



Implementation of Computer Based Systems as Efficiency of Manager Decisions in Employee Reward

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Abstract – The purpose of this study is to provide support to management in determining employees who are entitled to employee reward based on competence using a computer-based system. Rewards for employees are aimed at motivating employees. The method used is the Preference Selection Index (PSI), which has the advantage of being able to produce criteria weight values without identifying using the weighting method.

Keywords - Decision Support System, Employee Reward, Computer Base System, DSS, PSI

1 INTRODUCTION

A reward is a form of motivation for the company to an employee that is usually given in material. Giving rewards to these employees must meet certain criteria related to discipline, responsibility, performance, and productivity. This is the determination of the company. Often the gift of reward is constrained by problems such as decisions that are not objective, proximity factors, so the decisions produced have not been fully effective. To overcome these problems needed a system known as a decision support system or known as the DSS. DSS is a computer-based system that aims to help management to overcome problems both structured and semi-structured [1].

The application of DSS is not intended to replace management decisions but aims to provide support for management decisions. Several methods can be used to improve decision outcomes, including PSI, TOPSIS, AHP, MOORA, Promethee [2], [3]. In its application, many DSS are implemented to solve problems in the field of management. As what Mesran did in 2017 in choosing the best lecturers to apply the ELECTRE method. The results of the research on the efficiency of the application of ELECTRE quite help high school leaders in determining the best lecturers[4].

In this study, the authors used the Preference Selection Index (PSI) method in determining employees who will be given rewards. The advantage in using the PSI method, the weight can be generated from existing alternatives, so the results obtained are better than using AHP, ROC or other methods in producing weighting.

2 THEORY

2.1 Decision Support System (DSS)

Decision support system (DSS) was first put forward in early 1970 by Michael S. Scott Morton with the term Management Decision System. This term appears for the use of computers in the decision-making process. DSS is defined as an information system is helping in making decisions for management that is semi-structured or unstructured[5]–[7].

2.2 Employee Rewards

The reward is an award or gift, which aims to make employees become enthusiastic, enterprising and more diligent at work. Giving rewards will greatly affect productivity and performance in the company or agency because it can provide material or non-material satisfaction for employees.

2.3 Preference Selection Index (PSI)

The application of the Preference Selection Index (PSI) method is useful when there is a conflict in determining the importance of training between attributes. At the PSI calculation stage, the criteria weights are determined by the X_{ij} matrix rating contained in the decision matrix, with standard deviations or entropy methods will be able to objectively identify the criteria weights. Some steps to develop the PSI method[8]–[10]:

1. Making a decision matrix



$$X_{ij} = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \dots & \dots & \dots & \dots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix} \quad (1)$$

2. Normalize the decision matrix

In making a normalized decision matrix using equations (2) and (3). For equation (2) it is an attribute of profit (benefit).

$$R_{ij} = \frac{x_{ij}}{x_{j \max}} \quad (2)$$

For the cost attribute use equation 3.

$$R_{ij} = \frac{x_{j \min}}{x_{ij}} \quad (3)$$

3. Determination of the average value (N_j) of the normalized matrix

$$N_j = \frac{1}{n} \sum_{i=1}^m R_{ij} \quad (4)$$

4. Calculating the value of variation preferences (∅_j).

$$\emptyset_j = \sum_{i=1}^m [R_{ij} - N_j]^2 \quad (5)$$

5. Calculating the deviation of the preference value (Ω_j).

$$\Omega_j = 1 - \emptyset_j \quad (6)$$

6. Determine the criteria weights (W_j).

$$w_j = \frac{\Omega_j}{\sum_{j=1}^n \Omega_j} \quad (7)$$

7. Determine the preference index (Θ_i)

$$\Theta_i = \sum_{j=1}^m (R_{ij} \cdot w_j) \quad (8)$$

The highest alternative preference value is the best alternative.

3 RESULT AND DISCUSSION

Determining the eligibility of giving rewards to employees there are several obstacles that often occur. This is because there are no detailed criteria used in selecting the best employees. This is the problem at hand and must be solved by a method so that the results will be better. In this study, an attempt was made to prove and validate the application of the Preference Selection Index (PSI) method in providing decision efficiency for management. Following is the criteria table.

Table 1. Criteria

Description	Type
Communication (C1)	Benefit
Behavior (C2)	Benefit
The performance (C3)	Benefit
Presence (C4)	Benefit
Responsible(C5)	Benefit

Table 2. Criteria Value Weighting

Value	Weighted
Very Good	4
Good	3
Enough	2
Bad	1

The following are alternative employees who will be given rewards.

Table 3. Employee Alternative

Alternative	Criteria				
	C ₁	C ₂	C ₃	C ₄	C ₅



A1	Very Good	Enough	Enough	Very Good	Enough
A2	Good	Good	Very Good	Very Good	Enough
A3	Good	Enough	Enough	Enough	Good
A4	Very Good	Very Good	Very Good	Good	Very Good
A5	Very Good	Enough	Enough	Enough	Good
A6	Good	Enough	Enough	Very Good	Very Good
A7	Very Good	Enough	Enough	Bad	Enough
A8	Very Good	Good	Very Good	Good	Good
A9	Very Good	Very Good	Good	Good	Very Good
A10	Good	Very Good	Very Good	Good	Very Good
A11	Very Good	Very Good	Very Good	Good	Very Good
A12	Good	Good	Very Good	Very Good	Good
A13	Good	Good	Good	Very Good	Good
A14	Very Good	Good	Very Good	Good	Good
A15	Good	Very Good	Good	Very Good	Very Good

Based on table 2, the weighting is carried out, so that the results obtained are matched rating as follows.

Table 4. Match Rating

Alternative	Criteria				
	C ₁	C ₂	C ₃	C ₄	C ₅
A1	4	2	2	4	2
A2	3	3	4	4	2
A3	3	2	2	2	3
A4	4	4	4	3	4
A5	4	2	2	2	3
A6	3	2	2	4	4
A7	4	2	2	1	2
A8	4	3	4	3	3
A9	4	4	3	3	4
A10	3	4	4	3	4
A11	4	4	4	3	4
A12	3	3	4	4	3
A13	3	3	3	4	3
A14	4	3	4	3	3
A15	3	4	3	4	4

At the completion of a computer-based system requires the data contained in tables 1-3, so as to produce a match rating table, as shown in table 4. The settlement by applying the PSI method begins with making the match rating a X_{ij} matrix, as shown below:

$$X_{ij} = \begin{pmatrix} 4 & 2 & 2 & 4 & 2 \\ 3 & 3 & 4 & 4 & 2 \\ 3 & 2 & 2 & 2 & 3 \\ 4 & 4 & 4 & 3 & 4 \\ 4 & 2 & 2 & 2 & 3 \\ 3 & 2 & 2 & 4 & 4 \\ 4 & 2 & 2 & 1 & 2 \\ 4 & 3 & 4 & 3 & 3 \\ 4 & 4 & 3 & 3 & 4 \\ 3 & 4 & 4 & 3 & 4 \\ 4 & 4 & 4 & 3 & 4 \\ 3 & 3 & 4 & 4 & 3 \\ 3 & 3 & 3 & 4 & 3 \\ 4 & 3 & 4 & 3 & 3 \\ 3 & 4 & 3 & 4 & 4 \end{pmatrix}$$



The next step is to normalize the decision matrix. The benefit criteria use equation 2, while the cost criteria use equation 3. The results of normalizing the decision matrix are as follows:

$$R_{ij} = \begin{vmatrix} 1.00 & 0.50 & 0.50 & 1.00 & 0.50 \\ 0.75 & 0.75 & 1.00 & 1.00 & 0.50 \\ 0.75 & 0.50 & 0.50 & 0.50 & 0.75 \\ 1.00 & 1.00 & 1.00 & 0.75 & 1.00 \\ 1.00 & 0.50 & 0.50 & 0.50 & 0.75 \\ 0.75 & 0.50 & 0.50 & 1.00 & 1.00 \\ 1.00 & 0.50 & 0.50 & 0.25 & 0.50 \\ 1.00 & 0.75 & 1.00 & 0.75 & 0.75 \\ 1.00 & 1.00 & 0.75 & 0.75 & 1.00 \\ 0.75 & 1.00 & 1.00 & 0.75 & 1.00 \\ 1.00 & 1.00 & 1.00 & 0.75 & 1.00 \\ 0.75 & 0.75 & 1.00 & 1.00 & 0.75 \\ 0.75 & 0.75 & 0.75 & 1.00 & 0.75 \\ 1.00 & 0.75 & 1.00 & 0.75 & 0.75 \\ 0.75 & 1.00 & 0.75 & 1.00 & 1.00 \end{vmatrix}$$

The next step is calculating the mean value using equation 4.

- $N_1 = 0.8833$
- $N_2 = 0.7500$
- $N_3 = 0.7833$
- $N_4 = 0.7833$
- $N_5 = 0.8000$

After the mean value is obtained then calculating the variation preference value (\emptyset_j) using equation 5.

- $\emptyset_1 = 0.2333$
- $\emptyset_2 = 0.6250$
- $\emptyset_3 = 0.7333$
- $\emptyset_4 = 0.7333$
- $\emptyset_5 = 0.5250$

Then calculate the deviation using equation 6.

- $\Omega_1 = 0.7667$
- $\Omega_2 = 0.3750$
- $\Omega_3 = 0.2667$
- $\Omega_4 = 0.2667$
- $\Omega_5 = 0.4750$

The next step is using equation 7, to determine the weight of each criterion. The results are as follows:

- $W_1 = 0.3566$
- $W_2 = 0.1744$
- $W_3 = 0.1240$
- $W_4 = 0.1240$
- $W_5 = 0.2209$

The final step is to determine the value of the preference selection index by using equation 8.

Table 5. Alternative ranking

Alternative	\emptyset_i	Rank	Description
A4	0.96899	1	Good Performance
A11	0.96899	1	Good Performance
A9	0.93798	2	Good Performance
A15	0.87984	3	Good Performance
A10	0.87984	3	Good Performance
A8	0.87016	4	Good Performance



A14	0.87016	4	Good Performance
A12	0.81202	5	Good Performance
A13	0.78101	6	Good Performance
A6	0.76163	7	Good Performance
A2	0.75678	8	Good Performance
A1	0.74031	9	Enough Performance
A5	0.73353	10	Enough Performance
A7	0.64729	11	Enough Performance
A3	0.64438	12	Enough Performance

The results are seen at the highest value at 0.96899 and the lowest at 0.64438. At this stage, management can decide employees who get a reward can be at a value above 0.75, according to specified. So that it can be decided that there are 15 employees, 11 of whom have good performance are rewarded.

4 CONCLUSION

From the results of the study concluded that the computer-based system in determining employee reward can be determined quickly and easily by using the Preference Selection Index (PSI) method. When compared with other methods, the PSI becomes more effective, because the required weights are generated directly from the rating value of the alternatives.

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