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# Implementation Of Multi Factor Evaluation Process (MFEP) In Assessment Of Employee Performance Achievement

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**Abstract.** Human Resources is one of the competitive advantages and key elements that are important for success in competing to achieve goals. Therefore, which is an element of management in which there are manpower and other resources. Humans are always active and dominant in every activity and organizational activity. The purpose of a company is not possible without the active role of employees. Then the performance appraisal is a function of motivation and ability. To complete a task or work someone duly has a certain degree and level of ability. This study discusses how to make a selection in the case of selecting an employee who is performing and performing well. MFEP is a method to get the best solution from several alternative solutions by using 'pairwise comparison' as a basis for making choices. The Multi Factor Evaluation Process (MFEP) method is also described as a comparison. Based on performance appraisals, conclusions can be drawn which explain that employee performance appraisal in an organization is an important mechanism for a manager or leader.

## 1. Introduction

Human resources are one source of competitive advantage and key elements that are important for success in competing to achieve goals, therefore, the management of human resources for the organization that is important for service to the community human resources is part of management. Which is a management element in which there are workers in the company. Humans are always active and dominant in every activity of the organization. Objectives are not possible without the active role of employees even though the tools of the company are so sophisticated. Sophisticated tools owned by the company is of no benefit to the company. If the active role of the employee is excluded. Managing employees is difficult and complex, because they have heterogeneous thoughts, feelings, statuses, desires, and backgrounds that are brought into the organization, employees cannot be regulated and fully controlled like managing machines, capital or buildings[1].

Then the performance appraisal is a function of motivation and ability. To complete a task or work a person should have a certain degree of willingness and level of ability. A person's willingness and skills are not effective enough to do something without a clear understanding of what is done and how to do it. Performance is a real behavior that is displayed every person as a work achievement generated by employees in accordance with their role in the company.



Based on the notion of performance appraisal, conclusions can be drawn explaining that performance appraisal in a modern organization, performance appraisal is an important mechanism for management to be used in explaining performance goals and standards and motivating individual performance next time [2]. Performance appraisal is the basis for decisions that affect salary, promotion, termination, training, transfers, and other staffing conditions. From observations and field studies it is known that employee performance appraisal found several problems, including:

1. The duration of the implementation of the next stage of the selection stage of the selection due to difficulties in data processing is still manual.
2. Difficulties in filing all assessment results from one period, for evaluation material for the next period.
3. Difficulties in presenting assessment data in a fast and transparent time.
4. Difficulties in making decisions for employee appraisals due to lack of data support from the results of the selection of previous stages.

MFEP is a quantitative method that uses a "weighting system". For each decision that has a strategic influence, it is recommended to use a quantitative approach such as MFEP. The first step in the MFEP method requires that all criteria that are very important factors in making a consideration be given appropriate weighting. The same steps are taken for the alternatives to be chosen, which can then be evaluated in relation to these factors of consideration[3].

Decision Support System (DSS) uses data that provides an easy user interface, and can incorporate thinking into decision making. DSS is more intended to support management in carrying out analytical work in situations that are less structured and with unclear criteria[4][5]. DSS is not intended to automate decision making, but rather provides an interactive tool that allows decision makers to carry out various analyzes using available models. MFEP is a decision making model that uses a collective approach to the decision making process.

Below are the steps of the calculation process using the MFEP method [6], is:

1. Determine the factors and weighting factors where the total weighting must be equal to 1 ( $\sum \text{weighting} = 1$ ), that is the factor weight.
2. Fill in the value for each factor that influences the decision making of the data to be processed. The value entered in the decision making process is an objective value, which is definitely a factor evaluation whose value is between 01.
3. The process of calculating weight evaluation which is the process of calculating the weight between factor weight and factor evaluation with and adding up all weight evaluations results to obtain the evaluation results.

The use of the MFEP model can be realized:

1.  $WE = FW \times E$  (1) ..... (1)
2.  $\sum WE = \sum (FW \times E)$  (2) ..... (2)

Where :

WE = Weighted Evaluation

FW = Factor Weight

E = Evaluation

$\sum WE$  = Total Weighted Evaluation

## 2. Research Method

This research is a research development to produce a product in determining the factors that support the achievement and performance of employees in a company, in the study will be arranged stages that must be carried out from the beginning of data collection to produce outcomes or concluding results and useful in accordance with the introduction in the introduction.[7]

The design and stages of research carried out by researchers to facilitate the implementation stages can be seen in Figure 1 below:

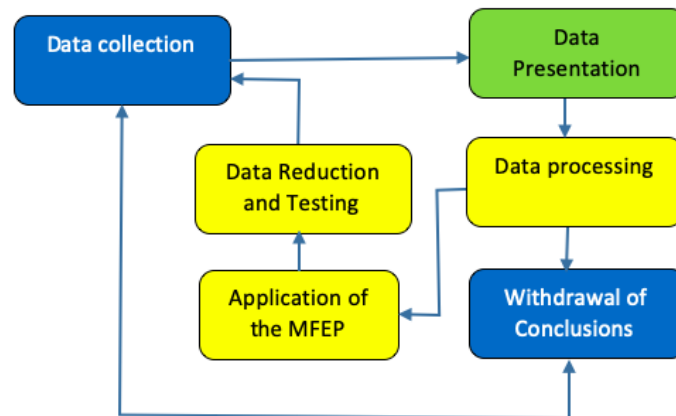


Figure 1. Research Stages of Research

Before designing a system for employee performance appraisal, it must first describe the problems in the appraisal process from collecting data on the system that is running then doing data processing in this case using the MFEP method until drawing conclusions.

### 3. Result and Discussion

Assessment means choice, which is the choice mechanism of two or more possibilities that exist to achieve predetermined goals. Assessment is not just an activity of choosing an alternative to the available alternatives, but it is a systematic overall process of what is done for decision making so that a decision is the best choice[8].

The assessment process begins with the activity of identifying a problem, determining the need for a need, analyzing and choosing alternatives that can solve the problem, as well as implementing that alternative, and ending with evaluating the effectiveness of the decision.

The stages that are passed in the process are as follows:

#### 1. Setting goals (needs) identify problems

The design of an appraisal system starts with the existence of a problem or a gap in the situation or with the desired condition. Before designing a decision support system in a company / agency, it must first determine what problems are being faced and what goals are achieved by the company. The problem faced in general is how to make a good and optimal assessment of employees and what are the conditions for making the right, fast and quality decisions.

#### 2. Identifying assessment criteria

Based on the identification of the problems carried out, it is necessary to identify a set of assessment criteria. The criteria sought are what the basic for decision making. Criteria in making decisions are as follows

- a. Testing
- b. Discipline
- c. Length of work
- d. Loyalty

#### 3. Ranking compatibility

The ranking of matches for each alternative criterion is graded 1 to 5, namely:

- a. 1 = Very bad
- b. 2 = Bad

- c. 3 = Enough
- d. 4 = Good
- e. 5 = Very good

From each of these criteria, weights will be determined. The weight consists of five fields of Multi Attribute Decision Making, which are very bad, bad, enough, good, and very good, as shown in table 1 below:

Table 1: Criteria

Fuzzy	Weight
Lowest	1
Low	2
Medium	3
High	4
The Highest	5

Based on the selection steps to determine the results of the assessment using the Multi Attribute Decision Making method, the steps that must be carried out are:

a. Determine Criteria Weight

Determination of criteria weights is done by filling in a pairwise comparison matrix conducted by management. The pairwise comparison matrix form can be seen in table 2 below

Table 2. Determining Criteria Weight

Criteria	Testing	Discipline	Working Time	Loyalty
Testing	1	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{3}$
Discipline	2	1	1	$\frac{1}{2}$
Working Time	2	1	1	$\frac{1}{2}$
Loyalty	3	2	2	1

The steps in determining the criteria weights are as follows:

1. Calculate the Eigen Value

The trick is to multiply each cell in the same row raised by the number of criteria.

$$\text{Testing Results} = (1 * \frac{1}{2} * \frac{1}{2} * \frac{1}{3})^{\frac{1}{4}} = 0.537$$

$$\text{Discipline} = (2 * 1 * 1 * \frac{1}{2})^{\frac{1}{4}} = 1$$

$$\text{Working time} = (2 * 1 * 1 * \frac{1}{2})^{\frac{1}{4}} = 1$$

$$\text{Loyalty} = (3 * 2 * 2 * 1)^{\frac{1}{4}} = 1.86 + 4,397$$

2. Calculate the Priority Weight of Each Criteria

To calculate the priority weights, the eigen value for each criterion is divided by the total eigen value.

$$\text{Testing Results} = 0.537 / 4.397 = 0.122$$

$$\text{Discipline} = 1 / 4,397 = 0.227$$

$$\text{Working time} = 1 / 4,397 = 0.227$$

$$\text{Loyalty} = 1.86 / 4.397 = 0.423$$

b. Determination of Weight Validity

The steps to determine the validity of weights are as follows:

1. Add up each column

$$\text{Testing Results} = 1 + 2 + 2 + 3 = 8$$

$$\text{Discipline} = \frac{1}{2} + 1 + 1 + 2 = 4.5$$

$$\text{Working Time} = \frac{1}{2} + 1 + 1 + 2 = 4.5$$

$$\text{Loyalty} = \frac{1}{3} + \frac{1}{2} + \frac{1}{2} + 1 = 2.33$$

2. Divide each cell from the column based on the results of the summation in the previous step shown in table 3 below

Table 3. Determination of Weight Validity

Criteria	Testing	Discipline	Working Time	Loyalty
Testing	$1/8 = 0.125$	$0.5/4.5 = 0.111$	$0.5/4.5 = 0.111$	$0.33/2.33 = 0.142$
Discipline	$2/8 = 0.25$	$1/4.5 = 0.222$	$1/4.5 = 0.222$	$0.5/2.33 = 0.2146$
Working Time	$2/8 = 0.25$	$1/4.5 = 0.222$	$1/4.5 = 0.222$	$0.5/2.33 = 0.2146$
Loyalty	$3/8 = 0.375$	$2/4.5 = 0.444$	$2/4.5 = 0.444$	$1/2.33 = 0.429$

3. Calculating the synthesis weight is by adding up per row the results from step 2

$$\text{Testing} = 0.125 + 0.111 + 0.111 + 0.142 = 0.489$$

$$\text{Discipline} = 0.25 + 0.222 + 0.222 + 0.2146 = 0.9086$$

$$\text{Working time} = 0.25 + 0.222 + 0.222 + 0.2146 = 0.9086$$

$$\text{Loyalty} = 0.375 + 0.444 + 0.444 + 0.429 = 1.692$$

4. Calculating the Maximum Eigen is done by dividing the weight of the synthesis by the priority weight. this is done for each criterion:

$$\text{Testing} = 0.489 / 0.122 = 4$$

$$\text{Discipline} = 0.9086 / 0.227 = 4$$

$$\text{Working time} = 0.9086 / 0.227 = 4$$

$$\text{Loyalty} = 1.692 / 0.423 = 4 + 16 (= x)$$

$$\lambda_{\max} = (x) / \text{number of criteria} = 16/4 = 4$$

5. Test Consistency

$$CI = (\lambda_{\max} - \text{number of criteria}) / (\text{number of criteria} - 1)$$

$$= (4 - 4) / (4 - 1) = 0$$

$$CR = CI / IR = 0 / 0.9 = 0.107$$

Because the consistency value  $\leq 0.1$  is said to be valid

c. Determination of the global weight of each alternative is done by determining the weight of each alternative for each criterion. In this case, it is exemplified for 4 employees, Andi, Budi, Anto, and Agus. This section is filled in by the Company. For example, in this section the researcher provides data:

### 3.1. Criteria for Testing Results

1. Global Weight of each Alternative for Completing the Pairwise Comparison Matrix of Testing Results can be seen in table 4 below.

Table 4: Testing Results Criteria

Testing Results	Andi	Budi	Anto	Agus
Andi	1	4/3	2	3/2
Budi	3/4	1	3/2	4/3
Anto	1/3	2/3	1	4/3
Agus	2/3	3/4	3/4	1

2. Calculating the Eigen Value by multiplying each cell in the same row and ranking by the number of alternatives:

$$\text{Andi} = (1 * 4/3 * 2 * 3/2) ^ { (1/4) } = 1.41$$

$$\text{Budi} = (3/4 * 1 * 3/2 * 4/3) ^ { (1/4) } = 1,106$$

$$\text{Anto} = (1/2 * 2/3 * 1 * 4/3) ^ { (1/4) } = 0.816$$

$$\text{Agus} = (2/3 * 2 * 2 * 1) ^ { (1/4) } = 1,277 + 4,609$$

3. Calculate the Global Weights for Each Alternative for the Testing Results criteria to calculate the priority weight of the way is the eigen value for each alternative divided by the total eigen value:

$$\text{Andi} = 1.41 / 4,609 = 0.3059$$

$$\text{Budi} = 1.106 / 4.609 = 0.2399$$

$$\text{Anto} = 0.816 / 4.609 = 0.177$$

$$\text{Agus} = 1,277 / 4,609 = 0,277$$

### 3.2. Discipline Criteria

1. Global Weights for each Alternative for filling in a pairwise comparison matrix Disciplinary criteria can be seen in table 5 below.

Table 5. Discipline Criteria

Discipline	Andi	Budi	Anto	Agus
Andi	1	1/2	1/3	1
Budi	2	1	2/3	2
Anto	3	3/2	1	3
Agus	1	1/2	1/3	1

2. Calculating the Eigen Value is to multiply each cell in the same row. Appointed with an alternative number:

$$\text{Andi} = (1 * 1/2 * 1/3 * 1) ^ (1/4) = 0.6389$$

$$\text{Budi} = (2 * 1 * 2/3 * 2) ^ (1/4) = 1,277$$

$$\text{Anto} = (3 * 3/2 * 1 * 3) ^ (1/4) = 1,916$$

$$\text{Agus} = (1 * 1/2 * 1/3 * 1) ^ (1/4) = 0.6389 + 4.4708$$

3. Calculating the Global Weights for Each Alternative for Discipline criteria to calculate the priority weights the way is the eigen value for each alternative divided by the total eigen value.

$$\text{Andi} = 0.6389 / 4.4708 = 0.1429$$

$$\text{Budi} = 1,277 / 4.4708 = 0.285$$

$$\text{Anto} = 1,916 / 4.4708 = 0.428$$

$$\text{Agus} = 0.6389 / 4.4708 = 0.1429$$

### 3.3. Working Time Criteria

1. Global Weight of each Alternative for Old criteria Working filling in the pairwise comparison matrix can be seen in table 6 below.

Table 6. Working Time Criteria

Working Time	Andi	Budi	Anto	Agus
Andi	1	2	2	1/2
Budi	1/2	1	1	1/4
Anto	1/2	1	1	1/4
Agus	2	4	4	1

2. Calculating the Eigen Value is by multiplying each cell in the same row raised by the number of alternatives:

$$\text{Andi} = (1 * 2 * 2 * 1/2) ^ (1/4) = 1,189$$

$$\text{Budi} = (1/2 * 1 * 1 * 1/4) ^ (1/4) = 0.5946$$

$$\text{Anto} = (1/2 * 1 * 1 * 1/4) ^ (1/4) = 0.5946$$

$$\text{Agus} = (2 * 4 * 4 * 1) ^ (1/4) = 2,378 + 4,7562$$

3. Calculate the Global Weights for Each Alternative for the old working criteria to calculate the priority weights the way is the eigen value for each alternative divided by the total eigen value:

$$\text{Andi} = 1.189 / 4.7562 = 0.2499$$

$$\text{Budi} = 0.5946 / 4.7562 = 0.125$$

$$\text{Anto} = 0.5946 / 4.7562 = 0.125$$

$$\text{Agus} = 2,378 / 4.7562 = 0.499$$

### 3.4. Loyalty Criteria

1. Global Weights for each Alternative for the Loyalty criteria filling in the pairwise comparison matrix can be seen in table 7 below.

Table 7. Loyalty Criteria

Loyalty	Andi	Budi	Anto	Agus
Andi	1	$\frac{1}{2}$	$\frac{1}{3}$	2
Budi	2	1	$\frac{2}{3}$	4
Anto	3	$\frac{3}{2}$	1	6
Agus	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{6}$	1

2. Calculating Eigen Value is by multiplying each cell in the same row. Appointed with an alternative number:

$$\text{Andi} = (1 * \frac{1}{2} * \frac{1}{3} * 2)^{\frac{1}{4}} = 0.759$$

$$\text{Budi} = (2 * 1 * \frac{2}{3} * 4)^{\frac{1}{4}} = 1.519$$

$$\text{Anto} = (3 * \frac{3}{2} * 1 * 6)^{\frac{1}{4}} = 2.275$$

$$\text{Agus} = (\frac{1}{2} * \frac{1}{4} * \frac{1}{6} * 1)^{\frac{1}{4}} = 0.379 = 4.932$$

3. Calculating the Global Weights for Each Alternative for the Loyalty ability criteria to calculate the priority weights the way is the eigen value for each criterion divided by the total eigen value:

$$\text{Andi} = 0.759 / 4.932 = 0.15389$$

$$\text{Budi} = 1.519 / 4.932 = 0.307$$

$$\text{Anto} = 2.275 / 4.932 = 0.461$$

$$\text{Agus} = 0.379 / 4.932 = 0.0768$$

The results of the previous processes can be presented for the assessment of Criteria for Employees who will be appointed as Employees by the MFEP method can be seen in the following table. An example of comparison of employee assessment criteria data is seen in Table 8 below

Table 8. Mariks Comparison of Employee Performance Weight Data

Alternative	Testing	Discipline	Working Time	Loyalty
	0.122	0.227	0.227	0.423
Andi	0.3059	0.1429	0.2499	0.15389
Budi	0.2399	0.285	0.125	0.307
Anto	0.177	0.28	0.125	0.461
Agus	0.277	0.1429	0.499	0.0768

So that the total value obtained by each employee is calculated by equation 2.

Total Alternative Values =

$$W_1 \times X_1 + W_2 \times X_2 + W_3 \times X_3 + \dots + W_n \times X_n$$

Where :

W = Weight for each criterion

X = Weight of Each Alternative for each criterion.

So it is obtained:

$$\text{Andi Total Global Weight} = (0.122 \times 0.3059) + (0.227 \times 0.1429) + (0.227 \times 0.2499) + (0.423 \times 0.15389) = 0.19158087$$

## 4. Conclusion

The choice of decisions in evaluating employee performance and achievement with the multi factor evaluation process method is one solution to improve the efficiency and effectiveness of the employee evaluation process. This system can help companies in providing an overview to provide decision support data to the leadership in assessing an employee, namely:



1. The MFEP method is more appropriate for solving multi-dimensional problems such as in employee performance appraisal, with many criteria as an assessment component for each alternative.
2. The implementation of the MFEP method in evaluating employee performance has advantages that can be used to conduct an assessment even if only one employee or object is assessed.
3. Factors that influence the results of calculations using the MFEP method are the criteria or sub-criteria weight, preference weight, and the nature (type) of the criteria or sub-criteria in this case the criteria used in assessing employee performance and performance are Testing, Discipline, Working Time and Loyalty.

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