



The Best Employee Selection Decision Support System at The Tribeca Condominium Apartment with the Promethee Method

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Article Info

Article history:

Received Nov 26, 2020

Revised Dec 20, 2020

Accepted Dec 27, 2020

Keywords:

Selection,
Best employee,
Decision Support System,
Promethee.

ABSTRACT

Employee development is highly dependent on company performance appraisal. Therefore we need a system that can provide the right decisions in determining the best employees so that employees are motivated to improve their work. For the selection of the best employees, the Preference Ranking Organization Method For Enrichment Evaluation (Promethee) method is used to determine the ranking of employees. The Promethee method is a method of determining the order (priority) in a multicriteria analysis. This method is used in this study because this method is quite good at taking into account the characteristics of the data and its multicriteria (can calculate many criteria) so that it can help decision makers assess the performance of each employee according to existing criteria.

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1. INTRODUCTION

Company performance is one of the main factors in facing the globalization era and has very important factors to determine the success of an organization. In some situations, personnel often cannot determine the rank of all employees. This is because there is no proper calculation system in carrying out the ranking process based on its performance. This can lead to inappropriate results in the form of decision making for selecting the best employees.

Tribeca Condominium Apartment is a part of Podomoro City in Medan City. The Tribeca Condominium Apartment is designed to be a modern minimalist and elegant residential place for those who are interested in this apartment. In the business management of the Tribeca Condominium apartment, there are a large number of human resources (HR) with the aim of facilitating the activities of running work procedures every day.

Companies use the information obtained to evaluate employee performance. In this case, the valuation information in the company is still a confidential archive (performance standard document). When staff reductions occur, personnel sometimes find it difficult to differentiate between employees and tend to make short-term decisions, for example, today there are several employees who are performing well. So immediately the manager may decide that the employee is the best employee among the others.

Personnel often find some problems in the results of the assessment itself. The difficulty of judging by many criteria becomes a problem that must be borne by the supervisor. In this case the

supervisor really has to be bothered with the many criteria documents, employee documents, and assessment documents. While many employees must be assessed. This consequence can cause a big influence on employees in terms of performance achievement. Ineffective assessments can lead to decreased employee performance.

Employee development is highly dependent on company performance appraisal. Therefore we need a system that can provide the right decisions in determining the best employees so that employees are motivated to improve their work. For the selection of the best employees, the Preference Ranking Organization Method For Enrichment Evaluation (Promethee) method is used to determine the ranking of employees. The Promethee method is a method of determining the order (priority) in a multicriteria analysis. This method is used in this study because this method is quite good at taking into account the characteristics of the data and its multicriteria (can calculate many criteria) so that it can help decision makers assess the performance of each employee according to existing criteria.

Previous research was conducted by Setya Pami with the research title "The Best Employee Selection Decision Support System Using the Promethee Method", a case study of this research was conducted at PT. Karya Abadi Mandiri. In this study, the criteria used as a reference for selecting the best employees were honesty, appearance, personality, presence, loyalty, responsibility, discipline, and achievement. This study concluded that it can simplify the process of selecting the best employees at PT. Karya Abadi Mandiri.

Previous research has also been conducted by Muhammad Mukhtar with the research title "Application of the Best Employee Selection Decision Support System Using the Promethee Method at PRIMKOPTI South Jakarta". In this study, the criteria used as a reference for selecting the best employees are discipline, responsibility, initiative, cooperation, honesty, neatness, dedication, and work quality. This study concluded that it can facilitate the process of selecting the best employees at PRIMKOPTI South Jakarta.

2. RESEARCH METHOD

The research framework in this study uses the waterfall model. The research framework with the waterfall model used in this research can be seen in the following figure:

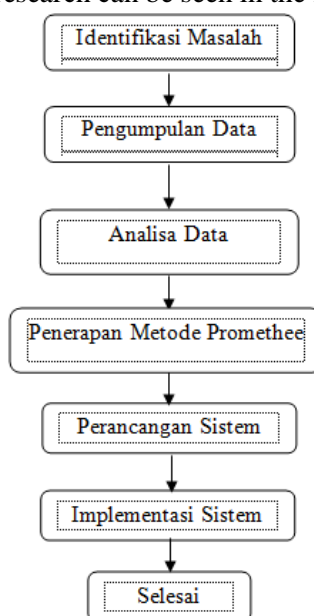


Figure 1. Research framework

The explanation of the framework using the waterfall method carried out in this study is as follows:

a. Problem Identification

At this stage, learn about the introduction of problems contained in the Tribeca Condominium Apartment. These problems include the number of criteria documents, employee documents, and assessment documents. While many employees must be assessed. This consequence can

cause a big influence on employees in terms of performance achievement. Ineffective assessments can lead to decreased employee performance.

b. Data Collection

At the data collection stage, namely conducting a field study to collect the data needed in this study, the data collection techniques used were:

1. Observation

Conducting direct observations at the research location to collect data related to the procedure for selecting the best employees at the Tribeca Condominium Apartment.

2. Interview

Conducting interviews with related parties regarding the ongoing system for the best employee selection procedure at the Tribeca Condominium Apartment.

The interview process carried out is as follows:

- a. Make a schedule and agenda for the parties involved, including the manager and the Tribeca Condominium Apartment.
- b. Make questions both strategic and technical in nature to find out user needs for the application.
- c. Set up a notebook or voice recorder.
- d. Asking questions that have been prepared to the manager and the Tribeca Condominium Apartment.
- e. Asking the Tribeca Condominium Apartment about the availability of providing employee data.
- f. Record and summarize all the results that have been obtained.

3. RESULTS AND DISCUSSION

Data analysis is the stage carried out by the writer to describe the results of the data collection process in the research carried out. The data analysis for selecting the best employees at the Tribeca Condominium Apartment in this study is as follows:

1. Alternative employee data

Namely the names of employees who are used as examples The author in determining the Best Employee. Alternative employee data used in this system are: Adriyani, ElviYusnita, Devi K, Fadhli Akbar, and Teti H.

2. Criteria data

Criteria data are in the form of variables used as measurements in determining position and career planning, consisting of:

- a. Assessment of Employee Performance from Leaders
- b. Academic Qualifications
- c. Presence
- d. Appearance
- e. Loyalty

The employee performance appraisal form follows the standard values set by the company with the value criteria, namely;

a. Employee Performance Appraisal.

This data is the result of an employee performance appraisal from the leadership. The assessment is carried out by the leadership based on the work performance of each employee. Employee performance appraisal variables can be seen in Table 1 below.

Table 1. Employee Performance Assessment Variables

No	Penilaian Karyawan	Penilaian	Skor Nilai
1	Kemampuan terhadap pekerjaan tidak baik	Diragukan	<40
2	Kemampuan terhadap pekerjaan kurang baik	Cukup	60
3	Kemampuan terhadap pekerjaan cukup baik	Cukup Baik	70

4	Kemampuan terhadap pekerjaan baik	Baik	80
5	Kemampuan terhadap pekerjaan sangat baik	Sangat Baik	90

b. Academic Qualifications

In this data, what will be assessed is the highest education history that the employee has obtained. Educational degrees that are assessed start from high school to doctoral degrees by attaching a copy of the certificate that is written and has been legalized by the university concerned. The variable for assessing academic qualifications can be seen in Table 2 below.

Table 2. The Variable of Academic Qualification Assessment

No	Jenjang Akademik	Penilaian	Skor Nilai
1	SMA	Sangat Kurang	5
2	Diploma	Kurang	10
3	D4	Cukup	10
4	S1	Cukup Baik	20
5	S2	Baik	30
6	S3	Sangat Baik	40

c. Presence

Attendance is an assessment for the consistency of employees being present in every job. The attendance criteria are assessed every 6 months. The presence variable can be seen in Table 3 below.

Table 3. Attendance Assessment Variables

No	Kehadiran	Penilaian	Skor Nilai
1	50%	Sangat Buruk	0
2	60%	Buruk	20
3	70%	Cukup Buruk	40
4	80%	Cukup Baik	60
5	90%	Baik	80
6	100%	Sangat Baik	100

d. Appearance

Appearance is an assessment of the employee's appearance at work. Performance assessment variables can be seen in Table 4 below.

Table 4. Appearance Assessment Variables

No	Penampilan	Penilaian	Skor Nilai
1	Penampilan kusut dan kotor	Tidak Bagus	10
2	Penampilan kusut	Kurang Bagus	20
3	Penampilan cukup rapi	Cukup Bagus	30
4	Penampilan rapi	Bagus	40
5	Penampilan rapi dan bersih	Sangat Bagus	50

e. Loyalty

Loyalty is an assessment of actions that show constant support and adherence to the company. The loyalty variable can be seen in Table 5 below.

Table 5. Loyalty Assessment Variables

No	Loyalitas	Penilaian	Skor Nilai
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1	Integritas dalam bekerja tidak bagus	Tidak Bagus	60
2	Integritas dalam bekerja kurang	Kurang Bagus	70
3	Integritas dalam bekerja cukup	Cukup Bagus	80
4	Integritas dalam bekerja bagus	Bagus	90
5	Integritas dalam bekerja sangat bagus	Sangat Bagus	100

Promethee Method Analysis

Method analysis is the stage carried out to carry out the problem-solving analysis process in selecting the best employees at the Tribeca Condominium Apartment using the promethee method that has been chosen by the author in this study. Calculations carried out using the promethee method in the process of selecting the best employees at the Tribeca Condominium Apartment will produce a ranking output where the winner of the highest score will be selected as the best employee at the Tribeca Condominium Apartment.

Promethee steps:

1. Determination of Alternatives

The alternatives used for the calculation of the Promethee method are as follows.

- a. Andriyani
- b. Elvi Yusnita
- c. Devi K
- d. Fadhli Akbar
- e. Teti H

2. Specifying the Preference Type

The types of preferences used in the creation of this system are:

a. Quasi Criteria (Quasi Criterion)

Quasi criteria (Criterion II) are used for the manpower category, which is included in this category, namely the criteria f_2 (.) = Academic qualifications and f_4 (.) = Work Experience.

H (d):

$$0 \text{ if } -q \leq d \leq q$$

$$1 \text{ if } d < -q \text{ or } d > q$$

b. Linear Preference Criteria (Criterion with linear Preference)

The Linear Preference Criteria (Criterion III) is used for the Operational Criteria category, which belongs to this category, namely f_1 (.) = Job Assessment of Branch Managers, f_3 (.) = Psychological Test.

H (d):

$$d / p \text{ if } -p \leq d \leq p$$

$$1 \text{ if } d < -p \text{ or } d > p$$

3. Define the minimum-maximum rule, preference type and parameters

The parameters that apply to each preference will be different, depending on the selected preference, for example, preference II (Quasi) is q and preference III (Linear Preference) is p . The value for the q parameter is close to the minimum deviation (difference between alternatives). The value for the p parameter is close to the maximum deviation (difference between alternatives). For example: the difference between alternatives is 5, 10, 10, 18, 25, 30. The minimum deviation is 5, then the value of q is between 6-9. The maximum deviation is 30, so the p value is between 26-29. So that the value of $q = 8$ and $p = 27$.

Based on interviews conducted by the author with the head of the Best Employee Selection Team at the Tribeca Condominium Apartments, values for each alternative are generated by considering predetermined criteria. The value data for each criterion can be seen in Table 6 below.

Table 6. Value data for each criterion

No.	Alternatif	Data nilai dari kriteria				
		PKK	KA	KH	PN	LY
1	Andriyani	80	20	70	30	86
2	Elvi Yusnita	84	20	90	30	77
3	Devi K	80	10	80	20	90
4	Fadhli Akbar	83	10	80	20	89
5	Teti H	79	30	80	30	80

Based on the value data in Table 6, the values for each alternative are generated by considering the predetermined criteria. Minmax rules can be seen in Table 7 below.

Table 7. Minimum-Maximum Rules, Preference Types and Parameters

Kriteria	Min/Max	Alternat f					Tipe Preferensi	Parameter	
		A1	A2	A3	A4	A5		P	Q
f1 (.)	Max	80	84	80	83	79	III (Tiga)	4,5	-
f2 (.)	Max	20	20	10	10	30	II (dua)	-	-15
f3 (.)	Max	70	90	80	80	80	III (Tiga)	5	-
f4 (.)	Max	30	30	20	20	30	II (dua)	-	-5
f5 (.)	Max	86	77	90	89	80	III (tiga)	9,5	-

The explanation from the table above in terms of determining the parameters for each criterion is as follows:

For example for f1 (.):

The difference between A1 and A2 is $80 - 84 = -4$

The difference between A1 and A3 is $80 - 80 = 0$

The difference between A1 and A4 is $80 - 83 = -3$

The difference between A1 and A5 is $80 - 79 = 1$

The difference between A2 and A3 is $84 - 80 = 4$

The difference between A2 and A4 is $84 - 83 = 1$

The difference between A2 and A5 is $84 - 79 = 5$

The difference between A3 and A4 is $80 - 83 = -3$

The difference between A3 and A5 is $80 - 79 = 1$

The difference between A4 and A5 is $83 - 79 = 4$

The explanation from the table above in terms of determining the parameters for each criterion is as follows:

F1 (.) =

80 84 80 83 79

-4 4 -3 4

0 1

-3 5

1

The criterion parameter f1 (.) Is P, the P parameter is the difference in values that is close to the maximum deviation. In this case the difference between the maximum deviation is 4 5, for the table above for the criteria f1 (.) Parameter P = 4.5 is selected.

F2 (.) =

20	20	10	10	30
0	10	0	-20	
10	10	-20		
10	-10			
-10				

The criterion parameter f2 (.) Is Q, the Q parameter is the difference in values that is close to the minimum deviation. In this case the minimum deviation difference is -20 - -10, for the above table for the criteria f2 (.) The parameter Q = -15 is selected.

F3 (.) =

70	80	80	70	80
-10	0	10	-10	
10	10	0		
0	0			
-10				

The criterion parameter f3 (.) Is P, the P parameter is the difference in values that is close to the maximum deviation. In this case the difference between the maximum deviation is 0 10, for the above table for the criteria f3 (.) Parameter P = 5 is selected.

F4 (.) =

30	30	20	20	30
0	10	0	-10	
10	10	-10		
10	0			
0				

The criterion parameter f4 (.) Is Q, the Q parameter is the difference in values that is close to the minimum deviation. In this case the difference between the minimum deviation is -10 - 0, for the above table for the criteria f4 (.) The parameter Q = -5 is selected.

F5 (.) =

86	77	90	89	80
9	-13	1	9	
-4	-12	10		
-3	-3			
6				

The criterion parameter f5 (.) Is P, the P parameter is the difference in values that is close to the maximum deviation. In this case the difference between the maximum deviation is 9-10, for the above table for the criteria f5 (.) The parameter P = 9.5 is selected.

4. Perform calculations in pairs between alternatives based on the criteria preference type.

Process (A1, A2)

F1 P (4,5)

d = 80 - 84 = -4

According to the maximization rule, the value of A1 is smaller than A2, so the pair value for (A1, A2) is 0

$$F2 Q (-15) d = 20 - 20 = 0$$

Preference II = Quasi Criterion (Quasi Criterion) because the value $A1 = A2$ and the value $d = 0$ then $P(A1, A2) = 0$

$$F3 P (5) d = 70 - 90 = -20$$

According to the maximization rule, the value of A1 is smaller than A2, so the pair value for (A1, A2) is 0

$$F4 Q (-5) d = 30 - 30 = 0$$

Preference II = Quasi Criterion (Quasi Criterion) because the value $A1 = A2$ and the value $d = 0$ then $P(A1, A2) = 0$

$$F5 P (9,5) d = 86 - 77 = 9$$

According to the maximization rule, the value of A1 is higher than A2, hence the value pair for (A1, A2).

Preference III = Linear Criterion (Linear Criterion)

$$H(d) = \begin{cases} \frac{d}{p} & \text{jika } -p \leq d \leq p \\ 1 & \text{jika } d < -p \text{ atau } d > p \end{cases}$$

From the Preference III function above, because $-9.5 \leq 9 \leq 9.5$ then $P(A1, A2) = 0.94737$

Process (A1, A3)

$$F1 P (4,5)$$

$$d = 80 - 80 = 0$$

Preference III = Linear Criterion (Linear Criterion) because the value $A1 = A3$ and the value $d = 0$ then $P(A1, A3) = 0$

$$F2 Q (-15)$$

$$d = 20 - 10 = 10$$

According to the maximization rule, the value of A1 is higher than A3, hence the value pair for (A1, A3).

Preference II = Quasi Criterion (Quasi Criterion)

$$H(d) = \begin{cases} 0 & \text{jika } -q \leq d \leq q \\ 1 & \text{jika } d < -q \text{ atau } d > q \end{cases}$$

From the Preference II function above, because $10 > -15$ then $P(A1, A3) = 1$

$$F3 P (5)$$

$$d = 70 - 80 = -10$$

Based on the maximization rule, the value of A1 is smaller than A3, so the pair value for (A1, A3) is 0

$$F4 Q (-5)$$

$$d = 30 - 20 = 10$$

According to the maximization rule, the value of A1 is higher than A3, hence the value pair for (A1, A3).

Preference II = Quasi Criterion (Quasi Criterion)

$$H(d) = \begin{cases} 0 & \text{jika } -q \leq d \leq q \\ 1 & \text{jika } d < -q \text{ atau } d > q \end{cases}$$

From the Preference II function above, because $10 > -5$ then $P(A1, A3) = 1$

$$F5 P (9,5) d = 86 - 90 = -4$$

Based on the maximization rule, the value of A1 is smaller than A3, so the pair value for (A1, A3) is 0

$$F4 Q (-5)$$

$$d = 30 - 20 = 10$$

According to the maximization rule, the value of A1 is higher than A3, hence the value of the pair

for (A1, A3).

Preference II = Quasi Criterion (Quasi Criterion)

$$H(d) = \begin{cases} 0 & \text{if } -q \leq d \leq q \\ 1 & \text{if } d < -q \text{ or } d > q \end{cases}$$

From the Preference II function above, because $10 > -5$ then $P(A1, A3) = 1$
 $F5 P(9,5)$

$$d = 86 - 90 = -4$$

According to the maximization rule, the value of A1 is smaller than A3, hence the value of the pair

for (A1, A3) is 0

5. Calculating Calculating the Multi Criteria Preference Index Value
 By using a calculation basis based on the equation:

$$P(a, b) = \sum_{i=1}^n P p_i(a, b): \forall a, b \in E$$

Then obtained:

$$P(A1, A2) = 1/5 (0 + 0 + 0 + 0 + 0.94737) = 0.1895$$

$$P(A1, A3) = 1/5 (0 + 1 + 0 + 1 + 0) = 0.4000$$

For the calculation of the multicriteria preference index value for other alternatives can be seen in Appendix C, while the results of calculating the full multicriteria preference index can be seen in the following table:

Table 8. Results of the calculation of the multicriteria preference index value:

Alternatif	A1	A2	A3	A4	A5
A1	-	0,1895	0,4000	0,4000	0,1708
A2	0,3778	-	0,7778	0,6444	0,4000
A3	0,2842	0,2000	-	0,0211	0,2444
A4	0,3965	0,2000	0,1333	-	0,3673
A5	0,4000	0,2632	0,4000	0,4000	-

6. Calculating Leaving Flow Value

For the calculation of the value of leaving flow, the following equation is used:

$$\Phi^+(a) = \frac{1}{n-1} \sum_{XEA} P(a, x)$$

$$\Phi^+(A1) = 1/(5-1) * (0,1895 + 0,4000 + 0,4000 + 0,1708) = 0,2901$$

$$\Phi^+(A2) = 1/(5-1) * (0,3778 + 0,7778 + 0,6444 + 0,4000) = 0,5500$$

$$\Phi^+(A3) = 1/(5-1) * (0,2842 + 0,2000 + 0,0211 + 0,2444) = 0,1874$$

$$\Phi^+(A4) = 1/(5-1) * (0,3965 + 0,2000 + 0,1333 + 0,3673) = 0,2743$$

$$\Phi^+(A5) = 1/(5-1) * (0,4000 + 0,2632 + 0,4000 + 0,4000) = 0,3658$$

Table 9. Calculation Results of Leaving Flow Value

	A1	A2	A3	A4	A5	LEAVING FLOW
A1	-	0,1895	0,4000	0,4000	0,1708	0,2901
A2	0,3778	-	0,7778	0,6444	0,4000	0,5500
A3	0,2842	0,2000	-	0,0211	0,2444	0,1874
A4	0,3965	0,2000	0,1333	-	0,3673	0,2743
A5	0,4000	0,2632	0,4000	0,4000	-	0,3658

7. Calculating Entering Flow Value

For calculating the value of entering flow, the following equation is used:

$$\Phi^-(a) = \frac{1}{n-1} \sum_{XEA} P(x, a)$$

$$\Phi^-(A1) = 1/(5-1) * (0,3778 + 0,2842 + 0,3965 + 0,4000) = 0,3646$$

$$\Phi^-(A2) = 1/(5-1) * (0,1895 + 0,2000 + 0,2000 + 0,2632) = 0,2132$$

$$\Phi^-(A3) = 1/(5-1) * (0,4000 + 0,7778 + 0,1333 + 0,4000) = 0,4278$$

$$\Phi^-(A4) = 1/(5-1) * (0,4000 + 0,6444 + 0,0211 + 0,4000) = 0,3664$$

$$\Phi^-(A5) = 1/(5-1) * (0,1708 + 0,4000 + 0,2444 + 0,3673) = 0,2956$$

Table 10. Results of Entering Flow Value Calculation

	A1	A2	A3	A4	A5	ENTERING FLOW
A1	-	0,1895	0,4000	0,4000	0,1708	0,3646
A2	0,3778	-	0,7778	0,6444	0,4000	0,2132
A3	0,2842	0,2000	-	0,0211	0,2444	0,4278
A4	0,3965	0,2000	0,1333	-	0,3673	0,3664
A5	0,4000	0,2632	0,4000	0,4000	-	0,2956

8. Calculating Net flow Value

To calculate the net flow value, the following equation is used:

$$\Phi^+(a) = \Phi^+(a) - \Phi^-(a)$$

$$\Phi(A1) = 0,2901 - 0,3646 = -0,0746$$

$$\Phi(A1) = 0,5500 - 0,2132 = 0,3368$$

$$\Phi(A1) = 0,18742 - 0,4278 = -0,2404$$

$$\Phi(A1) = 0,2764 - 0,3664 = -0,0921$$

$$\Phi(A1) = 0,3658 - 0,2956 = 0,0702$$

Table 11. Net Flow Value Calculation Results

Alternatif	LEAVING FLOW	ENTERING FLOW	NET FLOW
A1	0,4605	0,4008	0.0596
A2	0,65	0,302	0.348
A3	0,2401	0,5278	-0.2877
A4	0,3318	0,4644	-0.1326
A5	0,4099	0,2956	0.0126

9. Alternative Priority Order (Ranking)

Based on Complete Ranking (Promethee II) based on net flow characters, the following results are obtained:

Table 12. Complete Ranking based on Net Flow

Alternatif	NET FLOW	RANGKING
A1= Andriyani	0.0596	2
A2= Elvi Yusnita	0.348	1
A3= Devi K	-0.2877	5
A4= Fadhli Akbar	-0.1326	4
A5= Teti H	0.0126	3

Based on the calculation of the best employee using the promethee method, A2 = Elvi Yusnita with a total value of 0.348.

4. CONCLUSION

This decision support system aims to help HRD (Human Resources Department) employees determine the best employees who fit the desired criteria in the form of rankings. The results of the system calculation are a ranking of the highest to low values and the highest values are the results needed for consideration by the HRD (Human Resources Department) to obtain employees who match the desired criteria with the Promethee Method.

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