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Analytical Hierarchy Process Algorithm Approach for Determining Best Employee (Case Study IT Company in Jakarta)

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Abstract— In the decision making process involving many criteria and many alternatives, the Analytical Hierarchy Process (AHP), method is often used as a problem-solving method. Decision making is done by giving the value of perception as weighted by a decision maker or expert. Employees in a IT company play a very important role in the survival of the company. However, having a professional employee is certainly not easy for the company, because not many employees are able to prioritize professionalism in work. Many employees are not committed to work until they stop in the middle of the road. To obtain professional workforce in accordance with the demands of office, a company needs to conduct coaching on its employees. Coaching is not only done only occasionally, but there needs to be continuity of coaching employees. Employees who have gained coaching certainly produce outstanding work performance that has an impact on the progress of the company. This work achievement is evidenced by excellent performance and the company can move forward rapidly.

Keywords— AHP, employee, works performance, decision-making

I. INTRODUCTION

Employees in a IT company play a very important role in the survival of the company. The employee is the key component of any successful system. The employee development is immediately related to employee performance[1]. However, having a professional employee is certainly not easy for the company, because not many employees are able to prioritize professionalism in work. Many employees are not committed to work until they stop in the middle of the road. When individuals feel the organization is meeting its obligations, they tend to create emotional connections repaying the organization with citizenship behaviours, such as increased job satisfaction and affective commitment, and reduced turnover [2]. To obtain professional workforce in accordance with the demands of office, a company needs to do coaching to its employees. Coaching is not only done only occasionally, but there needs to be continuity of coaching employees. When employee coaching has been done, consider the results obtained from the coaching. The result certainly does not only affect the employees themselves but also the company. Employees who have obtained coaching certainly produce outstanding work performance that has an impact on the progress of the company. This work achievement is evidenced by excellent performance and the company can move forward rapidly. For that, with outstanding achievements and excellent performance demonstrated by employees, companies need to reward their

employees. The appreciation and appreciation that the company provides to employees will of course have a positive effect on the improvement of employee performance for the better. From the background that has been described above, then got this research problem can be formulated as that is how to determine best employee use algorithm AHP (Analytical Hierarchy Process).

A. Research Problems

Based on the introduction described in the previous section, in this section the research problem is taken on how to determine best employee using Analytical Hierarchy Process algorithm.

B. Limitation of Research

Here on below, there are some limitations that need to be considered so that the discussion is not widespread or widened and so the discussion is not too far from relevance so that research can be more focused to do in this study are:

1) Objects of this study at IT Industry in Jakarta
2) This study used 3 criteria which are; Attitude, Work Quality, and Expertise
3) The sample used 3 employee which are; A,B, and C

C. Purpose and Objectives

The purpose of this research are for to determine best employee using Analytical Hierarchy Process algorithm.

II. STUDY LITERATURE

To support the making of this research, it should be mentioned matters or theories related to the problem and the scope of the discussion as a foundation in making this research.

A. Employee Definition

An employee is a worker who does the work and gives his work to an entrepreneur working on where his work is in accordance with the profession or work on the basis of his skill as his livelihood. In line with this according to the Law No.14 of 1969 on the Principal of Manpower, the employee is any person capable of carrying out work, both inside and outside the working relationship to produce services or goods to meet the needs of the community[3].

B. Job Performance

Job performance represents the key performance outcome at the individual level that an ES is expected to enhance and is thus our ultimate dependent variable of interest. Job performance is how well an employee performs his or her job and is often an external assessment (e.g., supervisor assessment) of an employee's execution of his or her assigned job duties [4].

B. Decision Support System Definition

Decision Support System (DSS) is a computer based-system that can be used to make decision on the result of identification. DSS deals with making decision in terms of management, operation, and planning. In making decision, the support system is designed fully computerized, human, or combination of both systems. DSS is knowledge based in nature. It's functions to help a decision maker to compile data and information, document, or business model as how to identify, solve problems, as well as make decisions [5].

III. METHODOLOGY

A. Research Steps

In doing this research the authors take steps taken systematically so that what is desired can be achieved. Figure 1 is the steps undertaken by the author of conducting this research.

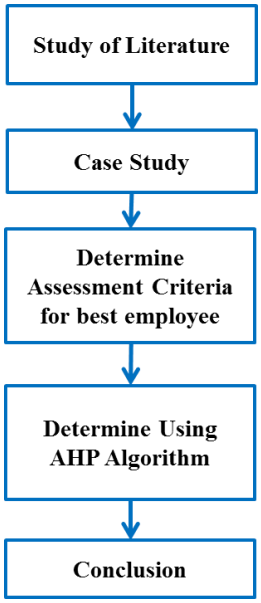

Fig. 1 Stages of Research

B. Analytical Hierarchy Process Algorithm

Analytical Hierarchy Process (AHP) was developed by Prof. Thomas Lorie Saaty (1998) from Wharston Business school to seek ranking or priority order of various alternatives in solving a problem. In everyday life, one is always faced with the choice of alternatives. Priority determination and consistency test are required on the options that have been made. In complex situations, decision-making is not influenced by just one factor but multi-factor and encompasses both levels and interests [6].

Basically AHP is a general theory of measurement used to find the scale of ratio of both discrete and continuous pairwise comparisons. These comparisons can be drawn from the actual size or base scale reflecting the strength of feelings and relative preferences [7]. Some principles in solving problems with Analytical Hierarchy Process (AHP):

1. Determining the hierarchy
2. Determining the priority of the elements by making pairwise comparisons
3. Synthesis
4. Measuring consistency
5. Calculate index consistency
6. Calculate the index ratios

IV. Result and Calculation

A. Determining the hierarchy

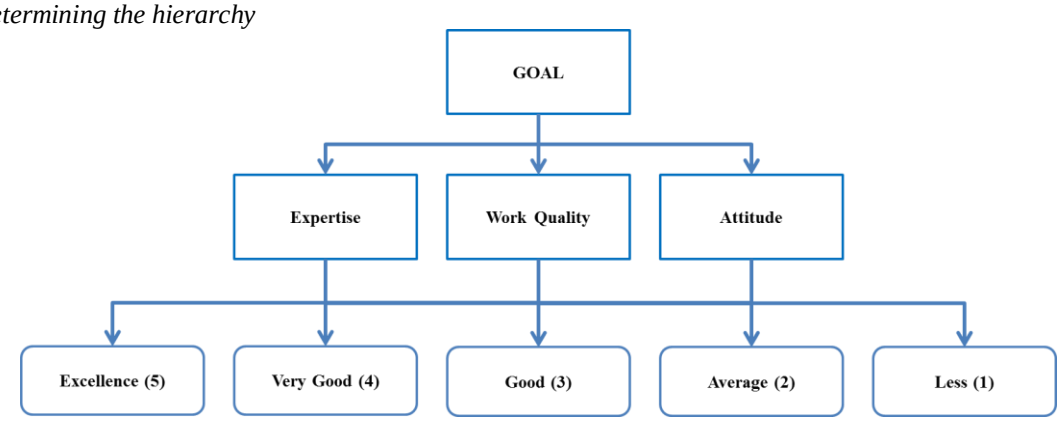

Figure 1. Stages of Research

Assessment criteria for determining best employee:

1. Expertise
2. Work quality
3. Attitude

Assessment sub criteria (Expertise, Work Quality, and Attitude) for determining best employee:

1. Point 1 = less
2. Point 2 = average
3. Point 3 = good
4. Point 4 = very good
5. Point 5 = Excellence

B. Determining the priority of the elements by making pairwire comparisons

For this step there are 3 result criteria element for this case study are:

1. Calculating Wire Pair Comparison attitude criteria
   a. Employee A 4x better than the employee B
   b. Employee A 2x better than the employees of C
   c. Employee B 3x better than the employees of C

   Calculating the amount of each employee columns A, B employees, and employees of C

Table 1. Matrix Pair Comparison Attitude

	Employee A	**Employee B**	**Employee C**
Employee A	1,000	4,000	2,000
Employee B	.250	1,000	3,000
Employee C	.500	0.333	1,000
Total	1,750	5.333	6,000

2. Calculating Wire Pair Comparison of work quality criteria
   a. Employee A 5x better than the employee B
   b. Employee A 3x better than the employees of C
   c. Employee B 4x better than the employees of C

   Calculating the amount of each employee columns A, B employees, and employees of C

Table 2. Matrix Pair Comparison Work Quality

	Employee A	**Employee B**	**Employee C**
Employee A	1,000	5,000	3,000
Employee B	.250	1,000	4,000
Employee C	0.333	.250	1,000
Total	1,583	6,250	8,000

3. Calculating Wire Pair Comparison Expertise criteria
   a. Employee A 3x better than the employee B
   b. Employee A 2x better than the employees of C
   c. Employee B 4x better than the employees of C

   Calculating the amount of each employee columns A, B employees, and employees of C

Table 3. Matrix Pair Comparison Expertise

	Employee A	**Employee B**	**Employee C**
Employee A	1,000	2,000	5,000
Employee B	.500	1,000	3,000
Employee C	.200	0.333	1,000
Total	1,700	3,333	9,000

C. Synthesis

For this step there are 3 result criteria element for this case study are:

1. Counting Eigen Vector Normalization (Attitude)

Table 4. Matrix Normalization Attitude

	Employee A	**Employee B**	**Employee C**	**amount**	***eigen Vector* normalization**
Employee A	.571	.750	0.333	1,654	**.5513**
Employee B	0,142	0.187	.500	0,829	**.2763**
Employee C	0.285	0.061	0.166	0.512	**.1706**
Total					**0.9982**

2. Counting Eigen Vector Normalization (Work Quality)

Table 5. Matrix Normalization Work Quality

	Employee A	**Employee B**	**Employee C**	**amount**	***eigen Vector* normalization**
Employee A	.653	0,800	0,375	1,828	**.6093**
Employee B	.130	.160	.500	.790	**.2633**
Employee C	0.215	0,040	0,125	.380	**.1266**
Total					**.9992**

3. Counting Eigen Vector Normalization (Expertise)

Table 6. Matrix Normalization Expertise

	Employee A	**Employee B**	**Employee C**	**amount**	***eigen Vector* normalization**
Employee A	0.588	0,600	0.555	1,743	**.5810**
Employee B	.294	.300	0.333	0.927	**.3090**
Employee C	.117	0,100	.111	0.328	**.1093**
Total					**.9993**

D. Measuring consistency

For this step there are 3 result criteria element for this case study are:

1. Calculating Maximum Eigen Vector (Attitude)
   Λmaks = (1.750 x 0.5513) + (5.333 x 0.2763) + (6.000 x 0.1706)
   = 0.964775 + 1.472679 + 1.0236
   = 3.461054

2. Calculating Maximum Eigen Vector (Work Quality)
   Λmaks = (1,583 x 0.6093) + (6.250 x 0.2633) + (8.000 x 0.1266)
   = 0.9645219 + 1.645625 + 0,1,0128
   = 3.6229469)

3. Calculating Maximum Eigen Vector (Expertise)
   Λmaks = (1.700 x 0.5810) + (3.333 x 0.3090) + (9.000 x 0.1093)
   = 0.9877 + 1.029897 + 0.9837
   = 3.001297

E. Calculate index consistency

For this step there are 3 result criteria element for this case study are:

1. Counting Consistency Index (Attitude)
   CI = (Λmaks - n) / (n - 1)
   = (3.461054 - 3) The / (3-1)
   = 0.461054 / 2
   = 0.230527

2. Counting Consistency Index (Work Quality)
   CI = (Λmaks - n) / (n - 1)
   = (3.6229469 - 3) The / (3-1)
   = 0.6229469 / 2
   = 0,31147345

3. Counting Consistency Index (Expertise)
   CI = (Λmaks - n) / (n - 1)
   = (3.001297 - 3) The / (3-1)
   = 0.001297 / 2
   = 0.0006485

F. Calculate the index ratios

For this step there are 3 result criteria element for this case study are:

1. Counting Consistency Ratio (Attitude)
   CR = CI / IR
   = 0.230527 / 0.58
   = 0,397460345

2. Counting Consistency Ratio (Work Quality)
   CR = CI / IR
   = 0.31147345 / 0.58
   = 0,53702319

3. Counting Consistency Ratio (Expertise)
   CR = CI / IR
   = 0.0006485 / 0.58
   = 0.00111810345

G. Calculating Overall Composite

Table 7. Overall Composite

Overall Composite Weight	Weight	Employee A	Employee B	Employee C
Attitude	.6232	.5513	.2763	.1706
Work quality	.2387	.6093	.2633	.3090
Expertise	.1372	.1706	.1266	.1093
Composite Weight		**0.51241639**	**0.25240939**	**0.19507218**

composite weight obtained from the column weight multiplied by the employee on each criterion. For example: the value of composite weight of the employee A is 0.51241639 obtained from (0.6232 x 0.5513) + (0.2387 x 0.6093) + (0.1372 x 0.1706)

V. CONCLUSION

From the calculation above it can be concluded that the best employee of the three employees of the above is an employee A value of composite weight 0.51241639 and that need to be considered for further research in this study is the determination of the best decision support system this employee should be able to apply the methods of other decision support system to get a better solution.

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