasi kinerja guru dan karyawan untuk memperoleh prioritas suatu permasalahan serta mencari solusi yang dapat diambil. Metode penelitian yang digunakan adalah penelitian kualitatif dengan jenis Analitic Network Process (ANP). Hasil penelitian menunjukkan prioritas masalah yang ada yakni masalah internal dan masalah eksternal. Masalah internal memiliki prioritas kurangnya penguasaan teknologi informasi dan prioritas masalah eksternal pada kebijakan pemerintah. Adapun prioritas solusi yang dapat diterapkan dalam evaluasi kinerja guru dan karyawan adalah dengan prioritas solusi internal melakukan uprgarding system untuk guru dan karyawan dan serta prioritas solusi pada eksternal mengoptimalkan program sertifikasi.

Kata Kunci – Evaluasi, Analytic Network Process (ANP)

I. INTRODUCTION

The quality of human resources is one of the factors needed to increase the productivity of a school. Human resources have a very important and strategic role and position to achieve educational goals (AKILAH, 2019). Therefore, competent educators and education staff are needed. Because this competence can support the improvement of work efficiency. The progress of the quality of educational institutions is closely related to school leaders who are responsible for managing educational units. So, in addition to managing students and activities in it, the principal must also be able to manage teachers and employees in the school as well as possibly to achieve educational goals well. So that teachers and employees have satisfaction in achieving the expected competencies.

Human resource management is the development, utilization, assessment and appreciation of working groups that have the aim of prospering teachers and employees (Mashar, 2019). To get qualified human resources or teachers who have adequate competence as professional educators, it is not enough to qualify educators with diplomas, it is also necessary to upgrade their competencies and knowledge (Faidatuna, 2023).

Technological changes in the world of education require teachers to continue to adapt. With that, it requires the implementation of teacher abilities for human resource development and education quality. According to research conducted by (Payong, 2011) obtained the results "continuous professional development is the development of teacher potential that is carried out according to the needs gradually and continuously to improve teacher

professionalism". Based on the Based definition, sustainable professional development programs are expected to bring better benefits to human resource management.

Large educational institutions do not necessarily have adequate human resources (Erwiati, Amini, Hajani, Sabar, Suhardi, 2022). This has become a phenomenon for schools in the Sidoarjo area, many teachers lack mastery of information technology so they cannot adjust the education program desired by the principal and the existence of government policies that make it easier for teachers to register for P3k or ASN which must be collaborated with school regulations and environment. With these problems, researchers are interested in researching more about the evaluation of teacher and employee performance at Islamic Education Institutions.

With The Recruitment Of Human Resources, Educators Can Provide Direction For Educational Institutions As Whole, Human Resources Who Continue To Develop Themselves Can Improve The Short And Long-Term Performance Of An Educational Institution. The Purpose Of Kinerja Is A Good Work Res Results In Terms Of The Number And Quality Of Employees Achieved According To The Criteria For Work Standards Expected By Educational Institutions (Purwati & Kurniawan, 2018). The Performance Of The Teacher During Implementation Corresponds To The Tasks Assigned To Him, As Well As Skills And Experience. High Work Efficiency Will Have A Positive Effect On Overall School Performance (Adityo, 2013). Based on professional qualification standards as teachers in schools, from aspects of performance activities carried out by teachers, among others, they aim to have competencies that include knowledge, attitudes and work efficiency (Kurniawan et al., 2021). Employee performance appraisal is an evaluation process carried out by institutions with provisions or criteria that have been set against the duties of an employee (Ruskan, 2017). (Performance appraisal is carried out in a structured and systematic manner on the display that can be seen from the performance of the employee and the level of potential employee performance to always develop himself (Novita & Yulianti, 2020) In improving the performance of an employee in the world of education, it can be done in various ways, including by carrying out training and work motivation (Setiawan et al., 2020). Some of the principal's efforts to improve teacher performance include monitoring teacher performance and motivating and evaluating teacher performance (Muspawi, 2021) Sohat school principals use the ANP method to make decisions on the performance of teachers and employees in educational institutions.

ANP is a decision-making method that can be used in evaluating the performance of teachers and employees in educational institutions. This method considers important aspects that affect the performance of teachers and employees, as well as takes into account the interaction between them. The ANP method also considers the different preferences and values of stakeholders. In the evaluation of teacher and employee performance, the ANP method can be used to assess individual performance and take into account their contribution to achieving the overall goals of the educational institution. This method can also help in designing training and development programs to improve teacher and employee performance (Tripathy, S., & Khilar, 2017).

The ANP method is generally used in business and industry for the level of interest of various parties at the level of relationship between existing criteria and sub-criteria. ANP research can also be combined with other methods such as rating scales to achieve desired goals. Research that utilizes the ANP Method is research from (Sesa et al., 2021) which shows the assessment of flour raw materials used to make bread comes from 3 flour suppliers, namely Supplier A, Supplier B and Supplier C, while for sugar raw materials come from 3 suppliers, namely Supplier X, Supplier Y and Supplier Z, from sampling from suppliers the final calculation results from the highest value of supplier B has the quality of wheat flour the best with a result of 3.48162 while for the best quality sugar raw materials in Supplier X with a result of 3.55081 with this strategy that ANP can also be used as a selection of quality bread raw materials. Tally ANP, can also be used in education as well as integrated rooftop school evaluation research using SWOT Analysis, the results of the analysis show that Strength (S) and TheThreats) get the highest score. Strength is an opportunity for students to continue their studies to high school and support from the city government both in terms of budget and curriculum. At the same time, Threats include the complexity of school management and delegation of authority to central and local governments, therefore the ST strategy can be used as an alternative strategy to increase Strength and minimize the TheThreatserwira et al., 2019). The study used a combination of the WOT analysis method with ANP for evaluation in educational institutions.

Another study on the support system for identifying outstanding students using the web-based ANP method showed the results of ANP calculations from 54 student data, up to 10 students who were entitled to outstanding scholarships in each batch of assessment based on five criteria, namely learning outcomes, certificates, attendance and extracurricular test results using the black box method, the functional system has 100% successfully functioned properly (Baskoro et al., 2021).

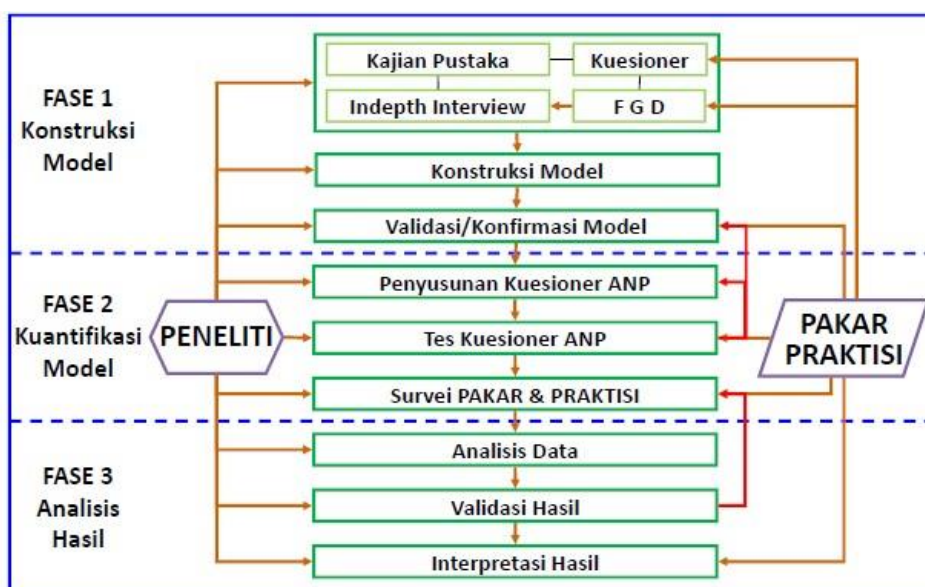
Based on the explanation above, the importance of this research focuses on evaluating the performance of teachers and employees. Researchers use the ANP method as a decision-making method that can be used to evaluate the performance of teachers and employees in educational institutions.

II. METHOD

The method used in this study is the ANP method which can analyze the influence with a standard approach to solve the form of the problem (Saaty, 2006). ANP can also be used as an alternative approach to qualitative research where subjective and intangible assessments can be combined with statistical data and other tangible factors. This method can be used to solve a problem based on adjusting the complexity of a problem and accompanied by an associated priority scale that produces the greatest priority influence. ANP is a generalization of the analytic hierarchy process that takes into account the dependencies between- elements of the hierarchy. Many decision problems cannot be arranged hierarchically because they involve the interaction of higher elements in the hierarchy with the lower elements (Affandi, 2020). The qualitative research approach was chosen because it has advantages in answering problems in this research to obtain a priority problem and finding alternative solutions and appropriate strategies based on the results of ANP. The analysis in this study is the ANP method and processed using "Super Decision" software and Ms Excel (Rusydia & Devi, 2013). The object of the study is the Islamic Elementary School (SDI) in Sidoarjo, the subject of the research is stakeholders who understand very well the development of SDI in Sidoarjo both in terms of academics (Head of Foundation), practitioners (principals, teachers and curriculum) and experts (HRD). The selection of the subjects of this study was by looking at the in-depth knowledge and understanding of experts related to the subject under studies such as principals, teachers and local employees and HRD with a total of 50 people. The measurement method used in collecting data in this study used a Likert scale questionnaire, the questionnaire consisted of 5 questions with the lowest score of 1 and the highest score of 9. The following is the scale of assessment of how important the ANP score is: (1) Not important/influential (2) relevant/influential (3) Less important/relevant/influential (4) relevant/influential (5) important/relevant/influential (6) relevant/influential (7) Very important/relevant/influential (8) relevant/influential (9) Very very important/relevant/influential.

From taking questionnaire data and giving scores on the questionnaire then processing by waiting for the "Super Decision" Software. The results obtained from the software if it shows a value of 0 mean that the answer is less varied, it shows that many respondents agree, while the results show a value of 1 means that the answer is varied and many respondents disagree (Rusydia & Devi, 2013).

The types and sources of data in this study are based on primary data obtained from interviews (in-depth interviews) with experts and practitioners who have a deeper understanding of the subject under study. As well as a literature review to develop an ANP model framework used to identify teacher and employee performance problems in Islamic Elementary Schools (SDI) in Sidoarjo. The stages of the ANP method include:



Sumber : Ascarya (2012)

Figure 1. Research Stages Using ANP

Phase 1:

The construction of the ANP model is based on literature studies obtained theoretically and empirically. And by providing questions to research subjects through interviews, discussions and questionnaires to explore data and find out the problems in the field.

Phase 2:

In the quantification phase of the model, the ANP survey questions asked are used as paired comparisons of *cluster* elements to find which elements have greater influence (more dominant) and how much influence through *numeric* scales from numbers one to nine. The data from the questionnaire is then collected and input in the *Super Decision* software to be further processed to produce a form of supermatrix. The large number of comparisons produced in filling out the questionnaire will affect the consistency of the respondents in answering the questionnaire. To enable researchers to obtain survey data with hundreds of questions and avoid inconsistencies, researchers followed a comparative survey model modified by (Ascarya, 2012a) using The form of the table is modified into a matrix form, making it easier for respondents to understand the problem. Questions in the form of this matrix are used as a second interview tool. Meanwhile, to answer respondents' questions, it is equipped with an overview of the questions asked in the scale or classification used by the ANP network.

Phase 3:

In this stage, after data processing using *Super Decision software* and *Ms Excel*, the level of consistency of experts is obtained in answering questions and the results of problem priorities according to the decomposition that has been set. Next, analyze each element that is a priority in the problem.

Data and information about the views seen by academics and practitioners are compiled in the form of a framework. After the survey results are collected, the data obtained will later be processed with Microsoft Excel and "Super Decision" software. The questionnaire is arranged in a comparison format (pair-wise comparison) both between cluster elements and between clusters to find out who has the greatest influence on a side.

To make it easier for the author to retrieve information on the questionnaire data with thousands of questions, and to maintain the level of consistency, the author follows a comparison questionnaire model that has been modified in the form of a table and re-modified into a matrix form by Ascarya, making it easier for respondents to understand the problem. Questions in the form of this matrix are used as a second interview tool. Answering respondents' questions is equipped with an overview of the scale/explanation that will be used for questions asked by the ANP network. By conducting this simpler comparative survey, it helps writers to shorten respondents' interview time and always get consistent results. Meanwhile, respondents were required to do *pairwise comparisons* in a questionnaire that had been prepared by choosing a numeric assessment scale, namely numbers 1 to 9.

ANP network results from several respondents combined. The data is then processed using *Microsoft Excell* and then the calculation of the *Rater Agreement* and *Geometric Mean* is carried out to obtain quantification results.

First, calculate the *Geometric Mean*. This measure aims to find out the individual assessment of the respondents and to obtain opinions about the group of respondents. *Geometric Mean* is a type of average calculation that shows a certain tendency or value. The formulation is (Ascarya, 2012a):

$$GM_k = (R_1 * R_2 * \dots * R_n)^{1/n}$$

Where, GM = *Geometric Mean*

R = Respondent

n = number of respondents

Second, calculating *Rate Agreement* is a measure that shows the level of conformity of respondents (R1-Rn) to a problem in a cluster. The tool used to measure *Rate Agreement* is *Kendall's Coefficient of Concordance* ($W; 0 < W < 1$). $W=1$ indicates a perfect fit (Ascarya, 2012). The formula for getting the W value is

$$U = (T_1 + T_2 + \dots + T_p) / p$$

$$S = (T_1 - U)^2 + (T_2 - U)^2 + \dots + (T_p - U)^2$$

$$\text{Max}S = (n - U)^2 + (2n - U)^2 + \dots + (pn - U)^2$$

$$W = S / \text{Max}S$$

Where, U = average value of the total ranking

S = sum of squares of deviations

P = number of nodes

N = number of respondents

If the suitability score is 1 ($W = 1$) then there is a perfect agreement between respondents. If when the W value is 0 or close to 0 then there is a disagreement between respondents.

III. RESULTS AND DISCUSSION

Based on the ANP method used, the stages carried out by researchers in obtaining data are as follows:

Phase 1 Model Construction

Researchers conducted a data review in lens.org and google scholar and obtained 1040 data about ANP on various topics. Furthermore, when searching the topic of the company, 95 articles appeared. Continuing by pursuing ANP's research topic on Education and 3 articles appeared. The three discussed teacher performance assessment, reminded the development of education quality and reward lecturers The following are the results of the ANP analytical study

No.	Article Title	Indicators
1.	Decision support system model for determining teacher performance improvement strategies using the ANP method	<ul style="list-style-type: none"> Teacher performance appraisal Improve the quality of students
2.	Implementation of ANP for teacher performance rating recommendation application at SMAN 1 Maospati	<ul style="list-style-type: none"> Job performance appraisal Evaluate teacher performance
3.	Analysis of human resource development in Improving the Quality of Education	<ul style="list-style-type: none"> HR development strategy Supporting and inhibiting factors of HR development
4.	Decision support system for selecting the best-performing teachers using the ANP method	<ul style="list-style-type: none"> Shaping teacher discipline Provide punishment and reward
5.	Lecturer performance decision support system using the ANP method	<ul style="list-style-type: none"> Pedagogic, professional, personality and social assessments.
6.	Decision support system for action strategies for student violations using the ANP method	<ul style="list-style-type: none"> Decision-making on actions of a supporting system for customers that occur.
7.	Performance design in Tahfidz teaching human resources using the ANP method	<ul style="list-style-type: none"> Improve human resource performance for tahfidz teachers and provide salary increases for productive teachers.
8.	Strategy for the application of green computing in the learning information system management unit based on the ANP method	<ul style="list-style-type: none"> Decision makers in determining alternative strategies The application of green computing is by those in schools.
9.	ANP method for selection of outstanding students at the Institution	<ul style="list-style-type: none"> Increase student motivation and get superior seeds that are supported to achieve more.
10.	Decision-making model based on multiple criteria in determining subject teaching teachers using the ANP method	<ul style="list-style-type: none"> Improve the quality of human resources in subject teachers to provide good quality to students.

Table 1. ANP Study Results

Furthermore, researchers conducted in-depth interviews with school principals, teachers and employees as well as HRD of local educational institutions. The results are based on the teacher and employee performance evaluation indicators that researchers get, according to the principal, several aspects need to be evaluated for implementation. Some teachers and employees lack discipline in participating in teacher activity programs, teachers have not mastered the use of information technology in learning, and teachers have difficulty packaging learning materials according to the new applicable curriculum. This usually occurs in teachers who are elderly and the uneven application of the independent learning curriculum in education units. The same thing was also expressed by teachers and employees at the local Islamic Primary School. Some teachers claim to lack mastery of learning materials that are taught according to the latest curriculum and lack mastery of information technology. In addition, the lack of school appreciation makes the motivation of teachers and employees not optimal. Seniority in the work environment also affects solidarity in it. In addition, the policy on teachers not being allowed to participate in the selection of ASN / P3 candidates in the contract period with educational institutions was also complained about. HRD Islamic Elementary School in Sidoarjo also revealed the frequent occurrence of teachers *resigning*, generally, the reasons stated regarding work *pressure*, and a work environment that is not suitable because of non-linear educational *background*. In terms of employees, managerial and behavioural aspects need to be evaluated.

Based on the results of the study, an initial draft of teacher and employee performance evaluation was obtained:

Draft Evaluation of Teacher and Employee Performance		
Academics	Practitioners	Expert
Teachers and employees lack discipline in participating in teacher activity programs at school	Teachers and elderly employees have difficulty using information technology	Many teachers resign due to work <i>pressure</i> and inappropriate work environment
Teachers and employees do not master information technology so the activity program and <i>school branding</i> are less than optimal	Teachers do not understand the learning material	<i>The background of teacher education is not linear</i>
Teachers have difficulty implementing the new curriculum	Lack of experts in IT and design	Managerial aspects and personality aspects in employees need to be improved, especially in leadership and loyalty aspects
	Lack of appreciation for teachers and employees	
	Seniority in the work environment	
	Teachers are not allowed to participate in the selection of ASN / P3 candidates during the contract period with educational institutions.	

Table 2. Draft Evaluation of Teacher and Employee Performance

Based on the results of *in-depth interviews* conducted by researchers conducted a *Forum Group Discussion* (FGD) with school principals, teachers and employees as well as HRD Islamic School in Sidoarjo. The purpose of this FGD is to map the problems that occur and then find the right solution. The results of the FGD are obstacles that have been collected into a draft evaluation of teacher and employee performance mapped into internal groups and external groups along with solutions that can be applied.

Results of <i>Forum Group Discussion</i> (FGD)		
Indicators	Problem	Solution
Work environment	There is seniority in the school environment.	Creating a comfortable and solid work environment
Education is not linear	There are still many classroom teachers who	Teachers who are not yet linear are allowed to socialize in education.

	are not linear with the education taken.	
Teacher and employee welfare	Lack of appreciation for teachers who have potential talents or achievements.	<i>Reward and punishment</i>
Technology and information	Many teachers lack mastery of technology	<i>Upgrading system</i>
Government policy	Must follow government policies and collaborate with the school environment	Optimize certification programs

Table 3. FGD Results

Based on the results of the FGD, researchers make the construction of a research model to be carried out:

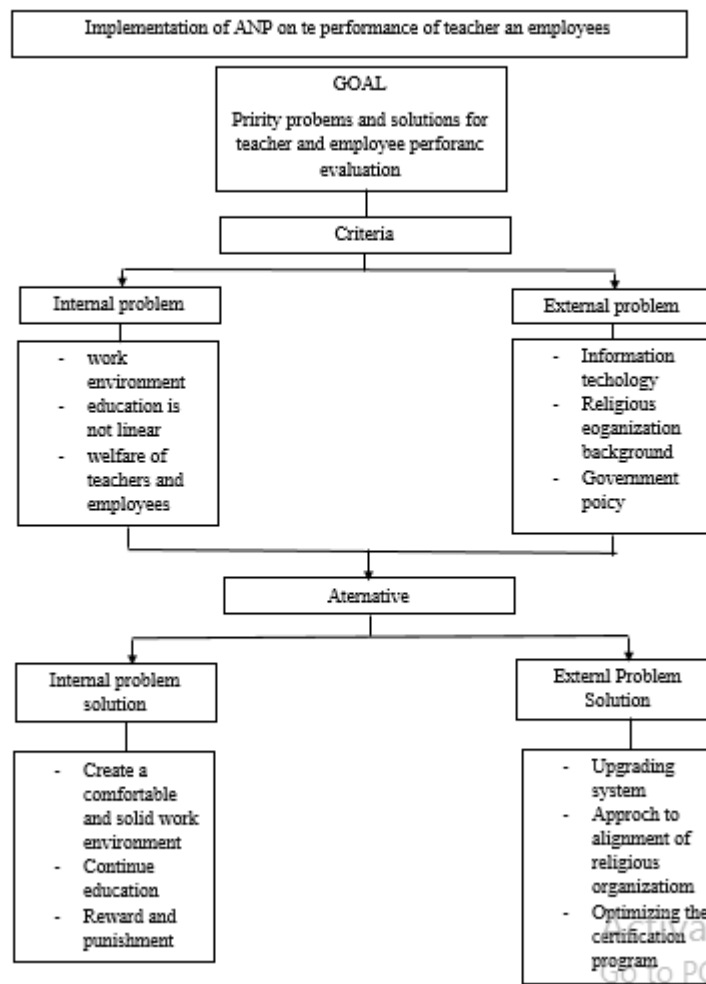


Figure 2. Construction of ANP Implementation Model on Teacher and employee performance evaluation.

The construction of the model is then validated by experts, regulators and academics. Then *input in* Super Decision to do ANP analysis. By mapping goals, problems and solutions into clusters and nodes, it facilitates ANP analysis to obtain priority problems and solutions that can be taken in teacher and employee performance evaluations.

Phase 2 Model Quantification

The cluster and nodes that have been created then are connected so that a network is formed in the *Network column*. Based on the network, questions will appear that must be filled in with values 1 to 9 to test the comparison between these elements. By making this comparison questionnaire simpler, it helps writers to shorten respondents' interview time and always get consistent results. Meanwhile, respondents were asked to *do a pairwise comparison* on the questionnaire that had been prepared by choosing a numeric k assessment scale between 1-9

Phase 3 Results Analysis

ANP network results from several respondents will be combined. The data is then processed using *Microsoft Excell* and then the calculation of the *Rater Agreement* and *Geometric Mean* is carried out to obtain quantification results. So that the results are obtained:

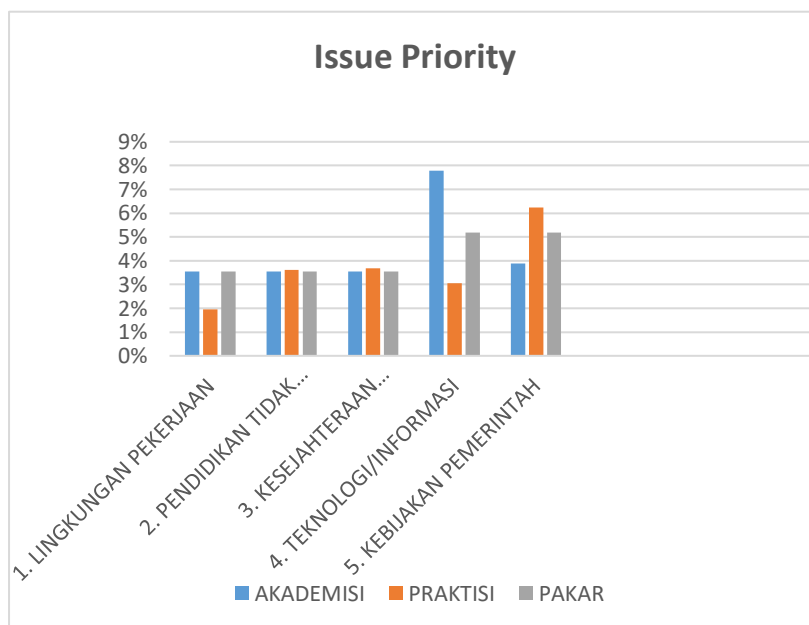


Figure 5. Issue Priority Diagram

The first problem of the work environment from the diagram can be known as many as 3.5% of academics and experts think the work environment is a problem that needs to be evaluated, while only 2% of practitioners are similar to it. The second problem of nonlinear education obtained the same result 3.5% of the third problem of teacher and employee welfare, obtaining 3.5% results from academics, practitioners and experts. The fourth problem of Technology and Information obtained quite high results, the results of 7.8% of academics agreed that technology and information problems were material for evaluating the performance of teachers and employees. Results 5.2% from experts and 3% from practitioners. The fifth issue of government policies obtained the results of 3.9% of academics while the results of practitioners were 6.2% and 5% of experts. both issues deserve to be material for evaluating the performance of teachers and employees, 6.2% practitioners and 5% experts. Based on the research that has been done,

information technology issues and government policies are prioritizing problems in evaluating teacher and employee performance. This is quite relevant considering that the educational institution studied is an Islamic Elementary School (SDI). Moreover, the number of private Islamic Elementary Schools (SDI) is more than the number of State Islamic Elementary Schools (SDI). So that the problem of teacher certification and registration of ASN / P3 candidates is a problem that becomes the first trigger for educational institutions. In the results of the diagram above, the lack of mastery in information technology and government policies results are quite high at 7.8% and 6.2% (Baskoro et al., 2021).

Therefore, the priority of solutions that can be done based on the research carried out includes:

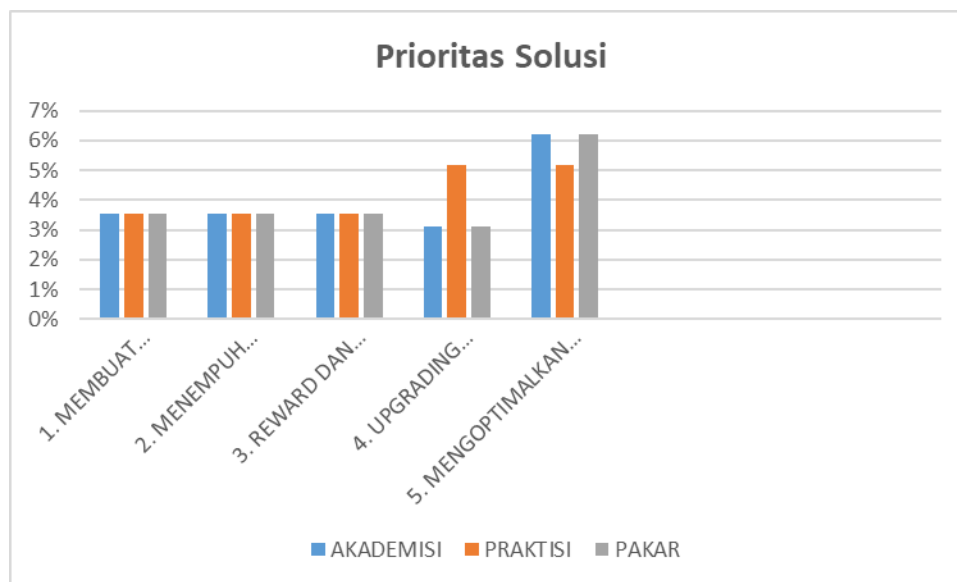


Figure 6. Priority Workable solutions

Based on the diagram above, (1) make the work environment comfortable and solidarity, (2) take PGSD education (3) Reward and Punishment from the results of academics, practitioners and experts have the same view regarding solutions to the problems of the work environment, non-linear education and the welfare of teachers and employees with the results of 3.5% of academics, practitioners and experts agree that these solutions can be the right step to unravel the problem. *Upgrading system* solutions obtained quite high results from practitioners, around 5.2%. The results of 3.2% of academics and experts agree with the solution. Optimization of certification programs gets very high results compared to others. As many as 6.2% of academics and experts agree that both are the best solutions to government policy problems, while the remaining 5.2% are filled by practitioners. Results of system upgrading solutions and certification programs (Perwira et al., 2019)

IV. CONCLUSION

The ANP method can be used to provide ease of decision-making in evaluating the performance of teachers and employees to improve the quality of school institutions. Based on the research conducted, the priority of the problem was the lack of mastery of information technology and government policies. The priority solution that can be applied in evaluating teacher and employee performance is to *upgrade* the system for teachers and employees and optimize the certification program.

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Conflict of Interest Statement:

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