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Implementation Of Decision Making in Determining Employee Bonus Giving Using the VIKOR Method (Visekriterijumsko Kompromisno Rangiranje) at PTPN IV Kebun Marjandi

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Abstract

At PTPN IV Kebun Marjandi, employees will of course get bonuses every year. The amount of bonuses given to employees depends on the profits obtained by the company. Determining employee bonuses is currently still done manually where the assessment criteria for each employee are still recorded one by one in paper form and then transferred to Excel for the calculation process. Of course, this process will take a long time. So, to overcome this problem, a decision support system is needed that can help determine employee bonuses according to the assessment criteria that have been determined and the calculation process. Having a decision support system can help companies make decisions and manage data on bonus recipients in more detail and more objectively. This system will be assisted by using the VIKOR method. There are 20 alternatives taken in this research and 4 criteria, namely class, dependents, position and performance. The results of this research are which alternative is more appropriate to get the highest bonus after carrying out the calculation process from the determined assessment. And from the results of tests carried out using the VIKOR method, the employee who deserves to get the highest bonus is A16 with a value of 0,026.

Keywords: *Decision Support System, VIKOR, Bonus, Employee.*

1. Introduction

A Decision Support System (DSS) or Decision Support System (DSS) is a computer-based information system component that helps people make decisions for organizations and companies [1]. A decision support system can be said to be a computer system that processes data into information to make decisions about specific semi-structured problems. There are several types of methods in decision support systems, one of which is the VIKOR method (VIšekriterijumsko KOmpromisno Rangiranje). The VIKOR method is one of the methods used in multi-criteria decision making. The aim of this method is to find the best solution that is closest to the ideal solution by considering existing criteria [2].

PTPN IV is a company that operates in the palm oil, rubber, tea and other plantation sectors. One of the units of PTPN IV is Kebun Marjandi, Panombeian Panei District, Simalungun Regency, North Sumatra. At PTPN IV Kebun Marjandi, employees will of course get bonuses every year. The amount of bonuses given to employees depends on the profits obtained by the company. If the company makes increasing profits, the amount of bonuses received by employees also increases, but if the company experiences decreasing profits, the amount of bonuses received by employees also decreases. At PTPN IV Kebun Marjandi in determining the award Currently employee bonuses are still done manually where the assessment criteria for each employee are still recorded one by one in paper form and then transferred to Excel for the calculation process. Of course, this process will take a long time and the resulting data will be unstructured or not stored in the form of neat detailed reports so that the results of the calculations for the assessment of the criteria that have been determined will not be appropriate. The criteria used in determining the award of this bonus include class, position, dependents and performance [3].

To overcome this problem, a decision support system is needed that can assist in determining employee bonuses according to the assessment criteria that have been determined and the calculation process. Having a decision support system can help companies make decisions and manage data on bonus recipients in more detail and more objectively. This system will be assisted by using the VIKOR method. With this method, it is hoped that the assessment will be more precise because it is based on predetermined criteria values and weights so that accurate results will be obtained. There was research previously conducted by [1], which discussed the VIKOR method for selecting bonuses for Indihome salesmen. This research is able to determine bonus recipients based on several criteria by carrying out a ranking process. Where the results of the ranking that gets first place will be used as a reference for decision making. From the problems that have been described, the author conducted research entitled "Implementation of Decision Making in Determining Employee Bonuses Using the VIKOR Method (VIšekriterijumsko KOmpromisno Rangiranje) at PTPN IV Kebun Marjandi". The aim of this research is to design a decision support

system using the VIKOR (VIšekriterijumsko KOmpromisno Rangiranje) method to determine employee bonuses based on predetermined criteria for employee assessment.

2. Methode

2.1 Method VIKOR (VIšekriterijumsko KOmpromisno Rangiranje)

VIKOR (VIšekriterijumsko KOmpromisno Rangiranje) comes from Serbian, meaning Multi Criteria Compromise Ranking). VIKOR is a ranking method using a multicriteria ranking index based on a certain measure of closeness to the ideal solution [3]. The VIKOR method is a multi-criteria decision making method (MCDM). This method is used to solve problems that are based on conflicting or incompatible criteria. This method focuses on the ranking and selection of various alternative criteria that can conflict with each other in the decision-making process [4]. The following steps will be taken to calculate using the VIKOR method [5], [6], [7], [8]:

1. The first step, process the decision matrix using the VIKOR method. Ai in the formula is the ith alternative, i is the serial number 1, 2,…m; Ci is the jth criteria formula, while Xij is the element of the matrix and the serial number 1, 2,…n;

$$J = \begin{array}{c} \\ A_1 \\ A_2 \\ \vdots \\ A_m \end{array} \begin{array}{c} \begin{array}{cccc} C_1 & C_2 & \cdots & C_n \end{array} \\ \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix} \end{array} \quad \text{.....(1)}$$

2. Determination of criteria weight (W)

Criteria weights are adjusted to the needs or criteria. In this equation wj is the value of the weight of criterion j, while j = 1,2,3,….n is the serial number of the attribute or criterion.

$$\sum_{j=1}^{n} wj = 1 \quad \text{.....(2)}$$

3. Creation of a normalization matrix
The normalization matrix has two values, positive and negative, which will be used to solve each criterion ideally.
Rij and Xij = elements of the decision-making matrix
X_j^+ = best elements from criterion j
X_j^- = is the worst element from criterion j
i = alternatives
j = criteria

$$R_{ij} = \frac{(X_j^+ - X_{ij})}{(X_j^+ - X_j^-)} \quad \text{.....(3)}$$

4. Weight normalization
To normalize the weights, the normalized data values must be multiplied by the weight values in the predetermined criteria (w).

$$X_{ij}^* = w_j \cdot R_{ij} \quad \text{.....(4)}$$

X_{ij} = is the normalized weight value for alternative i and criterion j
w_j = is the weight value of criterion j
R_{ij} = is normalized data for alternative i and criterion j

5. Calculates Utility Measures (S) and Regret Measures (R). Each alternative will be calculated by Utility Measure (S_i) and Regret Measure (R_i).

$$S_i = \sum_j {}_{=1}^{n} \quad wj \ \frac{(X_i^+ - X_{ij})}{(X_j^+ - X_j^-)} \quad \text{.....(5)}$$

$$R_i = max_j \left[wj \ \frac{(X_i^+ - X_{ij})}{(X_j^+ - X_j^-)} \right] \quad \text{.....(6)}$$

Information:
S_i/R_i = alternative preferences are analogous to the V vector
X = criterion value
W = weight of criteria and sub-criteria
i = alternative
j = criteria
n = number of criteria

6. Calculate the VIKOR index value (Qi)
The VIKOR index value for each alternative will be calculated using the following formula:

$$Qi = \left[\frac{S_i - S^-}{S^+ - S^-}\right] v + \left[\frac{R_i - R^-}{R^+ - R^-}\right] (1 - v) \quad \text{.....(7)}$$

Information:
S^- = max value of S_i, S = min value of S_i and R^- = max value of R_i,
R^+= min value of R_i, v is a weight value which is generally worth 0.5, while 1- v is the weight value of individual regret. The best VIKOR index (Qi) value is the smallest value of the alternatives.

7. Do the ranking
Ranking is done after getting the Qi value, in this ranking there are 3 types of ranking, namely S_i, R_i, and Qi. The VIKOR method determines the best solution based on the results of Qi with the lowest value [9], [10].

3. Result and Discussion

3.1. Manual Calculation Using The Vikor Method

Table 1 contains alternative data, namely the names of employees.

Table 1: Alternative Data

Alternative	Employee Name
A1	Jumarno
A2	Marlon Hutapea
A3	Saut Marulitua Haloho, SH
A4	Suadi
A5	Wagiman
A6	Zulfikar
A7	Adi Wibowo
A8	Bambang Suriatman
A9	Emmy Suriati
A10	Hendra
A11	Romlan
A12	Ali Imran Lubis
A13	Harlina
A14	Jariani
A15	Zulham Effendi
A16	Heri Andrian
A17	Otong Yudhi
A18	Juhari
A19	Wijaya Rumapea
A20	Sugiati

Table 2. contains criteria data where employee assessments will be calculated based on predetermined criteria, and each criterion has been given a weight.

Table 2: Criteria data

Criteria	Information	Weight
C1	Group	0.4
C2	Dependents	0.3
C3	Position	0.2
C4	Performance	0.1

Table 3. contains group sub-criteria data and each sub-criteria is given a weight.

Table 3: Group sub-criteria data

Sub Criteria	Weight
IVA-IVD	4
IIIA-IIID	3
IIA-IID	2
IA-ID	1

Table 4. contains data on dependent sub-criteria and each sub-criteria is given a weight.

Table 4: Dependent sub-criteria data

Sub Criteria	Weight
K3 (Wife and children 3)	4
K2 (Wife and children 2)	3
K1 (Wife and children 1)	2
K0 (Wife/single only)	1

Table 5. contains job sub-criteria data and each sub-criteria is given a weight.

Table 5: Job sub-criteria data

Sub Criteria	Weight
Pratama executor: - Operator - Security guard - Religious officers - Driver - Mess attendant - Office maid - Builder	1
Primary Supervisor: - Foreman - Krani	2
Primary Manager: - Assistant - Askep	3
Main Stylist: - Manager	4

Table 6. contains performance sub-criteria data and each sub-criteria is given a weight.

Table 6: Performance sub-criteria data

Sub Kriteria	Bobot
Very Good	4
Good	3
Avarage	2
Poor	1

Table 7. contains match rating data between the alternative table and the criteria table.

Table 7: Data alternative dan criteria

Alternatif	Group	Dependents	Position	Performance
Jumarno	IC	K2	Driver	Good
Marlon Hutapea	IIIA	K2	Krani	Avarage
Saut Marulitua Haloho, SH	IVB	K1	Manager	Good
Suadi	IB	K1	Driver	Avarage
Wagiman	IID	K3	Security guard	Poor
Zulfikar	IIIC	K2	Assistant	Good
Adi Wibowo	IIB	K0	Operator	Good
Bambang Suriatman	IIA	K3	Religious officer	Avarage
Emmy Suriati	ID	K1	Mess attendant	Very Good
Hendra	IIC	K3	Security guard	Good
Romlan	IIB	K2	Driver	Poor
Ali Imran Lubis	IIID	K2	Krani	Avarage
Harlina	IIA	K1	Office maid	Good
Jariani	IB	K2	Mess attendant	Avarage
Zulham Effendi	IIIA	K2	Askep	Avarage
Heri Andrian	IIIC	K3	Foreman	Very good
Otong Yudhi	IB	K3	Builder	Poor
Juhari	IIA	K2	Builder	Good
Wijaya Rumapea	IIIC	K3	Foreman	Good
Sugiati	IIC	K1	Office maid	Good

Table 8. contains matching data with weight values.

Tabel 8: Matching Data With Weighted Values

Alternative	C1	C2	C3	C4
Jumarno	1	3	1	3
Marlon Hutapea	3	3	2	2
Saut Marulitua Haloho, SH	4	2	4	3
Suadi	1	2	1	2
Wagiman	2	4	1	1
Zulfikar	3	3	3	3
Adi Wibowo	2	1	1	3
Bambang Suriatman	2	4	1	2
Emmy Suriati	1	2	1	4
Hendra	2	4	1	3
Romlan	2	3	1	1
Ali Imran Lubis	3	3	2	2
Harlina	2	2	1	3
Jariani	1	3	1	2
Zulham Effendi	3	3	3	2
Heri Andrian	3	4	2	4
Otong Yudhi	1	4	1	1
Juhari	2	3	1	3
Wijaya Rumapea	3	4	2	3
Sugiati	2	2	1	3

1. Decision Matrix
   Table 9. contains rating data which has been weighted according to the specified weights.

Tabel 9: Decision Matrix

Alternative	C1	C2	C3	C4
Alternative 1	1	3	1	3
Alternative 2	3	3	2	2
Alternative 3	4	2	4	3
Alternative 4	1	2	1	2
Alternative 5	2	4	1	1
Alternative 6	3	3	3	3
Alternative 7	2	1	1	3
Alternative 8	2	4	1	2
Alternative 9	1	2	1	4
Alternative 10	2	4	1	3
Alternative 11	2	3	1	1
Alternative 12	3	3	2	2
Alternative 13	2	2	1	3
Alternative 14	1	3	1	2
Alternative 15	3	3	3	2
Alternative 16	3	4	2	4
Alternative 17	1	4	1	1
Alternative 18	2	3	1	3
Alternative 19	3	4	2	3
Alternative 20	2	2	1	3
Max	4	4	4	4
Min	1	1	1	1

Normalization of Matrix X Rij values

R11=(4-1)/(4-1)=1
R12=(4-3)/(4-1)=0,333
R13=(4-4)/(4-1)=0
R14=(4-1)/(4-1)=1
R15=(4-2)/(4-1)=0,667
R16=(4-3)/(4-1)=0,333
R17=(4-2)/(4-1)=0,667
R18=(4-2)/(4-1)=0,667
R19=(4-1)/(4-1)=1
R110=(4-2)/(4-1)=0,667
R111=(4-2)/(4-1)=0,667
R112=(4-3)/(4-1)=0,333
R113=(4-2)/(4-1)=0,667
R114=(4-1)/(4-1)=1
R115=(4-3)/(4-1)=0,333
R116=(4-3)/(4-1)=0,333

R117=(4-1)/(4-1)=1
R118=(4-2)/(4-1)=0,667
R119=(4-3)/(4-1)=0,333
R120=(4-2)/(4-1)=0,667

R21=(4-3)/(4-1)=0,333
R22=(4-3)/(4-1)=0,333
R23=(4-2)/(4-1)=0,667
R24=(4-2)/(4-1)=0,667
R25=(4-4)/(4-1)=0
R26=(43)/(4-1)=0,333
R27=(4-1)/(4-1)=1
R28=(4-4)/(4-1)=0
R29=(42)/(4-1)=0,667
R210=(4-4)/(4-1)=0
R211=(4-3)/(4-1)=0,333
R212=(4-3)/(4-1)=0,333
R213=(4-2)/(4-1)=0,667
R214=(4-3)/(4-1)=0,333
R215=(4-3)/(4-1)=0,333
R216=(4-4)/(4-1)=0
R217=(4-4)/(4-1)=0
R218=(4-3)/(4-1)=0,333
R219=(4-4)/(4-1)=0
R220=(4-2)/(4-1)=0,667

R31=(4-1)/(4-1)=1
R32=(4-2)/(4-1)=0,667
R33=(4-4)/(4-1)=0
R34=(4-1)/(4-1)=1
R35=(4-1)/(4-1)=1
R36=(4-3)/(4-1)=0,333
R37=(4-1)/(4-1)=1
R38=(4-1)/(4-1)=1
R39=(4-1)/(4-1)=1
R310=(4-1)/(4-1)=1
R311=(4-1)/(4-1)=1
R312=(4-2)/(4-1)=0,667
R313=(4-1)/(4-1)=1
R314=(4-1)/(4-1)=1
R315=(4-3)/(4-1)=0,333
R316=(4-2)/(4-1)=0,667
R317=(4-1)/(4-1)=1
R318=(4-1)/(4-1)=1
R319=(4-2)/(4-1)=0,667
R320=(4-1)/(4-1)=1

R41=(4-3)/(4-1)=0,333
R42=(4-2)/(4-1)=0,667
R43=(4-3)/(4-1)=0,333
R44=(4-2)/(4-1)=0,667
R45=(4-1)/(4-1)=1
R46=(4-3)/(4-1)=0,333
R47=(4-3)/(4-1)=0,333
R48=(4-2)/(4-1)=0,667
R49=(4-4)/(4-1)=0
R410=(4-3)/(4-1)=0,333
R411=(4-1)/(4-1)=1
R412=(4-2)/(4-1)=0,667
R413=(4-3)/(4-1)=0,333
R414=(4-2)/(4-1)=0,667
R415=(4-2)/(4-1)=0,667
R416=(4-4)/(4-1)=0
R417=(4-1)/(4-1)=1
R418=(4-3)/(4-1)=0,333
R419=(4-3)/(4-1)=0,333

R420=(4-3)/(4-1)=0,333

After all the weights have been entered, the next step is to carry out the calculation process using the vikor method as below. Table 10. contains the results of the normalization process

Tabel 10: Normalization of Rij Values

No	Alternatif	C1	C2	C3	C4
1	Alternatif 1	1	0,333	1	0,333
2	Alternatif 2	0,333	0,333	0.667	0,667
3	Alternatif 3	0	0,667	0	0,333
4	Alternatif 4	1	0,667	1	0,667
5	Alternatif 5	0,667	0	1	1
6	Alternatif 6	0,333	0,333	0,333	0,333
7	Alternatif 7	0,667	1	1	0,333
8	Alternatif 8	0,667	0	1	0,667
9	Alternatif 9	1	0,667	1	0
10	Alternatif 10	0,667	0	1	0,333
11	Alternatif 11	0,667	0,333	1	1
12	Alternatif 12	0,333	0,333	0,667	0,667
13	Alternatif 13	0,667	0,667	1	0,333
14	Alternatif 14	1	0,333	1	0,667
15	Alternatif 15	0,333	0,333	0,333	0,667
16	Alternatif 16	0,333	0	0,667	0
17	Alternatif 17	1	0	1	1
18	Alternatif 18	0,667	0,333	1	0,333
19	Alternatif 19	0,333	0	0,667	0,333
20	Alternatif 20	0,667	0,667	1	0,333

1. Determine the X

Criterion weight (wj)
C1 = 0,4
C2 = 0,3
C3 = 0,2
C4 = 0,1

Rij*Wj=

0,4	0,1	0,2	0,033	0,4
0,133	0,1	0,133	0,067	0,133
0	0,2	0	0,033	0,2
0,4	0,2	0,2	0,067	0,4
0,267	0	0,2	0,1	0,267
0,133	0,1	0,067	0,033	0.133
0,267	0,3	0,2	0,033	0,3
0,267	0	0,2	0,067	0,267
0,4	0,2	0,2	0	0,4
0,267	0	0,2	0,033	0,267
0,267	0,1	0,2	0,1	0,267
0,133	0,1	0,133	0,067	0,133
0,267	0,2	0,2	0,033	0,267
0,4	0,1	0,2	0,067	0,4
0,133	0,1	0,067	0,067	0,133
0,133	0	0,133	0	0,133

0,4	0	0,2	0,1	0,4
0,267	0,1	0,2	0,033	0,267
0,133	0	0,133	0,033	0,133
0,267	0,2	0,2	0,033	0,267

2. Determine the S and R

S1=0,4+0,1+0,2+0,033=0,733
S2=0,133+0,1+0,133+0,067=0,433
S3=0+0,2+0+0,033=0,233
S4=0,4+0,2+0,2+0,067=0,867
S5=0,267+0+0,2+0,1=0,567
S6=0,133+0,1+0,067+0,033=0,333
S7=0,267+0,3+0,2+0,033=0,8
S8=0,267+0+0,2+0,067=0,534
S9=0,4+0,2+0,2+0=0,8
S10=0,267+0+0,2+0,033=0,5
S11=0,267+0,1+0,2+0,1=0,667
S12=0,133+0,1+0,133+0,067=0,433
S13=0,267+0,2+0,2+0,033=0,7
S14=0,4+0,1+0,2+0,067=0,767
S15=0,133+0,1+0,067+0,067=0,367
S16=0,133+0+0,133+0=0,266
S17=0,4+0+0,2+0,1=0,7
S18=0,267+0,1+0,2+0,033=0,6
S19=0,133+0+0,133+0,033=0,299
S20=0,267+0,2+0,2+0,033=0,7

S+ = 0,867
S- = 0,233
R+ = 0,4
R- = 0,133

3. Calculating Qi Value

Q1 =(((0,733-0,233)/(0,867-0,233))*0.5)+(((0,4-0,133)/(0,4-0,133))*(1-0.5))
Q1 = (0,5/0,634)*0,5+(0,267/0,267)*0,5
Q1 = 0,3943+0,5
Q1 = 0,8943

Q2 = (((0,433-0,233)/(0,867-0,233))*0.5)+(((0,133-0,133)/(0,4-0,133))*(1-0.5))
Q2 = (0,2/0,634)*0,5 + (0/0,267) *0.5
Q2 = 0,1577+0
Q2 = 0,1577

Q3 =(((0,233-0,233)/(0,867-0,233))*0.5)+(((0,2-0,133)/(0,4-0,133))*(1-0.5))
Q3 = (0/0,634)*0.5 + (0,067/0,267)*0.5
Q3 = 0 + 0,1255
Q3 = 0,1255

Q4 =(((0,867-0,233)/(0,867-0,233))*0.5)+(((0,4-0,133)/(0,4-0,133))*(1-0.5))
Q4 = (0,634/0,634)*0.5 + (0/0)*0.5
Q4 = 0,5 + 0,5
Q4 = 1

Q5 = (((0,567-0,233)/(0,867-0,233))*0.5)+(((0,267-0,133)/(0,4-0,133))*(1-0.5))
Q5 = (0,334/0,634)*0.5 + (0,134/0,267)*0.5
Q5 = 0,2634 + 0,2509
Q5 = 0,5143

Q6 = (((0,333-0,233)/(0,867-0,233))*0.5)+(((0,133-0,133)/(0,4-0,133))*(1-0.5))
Q6 = (0,1/0,634)*0.5 + (0/0,267)*0.5
Q6 = 0,0789 + 0
Q6 = 0,0789

Q7 = (((0,8-0,233)/(0,867-0,233))*0.5)+(((0,3-0,133)/(0,4-0,133))*(1-0.5))
Q7 = (0,567/0,634)*0.5 + (0,167/0,267)*0.5
Q7 = 0,4472 + 0,3127
Q7 = 0,7599

Q8 = (((0,534-0,233)/(0,867-0,233))*0.5)+(((0,267-0,133)/(0,4-0,133))*(1-0.5))
Q8 = (0,301/0,634)*0.5 + (0,134/0,267)*0.5
Q8 = 0,2374 + 0,2509
Q8 = 0,4883

Q9 = (((0,8-0,233)/(0,867-0,233))*0.5)+(((0,4-0,133)/(0,4-0,133))*(1-0.5))
Q9 = (0,567/0,634)*0.5 + (0,267/0,267)*0.5
Q9 = 0,4472 + 0,5
Q9 = 0,9472

Q10 = (((0,5-0,233)/(0,867-0,233))*0.5)+(((0,267-0,133)/(0,4-0,133))*(1-0.5))
Q10 = (0,267/0,634)*0.5 + (0,134/0,267)*0.5
Q10 = 0,2106 + 0,2509
Q10 = 0,4615

Q11 = (((0,667-0,233)/(0,867-0,233))*0.5)+(((0,267-0,133)/(0,4-0,133))*(1-0.5))
Q11 = (0,434/0,634)*0.5 + (0,134/0,267)*0.5
Q11 = 0,3423 + 0,2509
Q11 = 0,5932

Q12 = (((0,433-0,233)/(0,867-0,233))*0.5)+(((0,133-0,133)/(0,4-0,133))*(1-0.5))
Q12 = (0,2/0,634)*0.5 + (0/0,267)*0.5
Q12 = 0,1577 + 0
Q12 = 0,1577

Q13 = (((0,7-0,233)/(0,867-0,233))*0.5)+(((0,267-0,133)/(0,4-0,133))*(1-0.5))
Q13 = (0,467/0,634)*0.5 + (0,134/0,267)*0.5
Q13 = 0,3683 + 0,2509
Q13 = 0,6192

Q14 = (((0,767-0,233)/(0,867-0,233))*0.5)+(((0,4-0,133)/(0,4-0,133))*(1-0.5))
Q14 = (0,534/0,634)*0.5 + (0,267/0,267)*0.5
Q14 = 0,4211 + 0,5
Q14 = 0,9211

Q15 = (((0,367-0,233)/(0,867-0,233))*0.5)+(((0,133-0,133)/(0,4-0,133))*(1-0.5))
Q15 = (0,134/0,634)*0.5 + (0/0,267)*0.5
Q15 = 0,1057 + 0
Q15 = 0,1057

Q16 = (((0,266-0,233)/(0,867-0,233))*0.5)+(((0,133-0,133)/(0,4-0,133))*(1-0.5))
Q16 = (0,033/0,634)*0.5 + (0/0,267)*0.5
Q16 = 0,0260 + 0
Q16 = 0,0260

Q17 = (((0,7-0,233)/(0,867-0,233))*0.5)+(((0,4-0,133)/(0,4-0,133))*(1-0.5))
Q17 = (0,467/0,634)*0.5 + (0,267/0,267)*0.5
Q17 = 0,3683 + 0,5
Q17 = 0,8683

Q18 = (((0,6-0,233)/(0,867-0,233))*0.5)+(((0,267-0,133)/(0,4-0,133))*(1-0.5))
Q18 = (0,367/0,634)*0.5 + (0,134/0,267)*0.5
Q18 = 0,2895 + 0,2509
Q18 = 0,5404

Q19 = (((0,299-0,233)/(0,867-0,233))*0.5)+(((0,133-0,133)/(0,4-0,133))*(1-0.5))
Q19 = (0,066/0,634)*0.5 + (0/0,267)*0.5
Q19 = 0,0521 + 0
Q19 = 0,0521

Q20 = (((0,7-0,233)/(0,867-0,233))*0.5)+(((0,267-0,133)/(0,4-0,133))*(1-0.5))
Q20 = (0,467/0,634)*0.5 + (0,134/0,267)*0.5
Q20 = 0,3683 + 0,2509
Q20 = 0,6192

The results of the Qi value can be seen in table 11. below.

Tabel 11: Value Results Qi

No	Alternative	Value Qi

1.	Alternative 1	0,8943
2.	Alternative 2	0,1577
3.	Alternative 3	0,1255
4.	Alternative 4	1
5.	Alternative 5	0,5143
6.	Alternative 6	0,0789
7.	Alternative 7	0,7599
8.	Alternative 8	0,4883
9.	Alternative 9	0,9472
10.	Alternative 10	0,4615
11.	Alternative 11	0,5932
12.	Alternative 12	0,1577
13.	Alternative 13	0,6192
14.	Alternative 14	0,9211
15.	Alternative 15	0,1057
16.	Alternative 16	0,026
17.	Alternative 17	0,8683
18.	Alternative 18	0,5404
19.	Alternative 19	0,0521
20.	Alternative 20	0,6192

4. Ranking

Tabel 12: Ranking

Alternative	Value Qi	Ranking
Alternative 16	0,026	1
Alternative 19	0,0521	2
Alternative 6	0,0789	3
Alternative 15	0,1057	4
Alternative 3	0,1255	5
Alternative 12	0,1577	6
Alternative 2	0,1577	7
Alternative 10	0,4615	8
Alternative 8	0,4883	9
Alternative 5	0,5143	10
Alternative 18	0,5404	11
Alternative 11	0,5932	12
Alternative 13	0,6192	13
Alternative 20	0,6192	14
Alternative 7	0,7599	15
Alternative 17	0,8683	16
Alternative 1	0,8943	17
Alternative 14	0,9211	18
Alternative 9	0,9472	19
Alternative 4	1	20

3.2. System implementation

Admin Login View

The first display that appears when the system starts. Figure 1. shows the admin login display.

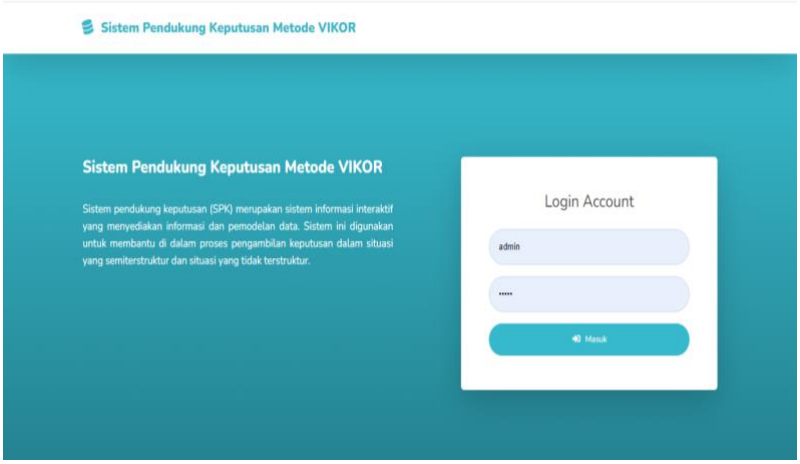

Fig. 1: Admin Login

Admin Dashboard View

In this display there is data on criteria, sub-criteria, alternatives, assessments, calculations and final results. Figure 2. shows the admin dashboard display.

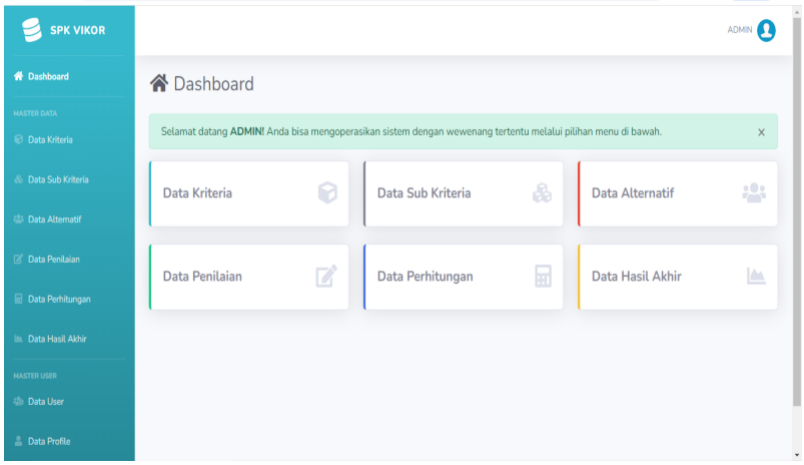

Fig. 2: Admin Dashboard

Criteria Data Display

In this view the admin can delete, edit and add criteria data. Figure 3. shows the criteria data display.

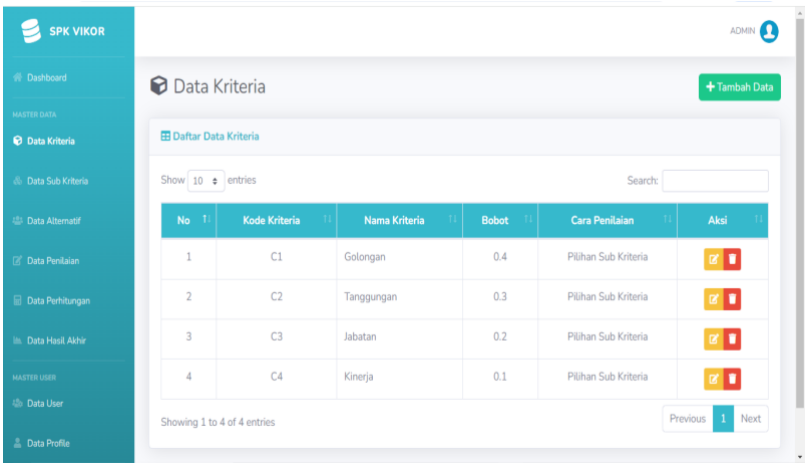

Fig. 3: Criteria data

Sub Criteria Data Display
In this view the admin can delete, edit and add sub-criteria data. Figure 4. shows the display of sub-criteria data.

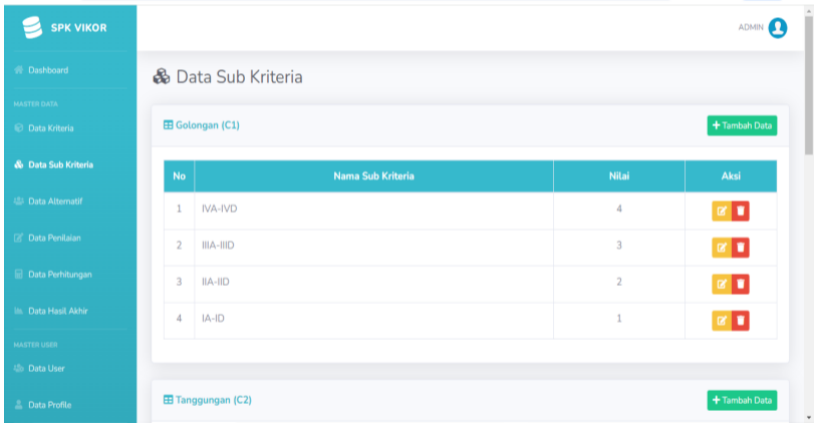

Fig. 4: Sub criteria data

Alternative Data Views
In this view the admin can delete, edit and add alternative data. Figure 5. shows an alternative data display.

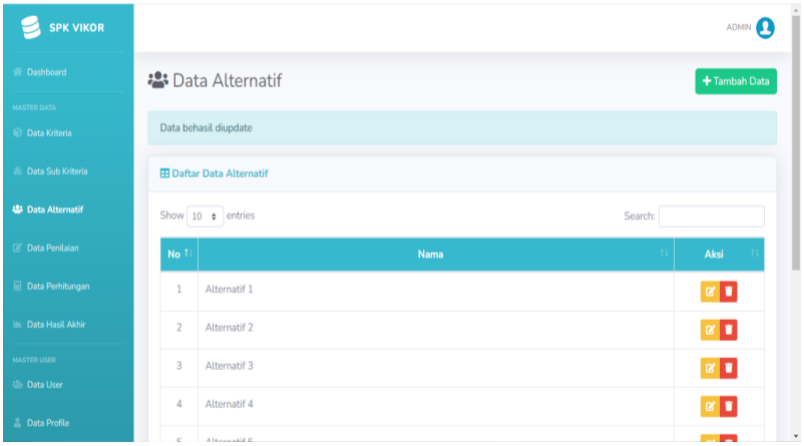

Fig. 5: Alternative Data

Assessment Data Display
In this view the admin can enter and edit assessment data for each alternative. Figure 6. shows the assessment data display.

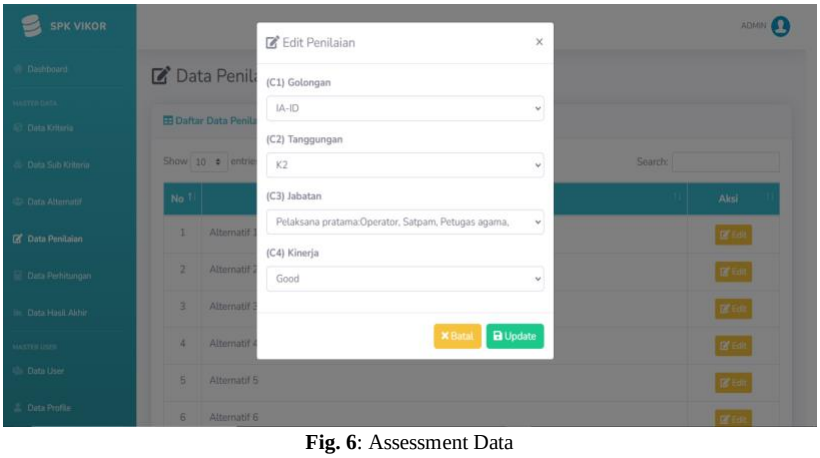

Fig. 6: Assessment Data

Calculation Data Display

In this view the admin can see the calculation process after assessing each alternative. Figure 7. shows the calculation data display.

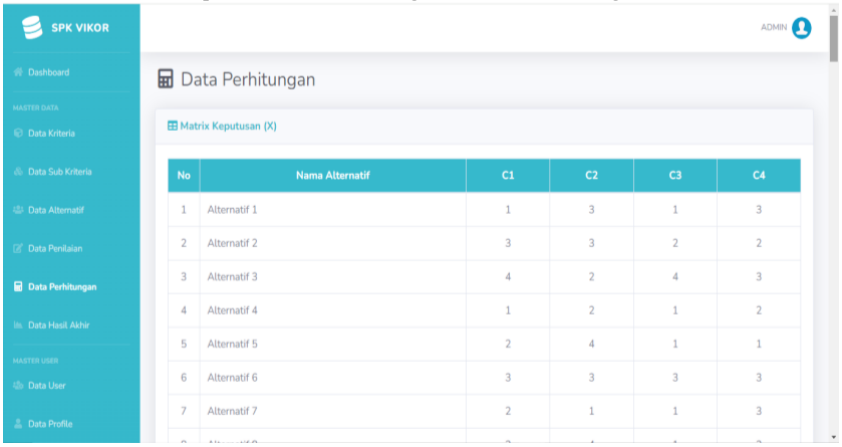

Fig. 7: Calculation Data

Final Result Data Display

In this view the admin can see the final results and print data from the calculation process that was carried out previously. Figure 8. shows the final data display.

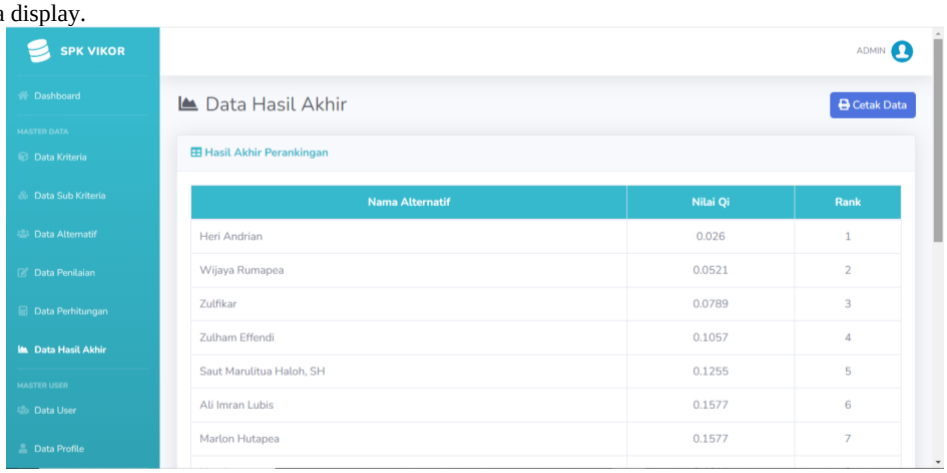

Fig. 8: Final Result Data

4. Conclusion

Based on the results of the tests that have been carried out, conclusions can be drawn, by carrying out the calculation process using the VIKOR method, there are 20 alternative people with 4 assessment criteria in determining bonuses to employees. Based on the value of each alternative, it can be determined that the employee who is entitled to get the highest bonus is given to A16, namely Heri Andrian with a Qi value of 0.026. A decision making system using the VIKOR method can be a tool to help make decisions, that this system is capable of measuring minimum values which can be used as a reference for obtaining assessment rankings.

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