※ Tabel Kriteria

Kode	Kriteria
C1	Kadar air
C2	Ketinggian Lokasi
C3	Warna biji
C4	Aroma
C5	Nilai cacat

※ Tabel bobot preferensi kriteria

Kode	Kriteria	Bobot	Atribut
C1	Kadar air	5	Benefit
C2	Ketinggian lokasi	4	Benefit
C3	Warna biji	3	Benefit
C4	Aroma	4	Benefit
C5	Nilai cacat	5	Benefit

※ Nilai Alternatif

Alternatif	C1	C2	C3	C4	C5
A1	1	2	1	3	3
A2	2	3	1	3	3
A3	2	2	1	3	3
A4	2	4	2	4	3
A5	2	4	2	3	3

※ matriks normalisasi

$$X = \begin{bmatrix} 1 & 2 & 1 & 3 & 3 \\ 2 & 3 & 1 & 3 & 3 \\ 2 & 2 & 1 & 3 & 3 \\ 2 & 4 & 2 & 4 & 3 \\ 2 & 4 & 2 & 3 & 3 \end{bmatrix}$$

Rumus : $$R_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}}$$

dimana : $i = 1,2,3,\ldots m$; dan
$j = 1,2,3,\ldots m$

$$|X1| = \sqrt{(1)^2+(2)^2+(2)^2+(2)^2+(2)^2} = \sqrt{17} = 4.1231$$

$$r_{11} = \frac{X_{11}}{|X1|} = \frac{1}{4.1231} = 0,2425$$

$$r_{21} = \frac{X_{21}}{|X1|} = \frac{2}{4.1231} = 0,4850$$

$$r_{31} = \frac{X_{31}}{|X1|} = \frac{2}{4.1231} = 0.4850$$

$$r_{41} = \frac{X_{41}}{|X1|} = \frac{2}{4.1231} = 0.4850$$

$$r_{51} = \frac{X_{51}}{|X1|} = \frac{2}{4.1231} = 0.4850$$

$$|X_2| = \sqrt{(2)^2+(3)^2+(2)^2+(4)^2+(4)^2} = \sqrt{49} = 7$$

$$r_{12} = \frac{X_{12}}{|X_2|} = \frac{2}{7} = 0,2857$$

$$r_{22} = \frac{X_{22}}{|X_2|} = \frac{3}{7} = 0,4285$$

$$r_{32} = \frac{X_{32}}{|X_2|} = \frac{2}{7} = 0,2857$$

$$r_{42} = \frac{X_{42}}{|X_2|} = \frac{4}{7} = 0,5714$$

$$r_{52} = \frac{X_{52}}{|X_2|} = \frac{4}{7} = 0,5714$$

$$|X_3| = \sqrt{(1)^2+(1)^2+(1)^2+(2)^2+(2)^2} = \sqrt{11} = 3,3166$$

$$r_{13} = \frac{X_{13}}{|X_3|} = \frac{1}{3,3166} = 0,3015$$

$$r_{23} = \frac{X_{23}}{|X_3|} = \frac{1}{3,3166} = 0,3015$$

$$r_{33} = \frac{X_{33}}{|X_3|} = \frac{1}{3,3166} = 0,3015$$

$$r_{43} = \frac{X_{43}}{|X_3|} = \frac{2}{3,3166} = 0,6030$$

$$r_{53} = \frac{X_{53}}{|X_3|} = \frac{2}{3,3166} = 0,6030$$

$$|X_4| = \sqrt{(3)^2+(3)^2+(3)^2+(4)^2+(3)^2} = \sqrt{52} = 7.2111$$

$$r_{14} = \frac{X_{14}}{|X_4|} = \frac{3}{7.2111} = 0,4160$$

$$r_{24} = \frac{X_{24}}{|X_4|} = \frac{3}{7.2111} = 0,4160$$

$$r_{34} = \frac{X_{34}}{|X_4|} = \frac{3}{7.2111} = 0,4160$$

$$r_{44} = \frac{X_{44}}{|X_4|} = \frac{4}{7.2111} = 0,5547$$

$$r_{54} = \frac{X_{54}}{|X_4|} = \frac{3}{7.2111} = 0,4160$$

$|X5| = \sqrt{(3)^2+(3)^2+(3)^2+(3)^2+(3)^2} = \sqrt{45} = 6.7082$

$r_{15} = \frac{X_{15}}{|X5|} = \frac{3}{6.7082} = 0.4472$

$r_{25} = \frac{X_{25}}{|X5|} = \frac{3}{6.7082} = 0.4472$

$r_{35} = \frac{X_{35}}{|X5|} = \frac{3}{6.7082} = 0.4472$

$r_{45} = \frac{X_{45}}{|X5|} = \frac{3}{6.7082} = 0.4472$

$r_{55} = \frac{X_{55}}{|X5|} = \frac{3}{6.7082} = 0.4472$

Sehingga matriks ternormalisasi (R):

0.2425	0.2857	0,3015	0,4160	0.4472
0.4850	0.4285	0,3015	0,4160	0.4472
0.4850	0,2857	0,3015	0,4160	0.4472
0.4850	0.5714	0,6030	0,5547	0.4472
0.4850	0,5714	0,6030	0,4160	0.4472

※ matriks ternormalisasi terbobot

Rumus : $y_{ij} = w_i x r_{ij}$ dengan $i = 1,2,3,\cdots m$; dan $j = 1,2,\cdots n$

W = (5,4,3,4,5)

$r_{11} = (5)(2425) = 1.2125$

$r_{21} = (5)(0,4850) = 2.425$

$r_{31} = (5)(0,4850) = 2.425$

$r_{41} = (5)(0,4850) = 2.425$

$r_{51} = (5)(0,4850) = 2.425$

$r_{12} = (4)(0,2857) = 1.1428$

$r_{22} = (4)(0.4285) = 1.714$

$r_{23} = (4)(0.2857) = 1.1428$

$r_{24} = (4)(0,5714) = 2.2856$

$r_{25} = (4)(0,5714) = 2.2856$

$r_{13} = (3)(0,3015) = 0,9045$

$r_{23} = (3)(0,3015) = 0,9045$

$r_{33} = (3)(0,3015) = 0.9045$

$r_{43} = (3)(0,6030) = 1.809$

$r_{54} = (3)(0,6030) = 1.809$

$r_{14} = (4)(0,4160) = 1.664$

$r_{24} = (4)(0,4160) = 1.664$

$r_{34} = (4)(0,4160) = 1.664$

$r_{44} = (4)(0,5547) = 2,2188$

$r_{45} = (4)(0,4160) = 1,664$

$r_{15} = (5)(0.4472) = 2.236$

$r_{25} = (5)(0.4472) = 2.236$

$r_{35} = (5)(0.4472) = 2.236$

$r_{45} = (5)(0.4472) = 2.236$

$r_{55} = (5)(0.4472) = 2.236$

Sehingga matriks ternormalisasi terbobot

1.2125	1.1428	0.9045	1.664	2.236
2.425	1.714	0.9045	1.664	2.236
2.425	1.1428	0.9045	1.664	2.236
2.425	2.2856	1.809	2.2188	2.236
2.425	2.2856	1.809	1.664	2.230

* menentukan matriks solusi ideal positif dan solusi ideal negatif

dimana : $y_j^+ = \begin{cases} \max & \text{jika } j \text{ adalah kriteria keuntungan} \\ \min & \text{jika } j \text{ adalah kriteria biaya} \end{cases}$

$y_j^- = \begin{cases} \max & \text{jika } j \text{ adalah kriteria keuntungan} \\ \min & \text{jika } j \text{ adalah kriteria biaya} \end{cases}$

$y_1^+ = \max(1.2125; 2.425; 2.425; 2.425; 2.425) = 2.425$

$y_2^+ = \max(1.1428; 1.714; 1.1428; 2.2856; 2.2856) = 2.2856$

$y_3^+ = \max(0.9045; 0.9045; 0.9045; 1.809; 1.809) = 1.809$

$y_4^+ = \max(1.664; 1.664; 1.664; 2.2188; 1.664) = 2.2188$

$y_5^+ = \max(2.236; 2.236; 2.236; 2.236; 2.236) = 2.236$

maka diketahui nilai solusi ideal positif :

$A^+ = (2.425; 2.2856; 1.809; 2.2188; 2.236)$

$y_1^- = \min(1.2125; 2.425; 2.425; 2.425; 2.425) = 1.2125$

$y_2^- = \min(1.1428; 1.714; 1.1428; 2.2856; 2.2856) = 1.1428$

$y_3^- = \min(0.9045; 0.9045; 0.9045; 1.809; 1.809) = 0.9045$

$y_4^- = \min(1.664; 1.664; 1.664; 2.2188; 1.664) = 1.664$

$y_5^- = \min(2.236; 2.236; 2.236; 2.236; 2.236) = 2.236$

maka diketahui nilai solusi ideal negatif :

$A^- = (1.2125; 1.1428; 0.9042; 1.664; 2.236)$

* menentukan jarak antara nilai setiap alternatif dengan matriks solusi ideal positif

Rumus : $D_i^+ = \sqrt{\sum_j^n = (y_{ij} - y_j^+)^2}$ dengan $i = 1, 2, \ldots m$

$D_1^+ = \sqrt{(1.2125 - 2.425)^2 + (1.1428 - 2.2856)^2 + (0.9045 - 1.809)^2 + (1.664 - 2.2188)^2 + (2.236 - 2.236)^2} = 1.9753$

$D_2^+ = \sqrt{(2.425 - 2.425)^2 + (1.714 - 2.2856)^2 + (0.9045 - 1.809)^2 + (1.664 - 2.2188)^2 + (2.236 - 2.236)^2} = 1.2052$

$D_3^+ = \sqrt{(2.425 - 2.425)^2 + (1.1428 - 2.2856)^2 + (0.9045 - 1.809)^2 + (1.664 - 2.2188)^2 + (2.236 - 2.236)^2} = 1.5594$

$D_4^+ = \sqrt{(2.425 - 2.425)^2 + (2.2856 - 2.2856)^2 + (1.809 - 1.809)^2 + (2.2188 - 2.2188)^2 + (2.236 - 2.236)^2} = 0$

$D_5^+ = \sqrt{(2.425 - 2.425)^2 + (2.2856 - 2.2856)^2 + (1.809 - 1.809)^2 + (1.664 - 2.2188)^2 + (2.236 - 2.236)^2} = 0.5548$

※menentukan jarak antara nilai setiap alternatif dengan matriks solusi ideal negatif

Rumus : $D_i^- = \sqrt{\sum_{j}^{n} (y_{ij} - y_j^-)^2}$ dengan $i = 1, 2, \cdots m$

$D_1^- = \sqrt{(1.2125-1.2125)^2+(1.1428-1.1428)^2+(0.9045-0.9045)^2+(1.664-1.664)^2-(2.236-2.236)^2}$

$= 0$

$D_2^- = \sqrt{(2.425-1.2125)^2+(1.714-1.1428)^2+(0.9045-0.9045)^2+(1.664-1.664)^2-(2.236-2.236)^2}$

$= 1.3403$

$D_3^- = \sqrt{(2.425-1.2125)^2+(1.1428-1.1428)^2+(0.9045-0.9045)^2+(1.664-1.664)^2-(2.236-2.236)^2}$

$= 1.2125$

$D_4^- = \sqrt{(2.425-1.2125)^2+(2.2856-1.1428)^2+(1.809-0.9045)^2+(2.2188-1.664)^2-(2.236-2.236)^2}$

$= 1.9753$

$D_5^- = \sqrt{(2.425-1.2125)^2+(2.2856-1.1428)^2+(1.809-0.9045)^2+(1.664-1.664)^2-(2.236-2.236)^2}$

$= 1.8958$

maka diketahui jarak nilai setiap alternatif solusi ideal positif dan negatif

D^+
1.9753
1.2052
1.5594
0
0,5548

D^-
0
1.3403
1.2125
1.9753
1.8958

※menentukan nilai preferensi untuk setiap alternatif (V)

Rumus : $V_i = \frac{D_i^-}{D_i^- + D_i^+}$ dimana $i = 1, 2, \cdots m$

$V_1 = \frac{0}{0+1.9753} = 0$

$V_2 = \frac{1.3403}{1.3403+1.2052} = 0.5265$

$V_3 = \frac{1.2125}{1.2125+1.5594} = 0.4374$

$V_4 = \frac{1.9753}{1.9753+0} = 1$

$V_5 = \frac{1.8958}{1.8958+0.5548} = 0,7736$

※membuat ranking dari setiap alternatif

Alternatif	Nilai akhir (V)	Ranking
A1	0	5
A2	0,5265	3
A3	0,4374	4
A4	1	1
A5	0,7736	2

Hasilnya, dapat dilihat bahwa V4 memiliki nilai terbesar sehingga dapat diambil kesimpulan jika penentuan kopi yang sesuai dengan ranking yang sudah ditentukan adalah kopi Arabika Aceh Gayo.