**OPTIMIZATION OF INCENTIVE GIVING THROUGH**

***MULTI-CRITERIA DECISION ANALYSIS* APPROACH**

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**Abstract:** This research aims to optimize the provision of incentives to employees (sales team) in a company using a multi-criteria approach. Many companies face challenges in determining criteria and mechanisms for providing incentives that are effective and fair to improve work performance and motivation. The multi-criteria approach used is Multi-Attribute Utility Theory (MAUT) which can assess various aspects of employee performance comprehensively and objectively. Factors considered include productivity, quality of work, attendance, innovation and overall turnover. The research results show that the multi-criteria approach provides a more comprehensive and accurate assessment, so that companies can develop a more transparent and effective incentive system. Implementation of this approach is expected to increase employee motivation and productivity, help companies achieve their business goals more efficiently, and provide long-term benefits in the form of increased employee loyalty and competitiveness in the field.

**Keywords:** Optimization, Incentives, Multi Criteria, MAUT Method

**Abstract:** This study aims to optimize the provision of incentives to employees (sales team) in a company using a *multicriteria approach* . Many companies face challenges in determining the criteria and mechanisms for providing effective and fair incentives to improve work performance and motivation. The multicriteria approach used is the *Multi-Attribute Utility Theory* (MAUT) which can evaluate various aspects of employee performance comprehensively and objectively. The factors considered include productivity, work quality, attendance, innovation and overall turnover. The results of the study indicate that the multicriteria approach provides a more comprehensive and accurate assessment, so that companies can develop a more transparent and effective incentive system. The implementation of this approach is expected to increase employee motivation and productivity, help companies achieve their business goals more efficiently, and provide long-term benefits in the form of increased employee loyalty and competitiveness in the field.

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**INTRODUCTION**

Along with the development of technology, the incentive system can be improved through the use of *Artificial Intelligence (AI), Big Data Analytics, and Decision Support Systems (DSS)* [1] *.* This technology allows companies to analyze employee performance data more accurately and objectively, so that the incentive system can be adjusted based on various multi-criteria factors.

*Decision Support Systems (DSS)* – DSS technology based on *Multi-Criteria Decision Analysis (MCDA)* can be used to assist decision making regarding incentive provision [2] . DSS is able to integrate various assessment factors, such as productivity, work quality, attendance, innovation and overall turnover obtained for each employee.

Human resources (HR) are a key element in the success of an organization. Employee productivity and performance are greatly influenced by various factors, one of which is the incentive system implemented by the company [3] . Well-designed incentives can increase work motivation, employee satisfaction, and loyalty to the company [4] . Various studies have shown that an effective incentive system contributes to increased performance and achievement of company targets [5] .

However, the implementation of incentive systems in various companies still faces a number of challenges. Many organizations use conventional approaches in determining incentives, such as based on seniority or individual achievements, without considering other factors that influence the success of the organization [6] . Incentive systems that are not based on quantitative methods or data-based approaches can lead to dissatisfaction among employees [7] . In addition, several studies have proposed technology-based approaches such as AI and Big Data in employee management, but their application in incentive systems is still limited [8] . This can lead to unfairness in the distribution of incentives and cause dissatisfaction among employees. Therefore, a more comprehensive approach is needed in providing incentives to ensure a more objective, fair, and effective system.

By utilizing this technology, the incentive system can be optimized to be more objective, transparent, and fair, and can increase employee motivation and satisfaction.

**METHOD**

The multicriteria approach to decision making is a method used to evaluate several alternatives based on various relevant factors or criteria. In the context of employee incentives, this approach allows companies to consider various aspects of the assessment, such as individual performance, job difficulty, team involvement, innovation, and attendance.

One method that is often used in multi-criteria decision making is *the Multi-Attribute Utility Theory (MAUT)* . This method is based on the concept of utility function, where each criterion is given a weight according to its level of importance, then aggregated to determine the best alternative.

In a decision support system *(DSS),* MAUT can be used to optimize incentive provision by:

1. Determining Assessment Criteria – Identify factors that influence the provision of incentives, such as productivity, discipline, and contribution to the company.
2. Setting Criteria Weights – Each criterion is given a weight based on its level of influence on the success of the organization.
3. Calculating *Utility Function* – Each alternative (employee) is evaluated based on a predetermined assessment scale, then the total utility value is calculated.
4. Determining Optimal Decisions – The alternative with the highest utility value is selected as the recipient of the most optimal incentive.

By implementing MAUT in DSS, the incentive system can be more transparent, fair, and data-based. This helps companies reduce subjectivity and increase effectiveness in rewarding employee performance.

*Multi-Attribute Utility Theory (MAUT)* method is a quantitative comparison method that usually combines measurements of different risk costs and benefits. Each existing criterion has several alternatives that can provide solutions, to find alternatives that are close to the user's wishes, then to identify them, multiplication is carried out on the predetermined priority scale.

Where Vi(x) is the evaluation value of an object i and wi is the weight that determines the value of how important element i is to other elements. While n is the number of elements. The total weight is 1. In summary, the steps in the MAUT method are as follows [9] :

* 1. Break a decision down into different dimensions.
	2. Determine the alternative weights on each dimension.
	3. List all alternatives
	4. Enter the utility for each alternative according to its attributes.
	5. Multiply the utility by the weight to determine the value of each alternative.

To calculate the overall evaluation value, it can be defined using several equations, formulated as follows [10] :

$ v\_{\left(x\right)= }\sum\_{i-1}^{n}WiVi(x)$....................... (1)

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$\sum\_{i=1}^{n}Wi$= 1 ……………………………. (2)

For each dimension, the *evaluation value* vi(x) is defined as the sum of the relevant attributes.

$vi\_{\left(X\right)}$= $\sum\_{e=Ai}^{}Wai.Vai\left(I\left(a\right)\right)$………. (3)

**Information:**

|  |  |  |
| --- | --- | --- |
| $$V\_{(x)}$$ | : | Evaluation value |
| n | : | Number of elements/criteria |
| i | : | Total weight is 1 |
| $$A\_{i}$$ | : | The set of all relevant attributes |
| Vai(1(a) | : | Evaluation of the actual level |
| Wow | : | The weight that determines the impact of the attribute evaluation on the dimension |
| Vi | : | The overall value of the alternative choices for a criterion |
| A | : | Criteria |

In summary, the steps in the MAUT method for calculating the normalized *Utility value* of the matrix for each alternative according to its attributes.

$U\_{(X)}$=$\frac{(X-Xi)}{Xi^{+}- Xi^{-}}$

**Information:**

|  |  |  |
| --- | --- | --- |
| U(x) | : | Alternative weight normalization |
| $$Xi^{-}$$ | : | Minimum criteria value (worst weight) |
| $$Xi^{+}$$ | : | Maximum criteria value (best weight) |
| X | : | Alternative weights |

Multiply *the utility* by the weight to find the value of each alternative.

**RESULTS AND DISCUSSION**

 In solving with the *MAUT method* , we need to determine the criteria needed to determine who will be selected as an alternative that has appropriate and good criteria.in providing incentives. The criteria are as follows:

Table 1 Criteria and Weight Data

|  |  |  |
| --- | --- | --- |
| **Code** | **Criteria** | **Weight** |
| C1 | Productivity | 40 |
| C2 | Quality of Work | 20 |
| C3 | Presence | 10 |
| C4 | Innovation | 5 |
| C5 | Total Turnover | 25 |

Table 2 Productivity Sub-Criteria Weights

|  |  |
| --- | --- |
| **Sub Criteria** | **Mark** |
| Productivity | 10 |
| No Productivity | 5 |

Table 3 Weight of Sub-Criteria for Work Quality

|  |  |
| --- | --- |
| Sub Criteria | Mark |
| Very good | 10 |
| Good | 9 |
| Pretty good | 8 |
| Not good | 7 |

Meanwhile, there are 10 (ten) alternatives, namely: Nadia, Dea, Novi, Jefry, Kiki, Ahmad, Doni, Dedi, Yudi, Andre.

The input data will be processed using the *multi attribute utility theory method* , to calculate the data using manual methods and system calculation methods. Then alternative data will be input into a system designed to input the value of each criterion owned by *sales* and this application is built using the *visual basic* programming language and *MySQL database* .

The manual calculation process of the *multi-attribute utility theory method* in providing incentives is to determine the alternatives first. The alternatives for assessing the provision of incentives that have been normalized are as follows:

**Table 4 Alternative Value Normalization Data**

| **Name** | **C01** | **C02** | **C03** | **C04** | **C05** |
| --- | --- | --- | --- | --- | --- |
| Nadia | 10 | 164 | 92 | 10 | 97 |
| Dea | 10 | 141 | 100 | 10 | 65 |
| New | 10 | 132 | 96 | 10 | 67 |
| Jeffrey | 10 | 185 | 100 | 10 | 67 |
| Kiki | 10 | 203 | 100 | 8 | 116 |
| Ahmad | 10 | 172 | 96 | 10 | 56 |
| Donny | 5 | 212 | 100 | 9 | 77 |
| Deddy | 5 | 147 | 100 | 10 | 77 |
| Yudi | 5 | 102 | 100 | 9 | 77 |
| Andrew | 10 | 184 | 100 | 10 | 91 |
| **Max** | **10** | **212** | **100** | **10** | **116** |
| **Min** | **5** | **102** | **92** | **8** | **56** |

The 2nd stage is to carry out normal weight correction using the following formula calculation:

$$Wj= \frac{Wj}{\sum\_{}^{}Wj}$$

**Where:**

|  |  |  |
| --- | --- | --- |
| Wj | : | Weight of each criteria |
| ∑Wj | : | The total weight of all criteria |

With the calculation of the formula above, the weight of improvement for criterion (C1) is as follows:

**Table 5** **Repair Weight**

|  |  |  |
| --- | --- | --- |
| **Code** | **Criteria** | **Repair** |
| C1 | Productivity | 0.4 |
| C2 | Quality of Work | 0.2 |
| C3 | Presence | 0.1 |
| C4 | Innovation | 0.05 |
| C5 | Total Turnover | 0.25 |

The next stage is the calculation of the *Utility Value* (U), by dividing the criteria value minus the minimum value by the maximum value minus the minimum value with the following formula:



Following are the values and their normalization results.

**Table 6 Results of MAUT Matrix Normalization**

| **Code** | **C01** | **C02** | **C03** | **C04** | **C05** |
| --- | --- | --- | --- | --- | --- |
| A01 | 1 | 0.56 | 0 | 1 | 0.68 |
| A02 | 1 | 0.35 | 1 | 1 | 0.15 |
| A03 | 1 | 0.27 | 0.5 | 1 | 0.18 |
| A04 | 1 | 0.75 | 1 | 1 | 0.18 |
| A05 | 1 | 0.92 | 1 | 0 | 1 |
| A06 | 1 | 0.64 | 0.5 | 1 | 0 |
| A07 | 0 | 1 | 1 | 0.5 | 0.35 |
| A08 | 0 | 0.41 | 1 | 1 | 0.35 |
| A09 | 0 | 0 | 1 | 0.5 | 0.35 |
| A10 | 1 | 0.75 | 1 | 1 | 0.58 |

The next stage is to multiply the normalization matrix by the preference weights using the following formula:



So that the following results are obtained:

**Table 7 Result Values**

| **Code** | **C01** | **C02** | **C03** | **C04** | **C05** |
| --- | --- | --- | --- | --- | --- |
| **Weight** | **0.4** | **0.2** | **0.1** | **0.05** | **0.25** |
| A01 | 0.4 | 0.1 | 0 | 0.05 | 0.17 |
| A02 | 0.4 | 0.1 | 0.1 | 0.05 | 0.04 |
| A03 | 0.4 | 0.1 | 0.05 | 0.05 | 0.05 |
| A04 | 0.4 | 0.2 | 0.1 | 0.05 | 0.05 |
| A05 | 0.4 | 0.2 | 0.1 | 0 | 0.25 |
| A06 | 0.4 | 0.1 | 0.05 | 0.05 | 0 |
| A07 | 0 | 0.2 | 0.1 | 0.03 | 0.09 |
| A08 | 0 | 0.08 | 0.1 | 0.05 | 0.09 |
| A09 | 0 | 0 | 0.1 | 0.03 | 0.09 |
| A10 | 0.4 | 0.15 | 0.1 | 0.05 | 0.15 |

And the ranking results are as follows:

Table 8 Ranking

| **Rank** | **Code** | **Name** | **Total** |
| --- | --- | --- | --- |
| 1 | A05 | Kiki | 0.93 |
| 2 | A10 | Andrew | 0.84 |
| 3 | A04 | Jeffrey | 0.75 |
| 4 | A01 | Nadia | 0.73 |
| 5 | A02 | Dea | 0.66 |
| 6 | A06 | Ahmad | 0.63 |
| 7 | A03 | New | 0.60 |
| 8 | A07 | Donny | 0.41 |
| 9 | A08 | Deddy | 0.32 |
| 10 | A09 | Yudi | 0.21 |

**CONCLUSION**

 This study successfully identified and applied a multi-criteria approach method for optimizing incentive provision. By using this method, various factors that affect employee performance can be considered holistically, including productivity, work quality, attendance, and innovation. The results of the study indicate that the application of this multi-criteria approach provides several main benefits, namely by considering various criteria in providing incentives, employees are more motivated to improve their overall performance, rather than just focusing on one particular aspect. Then the multi-criteria approach helps create a fairer and more transparent incentive system, because all relevant performance criteria are considered in the evaluation process. Employees feel more appreciated and recognized for their contributions in various aspects of their work, which in turn increases their job satisfaction and loyalty to the company. Company management gets a more effective tool to measure and assess employee performance comprehensively, so that decisions related to providing incentives become more accurate and reasonable.

 Overall, the implementation of a multi-criteria approach in providing incentives has proven effective in increasing employee motivation and performance, as well as creating a fairer and more transparent incentive system. This study suggests continuing to develop and refine this approach to ensure the sustainability of the benefits obtained and to adapt to the dynamics and needs of the company in the future.

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