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DECISION SUPPORT SYSTEM FOR EMPLOYEE CONTRACT EXTENSION USING TOPSIS METHOD (CASE STUDY: GOVERNMENT & ENTERPRISE SERVICE UNIT PT. TELKOM WITEL SUMSEL)

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Abstract

Government & Enterprise Service (GES) Unit serve and manage corporate & government customers. In achieving its goals, GES Unit needs to maintain quality employees by evaluating their employees because employee performance can affect customer satisfaction. They use Excel as assessment process by having several criteria. However, this process is not effective and allows subjectivity, so that may cause errors in judgment and make the process of the determining employee contract renewals quite complicated. A decision support system is needed which can help in managing the assessment of the contract employees. The TOPSIS method will be used because It tends to be more superior and often used in multi-criteria decision making so it can be able to find the best option to evaluate several alternatives. Of the five employees, only the A2 is not extended for the contract period. With this system, the process of determining employee contract extension becomes more efficient.

1.0 INTRODUCTION

Human resources become one part that affects the validity of a company, therefore every human resource is required to innovate and contribute as best as possible in order to make the company more advanced [1]. The performance of contract employees becomes important aspect in determining the extension of employee contracts because it as a form of evaluation of the quality of employees. If the contracts employees' performance is good, then the contract period will be extended, otherwise the employee will be dismissed.

PT. TELKOM is the largest telecommunication company, which constantly strives to improve the services in accordance with customer requirements. Government & Enterprise Service (GES) Unit serve and manage corporate & government customers. However, not all employees are permanent employees, but also there are contract employees. The assessment is carried out by Manager and Assistance Manager. The final result of the assessment is submitted to Infomedia as the basis for the extension or termintation of the employee contract. PT Infomedia Nusantara is a subsidiary of the Telkom Group. Infomedia's task is more focused on Outsourcing Business Process Services. So, if Telkom needs freelancers or outsourcing, Telkom will ask Infomedia to provide its human resources.

The current assessment process, still using Microsoft Excel by having several criteria in the assessment, there are attendance, target achievement (quantity), target achievement (quality), discipline, responsibility, self-adjustment, technical mastery, cooperation, and organizational understanding. However, this process is not effective and allows subjectivity, so that may cause errors in judgment and make the process of the determining employee contract renewals quite complicated.

The research by Rahim et al [3] in selecting the best employees use TOPSIS method in a decision support system because it can help managerial in getting competent candidates so that the results are more accurate. Sunarti [4] uses TOPSIS method to assess the quality of employee performance in determining who is eligible to be promoted. The research conducted by Lestari et al [5] in determining employee performance using the TOPSIS method can produces the best salesman who deserve to be promoted and get bonuses.

Based on the previous research above, the decision support system is needed in determining contract employees. Decision support system is a computerized system that can processes data into information, then it can help decision makers to make decisions [2]. In this case, TOPSIS method is used because it can take into account all types of criteria, both quantitative and qualitative data, where the TOPSIS concept is in accordance with the criteria in determining the extension of the employee contract period at the GES Unit, then the final result obtained is the order of the best employees from the highest to the lowest based on the preference value.

2.0 THEORETICAL

2.1. Decision Support System

Decision support system is a computerized system that is designed to support all stages in the decision-making, starting from identifying a problem, selecting the relevant data, determining the approach used in the decision-making process, and evaluating the alternatives [6]. Decision support systems are widely used by decision makers in overcoming problems by providing information and producing the right decisions. The purposes of decision support system are [7]:

1. Support in overcoming semi-structured and unstructured problems.
2. Assisting managers at various levels of management, from top-level to lower-level management.
3. Increase effectiveness rathere than efficiency in decision making.

2.2. Performance Appraisal

Performance appraisal is a method used to determine employee performance in a company. The results of the appraisal process is then submitted to the manager for consideration in making decisions [8]. This performance appraisal is usually carried out over a certain period.

2.3 Employee

Employee is someone who works at a company who performs in accordance with the job description that has been determined by the supervisor or leader of the company [9]. Based on their status, employees can be grouped into permanent employees and contract employees. Permanent employees can be defined as employees who work permanently in accordance with a written PKWTT (Indefinite Work Agreement) agreement with the company while contract employees are employees who work in a company whose status is not a permanent employee, they work for a certain period of time based on an agreement with the employing company.

2.4 TOPSIS Method

The Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method is based on the concept that the chosen alternative have the closest distance to positive ideal (PIS) and the furthest distance with negative ideal (NIS). PIS presents the best solution by maximizing benefit attributes and minimizing cost attributes, while NIS presents the opposite [10]. TOPSIS method is widely used in several fields, one of which is in decision making of human resource management.

The TOPSIS method consists of following steps:

1. Calculate the Normalized Decision Matrix

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x^2 ij}}$$

where:

r_{ij} = normalized matrix

x_{ij} = decision matrix
i = 1,2,3,…,m
j=1,2,3,…,n

2. Calculate the Weighted Normalized Decision Matrix

$$y_{ij} = w_i r_{ij}$$

where:
r_{ij} = normalized matrix
w = weight preferences.
i = 1,2,3,…,m
j=1,2,3,…,n

3. Determine Positive Ideal and Negative Ideal Solutions
Positive Ideal Solution:

$A^+ = (y_1^+, y_2^+, \ldots, y_n^+)$ (3)

$$y_j^+ = \begin{Bmatrix} max_i y_{ij}; & if\ j\ is\ benefit\ type \\ min_i y_{ij}; & if\ j\ is\ cost\ type \end{Bmatrix}$$

Negative Ideal Solution:

$A^- = (y_1^-, y_2^-, \ldots, y_n^-)$

$$y_j^- = \begin{Bmatrix} min_i y_{ij}; & if\ j\ is\ benefit\ type \\ max_i y_{ij}; & if\ j\ is\ cost\ type \end{Bmatrix}$$

4. Calculate the Separation Measures from The Positive and The Negative Ideal Solutions
Positive Ideal Solution:

$$\mathrm{Di}^+ = \sqrt{\sum_{j=1}^{n} (Y_i^+ - Y_{ij})^2}$$

Negative Ideal Solution:

$$\mathrm{Di}^- = \sqrt{\sum_{j=1}^{n} (Y_{ij} - Y_i^-)^2}$$

where :
$Yi+$ = the positive ideal solution
Yi^- = the negative ideal solution
Yij = weighted normalized matrix

5. Calculate Preference Values for Each Alternative

$$V_i = \frac{\mathrm{Di}^-}{\mathrm{Di}^- + \mathrm{Di}^+}$$

3.0 METHODOLOGY

One of the system development methods is the DSS (Decision Support System) system development method. There are several stages in the decision-making process. According to Utami and Ruskan [11], the process of making a decision is divided into 4 phases, such as:

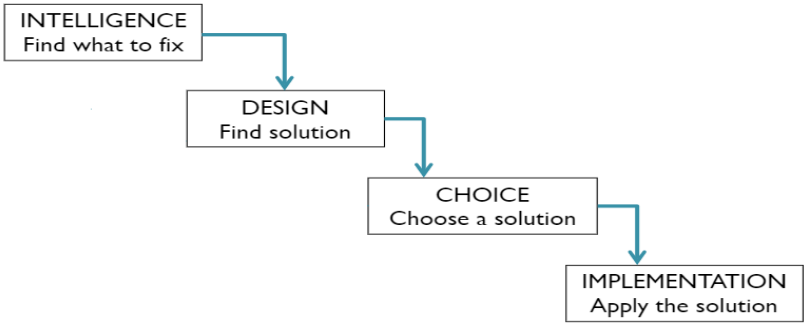

Figure 1. The Decision-Making Process

1. Intelligence Phase
   This phase is very important because before taking some actions, decision makers must conduct an investigation by defining the problematic scope in detail, then identifying the information that will be needed. Data was collected by means of interviews and direct observation at the GES unit. Data collection was carried out by conducting interviews with the Manager and making direct observations at the GES unit so that the authors could find and understand the problems. The result is the assessment using Excel allows errors in entering data, besides that the decision-making process takes a long time and allows subjective assessment.

2. Design Phase
   In this phase, decision makers analyzes and formulates alternatives to solve a problem then identifying and evaluating these alternatives. The author will make a design and explain in detail the current system modeling and the new system through Data Flow Diagrams, Entity Relationship Diagrams and make designs for the new system, so that a user interface design will be formed.

3. Choice Phase
   The process that occurs in this phase is the decision makers do the selections against the best alternatives among the alternatives. In this case, the author's solution is to offer calculations using the TOPSIS method.

4. Implementation Phase
   This phase is the implementation of the selected solution to solve the problem. The outcome of the decision can be adjusted if there is an improvement.

3.0 RESULANTS AND DISCUSSION

The following are the predefined criteria and the sub of criteria and all of the criteria are benefit type. These criteria are obtained from interviews with authorized persons in decision making:

Table 1. Criteria

Criteria Code	Description	Criteria Weight
C1	Attendance	15%
C2	Target Achievement (Quantity)	15%
C3	Target Achievement (Quality)	15%
C4	Dicipline	15%
C5	Responsibility	10%
C6	Self-Adjustment	5%
C7	Technical Mastery	15%
C8	Cooperation	5%
C9	Organizational Understanding	5%

Attendance is measured by the number of absences of contract employees for one year.

Table 2. Sub criteria of Attendance

Attendance	Description	Value
Always Present	Very Good	5
Permit < 3 days	Good	4
Permit > 3 days	Enough	3
Absent > 5 days	Bad	2
Absent > 10 days	Very Bad	1

Target Achievement Criteria (Quantity) is measured based on the achievement of employee targets that have been determined by the work unit.

Table 3. Sub criteria of Target Achievement (Quantity)

Target Achievement	Description	Value
Target Achievement 81%-100%	Very Good	5
Target Achievement 61%-80%	Good	4
Target Achievement 41%-60%	Enough	3
Target Achievement 21%-40%	Bad	2
Target Achievement 0%-20%	Very Bad	1

Target Achievement (Quality) is measured by the employee's ability to

complete their work, timeliness and accuracy.

Table 4. Sub criteria of Target Achievement (Quality)

No	Sub criteria	Description	Value
1	Punctuality in completing work in accordance with the target set	Very Good	5
		Good	4
		Enough	3
		Bad	2
		Very Bad	1
2	Thoroughness and perseverance in completing work	Very Good	5
		Good	4
		Enough	3
		Bad	2
		Very Bad	1

Discipline is measured by employee obedience to SOP, ROG and Company Regulations.

Table 5. Sub criteria of Dicipline

No	Sub criteria	Description	Value
1	Discipline towards company regulations both written and unwritten	Very Good	5
		Good	4
		Enough	3
		Bad	2
		Very Bad	1
2	Dicipline towards SOP (Standard Operating Procedure)	Very Good	5
		Good	4
		Enough	3
		Bad	2
		Very Bad	1
3	Dicipline towards ROG (Rule of The Game)	Very Good	5
		Good	4
		Enough	3
		Bad	2
		Very Bad	1

Responsibility is measured from all consequences and impacts generated by the employee's performance.

Table 6. Sub criteria of Responsibility

No	Subcriteria	Description	Value
1	Carrying out and completing the work for which their responsibility	Very Good	5
		Good	4
		Enough	3
		Bad	2
		Very Bad	1
2	Provide good service to customers	Very Good	5
		Good	4
		Enough	3
		Bad	2
		Very Bad	1
3	Quick action in resolving existing problems	Very Good	5
		Good	4
		Enough	3
		Bad	2
		Very Bad	1

Self-adjustment is measured by the employee's ability to adapt to the work environment and job challenges.

Table 7. Sub criteria of Self-Adjustment

No	Sub criteria	Description	Value
1	Adapting to the work environment	Very Good	5
		Good	4
		Enough	3
		Bad	2
		Very Bad	1
2	Meet job demands	Very Good	5
		Good	4
		Enough	3
		Bad	2
		Very Bad	1
3	Have good relationships with internal and external units	Very Good	5
		Good	4
		Enough	3
		Bad	2
		Very Bad	1

Technical mastery is measured by the employee's ability to have knowledge and skills and experience that supports task completion.

Table 8. Sub criteria of Techniqal Mastery

No	Sub criteria	Description	Value
1	Have knowledge and skills in carrying out the job according to job description	Very Good	5
		Good	4
		Enough	3
		Bad	2
		Very Bad	1
2	Have experience in other fields outside of job description	Very Good	5
		Good	4
		Enough	3
		Bad	2
		Very Bad	1

Cooperation is measured by the employee's ability to interact with other work units in an effort to complete work.

Table 9. Sub criteria of Cooperation

No	Sub criteria	Description	Value
1	Ability to coordinate with internal and external units	Very Good	5
		Good	4
		Enough	3
		Bad	2
		Very Bad	1

Organizational Understanding is measured by the employee's ability to

understand the field of business and organizational structure and corporate culture.

Table 10. Sub criteria of Organizational Understanding

No	Sub criteria	Description	Value
1	Understanding of the business field	Very Good	5
		Good	4
		Enough	3
		Bad	2
		Very Bad	1
2	Understanding of the company's organizational structure	Very Good	5
		Good	4
		Enough	3
		Bad	2
		Very Bad	1
3	Understanding of company culture	Very Good	5
		Good	4
		Enough	3
		Bad	2
		Very Bad	1

There are 5 sample of contract employees that we took from different job description.

Table 11. Alternatives Data

Employees Name	Alternatives	Job Description
Wiwik	A1	AM
Ahmad	A2	AM
Saputra	A3	EOS
Maya	A4	Inputer
Ade	A5	Payment

Table 12. Alternative Value Data

Criteria		Alternatives (A1)
Attendance (C1)		5
Target Achievement (Quantity) (C2)		4
Criteria	Sub criteria	Alternatives (A1)
Target Achievement (Quality) (C3)	Punctuality in completing work in accordance with the target set	4
	Thorougness and perseverance in completing work	4
Dicipline (C4)	Dicipline towards company regulations both written and unwritten	5
	Dicipline towards SOP (Standard Operating Procedure)	5
	Dicipline towards ROG (Rule of The Game)	4
Responsible (C5)	Carrying out and completing the work for which their responsibility	5
	Provide good service to customers	4
	Quick actions in resolving existing problems	4
Self-Adjustment (C6)	Adapting to the work environment	4
	Meet job demands	5
	Have good relationships with internal and external units	4
Techniqal Mastery (C7)	Have knowledge and skills in carrying out the job according to job description	3
	Have experience in other fields outside of job description	3
Cooperation (C8)	Ability to coordinate with internal and external units	4
Organizational Understanding (C9)	Understanding of the business field	4
	Understanding of the company's organizational structure	3
	Understanding of company culture	3

Steps in TOPSIS:

1. Make a Decision Matrix

$$R = \begin{bmatrix} 5 & 4 & 4 & 5 & 4 & 4 & 3 & 4 & 3 \\ 5 & 2 & 3 & 2 & 3 & 3 & 3 & 4 & 3 \\ 5 & 4 & 4 & 4 & 4 & 4 & 5 & 5 & 4 \\ 4 & 4 & 4 & 4 & 4 & 4 & 4 & 4 & 4 \\ 4 & 4 & 4 & 4 & 4 & 4 & 3 & 4 & 3 \end{bmatrix}$$

2. Calculate the Normalized Decision Matrix

Table 13. Normalized Decision Matrix

R	C1	C2	C3	C4	C5	C6	C7	C8	C9
R1	0.4833	0.4850	0.4681	0.5698	0.4681	0.4681	0.3638	0.4239	0.3905
R2	0.4833	0.2425	0.3511	0.2279	0.3511	0.3511	0.3638	0.4239	0.3905
R3	0.4833	0.4850	0.4681	0.455	0.4681	0.4681	0.6063	0.5299	0.5207
R4	0.3866	0.4850	0.4681	0.4558	0.4681	0.468	0.4850	0.4239	0.5207
R5	0.3866	0.4850	0.4681	0.4558	0.4681	0.4681	0.3638	0.4239	0.3905

3. Calculate the Wighted Normalized Decision Matrix

y_{12} = 0.15 * 0.485071 = 0.072761
y_{22} = 0.15 * 0.242536 = 0.03638
y_{32} = 0.15 * 0.485071 = 0.072761
y_{42} = 0.15 * 0.485071 = 0.072761
y_{52} = 0.15 * 0.485071 = 0.072761

4. Determine Positive Ideal and Negative Ideal Solutions

Table 14. Positive Ideal Solutions Matrix

Y_1^+	**0.072505**
Y_2^+	0.072761
Y_3^+	0.070225
Y_4^+	0.08547
Y_5^+	0.046816
Y_6^+	0.023408
Y_7^+	0.090951
Y_8^+	0.0265
Y_9^+	0.026038

Table 15. Negative Ideal Solutions Matrix

Y_1^-	**0.058004**
Y_2^-	0.03638
Y_3^-	0.052669
Y_4^-	0.034188
Y_5^-	0.035112
Y_6^-	0.017556
Y_7^-	0.054571
Y_8^-	0.0212
Y_9^-	0.019528

5. Calculate the Separation Measures from The Positive and The Negative Ideal Solutions

Table 16. Positive Ideal Solution Distance

D_1^+	**0.037336**
D_2^+	0.076334
D_3^+	0.017094
D_4^+	0.029351
D_5^+	0.043549

Table 17. Negative Ideal Solution Distance

D_1^-	**0.068141**
D_2^-	0.014501
D_3^-	0.067647
D_4^-	0.057837
D_5	0.054514

6. Calculate Preference Values For Each Alternative

$V_1 = \frac{0.068141}{(0.068141+0.037336)} = 0.646024$

$V_2 = \frac{0.014501}{(0.014501+0.076334)} = 0.159642$

$V_3 = \frac{0.067647}{(0.067647+0.017094)} = 0.798278$

$V_4 = \frac{0.057837}{(0.057837+0.029351)} = 0.663361$

$V_5 = \frac{0.054514}{(0.054514+0.043549)} = 0.555912$

7. Determine the Alternatives Rank

Table 18. Alternatives Rank

Alternatives	Job Descrription	Value
A3	EOS	0.798278
A4	Inputer	0.663361
A1	AM	0.646024
A5	Payment	0.555912
A2	AM	0.159642

Based on the range of values that has been determined by GES Unit, contract employees who have a final value from 0.40 to 1 their contract will be extended, while contract employees who have a final value from 0.39 - 0 their contract will not be extended. From the results of the assessment above, only the A2 alternative is not extended for the contract period.

5.0 CONCLUSION

This system is expected to make it easier for the GES Unit especially for the Manager, Assistance Manager and the Infomedia Team in determining the employee contract extensions. The calculation process in obtaining data in this decision support system uses the TOPSIS method because it can produces alternatives that have the furthest distance from the negative ideal solution and the closest distance from positive ideal solution, so that the results obtained are more accurate. With this system, the process of determining employee contract extension becomes more efficient because the assessment team and the Infomedia team can be directly connected through the system, so the result of the assessment that entered by the assessment team can be seen directly by the Infomedia team. In addition, the Infomedia team can also validate the employee contract extension and the results of employee validation from the Infomedia team can be seen by the admin.

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