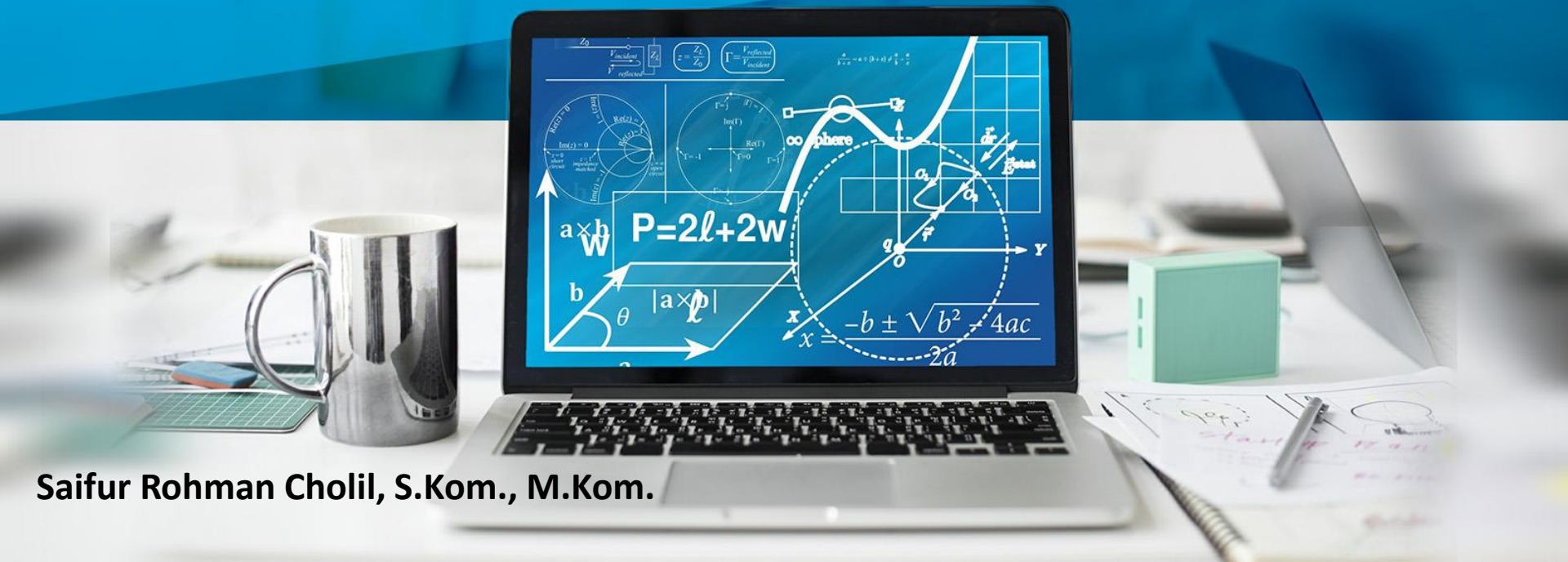
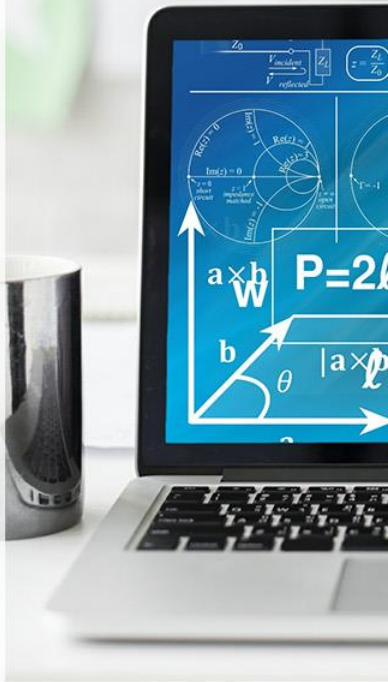
METODE EDAS

(Evaluation based on Distance from Average Solution)



Saifur Rohman Cholil, S.Kom., M.Kom.

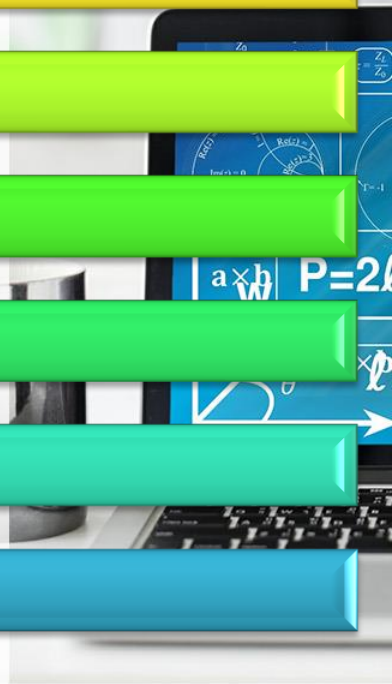
- Metode Evaluation based on Distance from Average Solution (EDAS) diperkenalkan oleh Keshavarz Ghorabaee pada tahun 2015 untuk menangani masalah Multi Criteria Decision Making atau MCDM (Mishra et al., 2020).
- Metode EDAS menggunakan solusi rata-rata untuk penilaian alternatif dengan cara menghitung jarak rata-rata positif (PDA) dan jarak rata-rata negatif (NDA) (Ghorabaee et al., 2015).



- Metode EDAS sangat berguna ketika kriteria yang bertentangan harus dipertimbangkan (benefit dan cost), stabil ketika berbagai kriteria bobot digunakan, dan konsisten dengan metode lain (Pamucar et al., 2022).
- Hasil akhir pengambilan keputusan multikriteria berdasarkan pada skor penilaian Apraisal Score (AS) tertinggi untuk mendapatkan pilihan terbaik dari semua alternatif (Biswas et al., 2022).

❑ Tahapan metode EDAS :

1. Pembentukan Matriks Keputusan (X)
2. Menentukan Solusi Rata-rata (AV)
3. Menentukan Jarak Positif/Negatif dari Rata-rata (PDA/NDA)
4. Menentukan Jumlah Terbobot dari PDA/NDA (SP/SN)
5. Normalisasi Nilai SP/SN (NSP/NSN)
6. Menghitung Nilai Skor Penilaian (AS)
7. Perankingan Alternatif

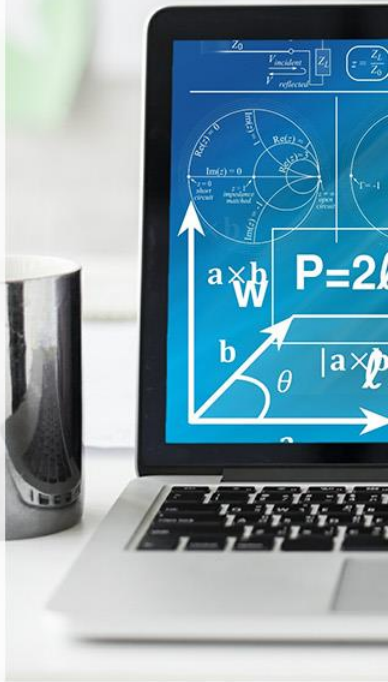


1. Pembentukan Matriks Keputusan (X)

Pada matriks keputusan (X), baris menunjukkan alternatif dan kolom menunjukkan kriteria. Matriks keputusan menunjukkan kinerja dari masing-masing alternatif terhadap berbagai kriteria.

$$X = \begin{bmatrix} x_{11} & \cdots & x_{12} & \cdots & x_{1n} \\ x_{21} & \cdots & x_{22} & \cdots & x_{2n} \\ x_{m1} & \cdots & x_{m2} & \cdots & x_{mn} \end{bmatrix}$$

Keterangan :
m = alternatif
n = kriteria

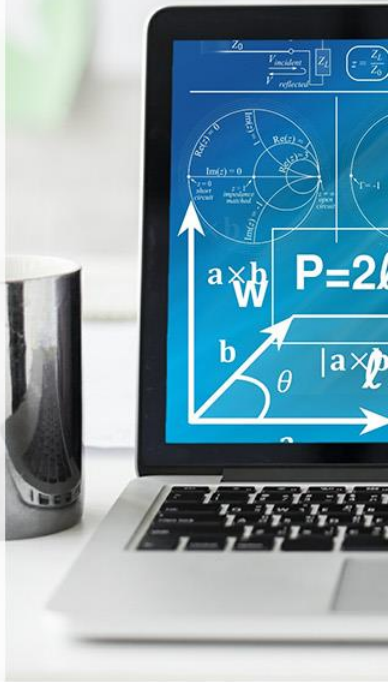


2. Menentukan Solusi Rata-rata / Average Solution (AV)

Penentuan solusi rata-rata (AV) sesuai dengan kriteria yang ditentukan dengan menggunakan persamaan:

$$AV_j = \frac{\sum_{i=1}^{m} X_{ij}}{m}$$

Keterangan :
AV_j = solusi rata-rata
X_{ij} = nilai kriteria dari alternatif
m = alternatif



3. Menentukan Jarak Positif/Negatif dari Rata-rata (PDA/NDA)

Hitung jarak positif dari matriks rata-rata (PDA) dan jarak negatif dari matriks rata-rata (NDA) sesuai jenis kriteria (benefit dan cost) dengan menggunakan persamaan:

$$PDA_{ij} = \left\{ \frac{\max\left(0, \left(x_{ij} - AV_j\right)\right)}{AV_j} \right\} kriteria\ benefit$$

$$PDA_{ij} = \left\{ \frac{\max\left(0, \left(AV_j - x_{ij}\right)\right)}{AV_j} \right\} kriteria\ cost$$

3. Menentukan Jarak Positif/Negatif dari Rata-rata (PDA/NDA)

Hitung jarak positif dari matriks rata-rata (PDA) dan jarak negatif dari matriks rata-rata (NDA) sesuai jenis kriteria (benefit dan cost) dengan menggunakan persamaan:

$$NDA_{ij} = \left\{ \frac{\max\left(0, \left(AV_j - x_{ij}\right)\right)}{AV_j} \right\} kriteria\ benefit$$

$$NDA_{ij} = \left\{ \frac{\max\left(0, \left(x_{ij} - AV_j\right)\right)}{AV_j} \right\} kriteria\ cost$$

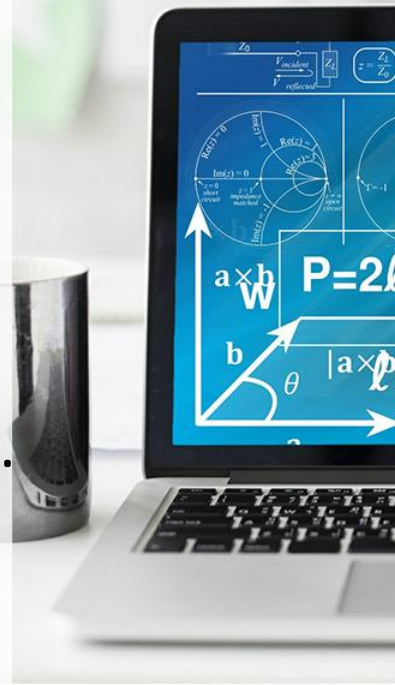
4. Menentukan Jumlah Terbobot dari PDA/NDA (SP/SN)

Menentukan jumlah terbobot dari PDA dan NDA untuk semua alternatif dengan persamaan berikut ini:

$$SP_i = \sum_{j=1}^{n} w_j \times PDA_{ij}$$

$$SN_i = \sum_{j=1}^{n} w_j \times NDA_{ij}$$

Nilai SPi dan SNi, masing-masing adalah nilai jumlah terbobot dari PDA dan NDA untuk setiap alternatif ke-i.

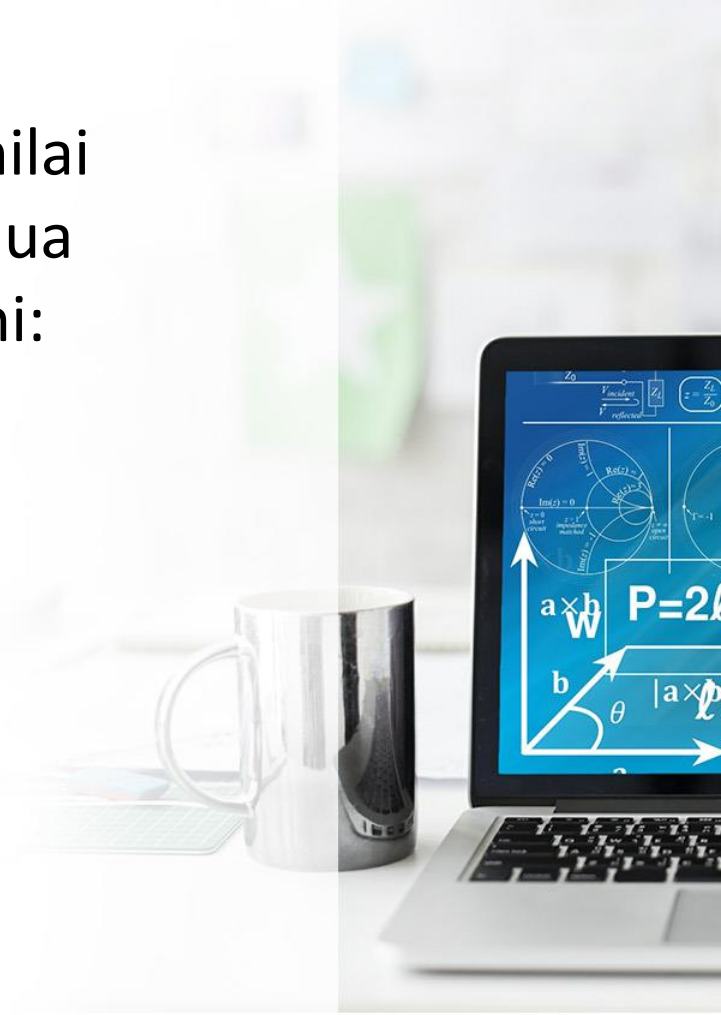


5. Normalisasi Nilai SP/SN (NSP/NSN)

Tahap berikutnya adalah menghitung nilai normalisasi dari SP daan SN untuk semua alternatif dengan persamaan berikut ini:

$$NSP_i = \frac{SP_i}{\max(SP_i)}$$

$$NSN_i = 1 - \frac{SN_i}{\max(SN_i)}$$



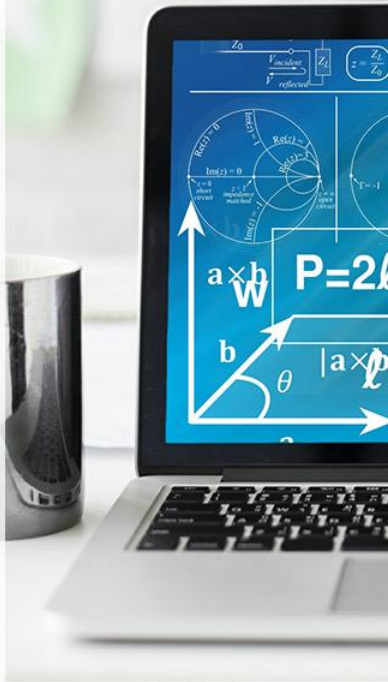
6. Menghitung Nilai Skor Penilaian (AS)

   Menghitung nilai Apraisal Score penilaian dengan persamaan berikut ini:

$$AS_i = \frac{1}{2}(NSP_i + NSN_i)$$

7. Perankingan Alternatif

   Perangkingan dari nilai skor penilaian AS dari nilai yang tertinggi hingga yang terendah. Alternatif dengan nilai yang tertinggi menunjukkan alternatif yang terbaik.



Contoh :

- Sebuah perusahaan akan melakukan rekrutmen kerja terhadap 5 calon pekerja untuk posisi operator mesin.
- Posisi yang dibutuhkan hanya 2 orang.
- Kriteria :
  - ✓ Pengalaman kerja (disimbolkan C1) ➔ Benefit
  - ✓ Pendidikan (C2) ➔ Benefit
  - ✓ Usia (C3) ➔ Benefit
  - ✓ Status perkawinan (C4) ➔ Cost
  - ✓ Alamat (C5) ➔ Cost

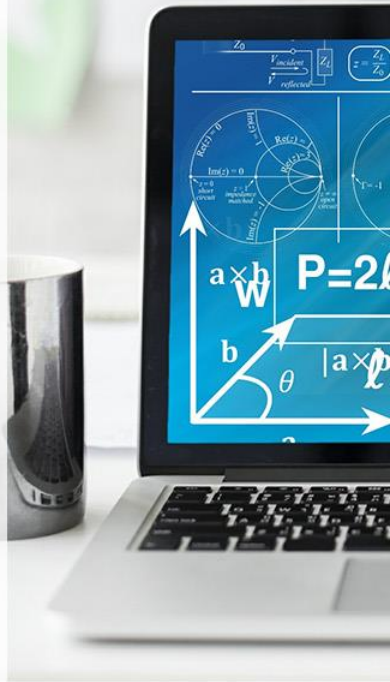
❑ Pembobotan (w)

Kriteria	Bobot
C1	0,3
C2	0,2
C3	0,2
C4	0,15
C5	0,15
Total	1

- Ada lima orang yang menjadi kandidat (alternatif) yaitu :
  - ✓ Doni Prakosa (disimbolkan A1)
  - ✓ Dion Pratama (A2)
  - ✓ Dina Ayu Palupi (A3)
  - ✓ Dini Ambarwati (A4)
  - ✓ Danu Nugraha (A5)

- Penilaian alternatif untuk setiap kriteria

Alternatif	kriteria				
	C1	C2	C3	C4	C5
A1	0,5	1	0,7	0,7	0,8
A2	0,8	0,7	1	0,5	1
A3	1	0,3	0,4	0,7	1
A4	0,2	1	0,5	0,9	0,7
A5	1	0,7	0,4	0,7	1



Jawab :

1. Pembentukan Matriks Keputusan (X) :

$$X = \begin{bmatrix} 0,5 & 1 & 0,7 & 0,7 & 0,8 \\ 0,8 & 0,7 & 1 & 0,5 & 1 \\ 1 & 0,3 & 0,4 & 0,7 & 1 \\ 0,2 & 1 & 0,5 & 0,9 & 0,7 \\ 1 & 0,7 & 0,4 & 0,7 & 1 \end{bmatrix}$$

Alternatif	kriteria				
	C1	C2	C3	C4	C5
A1	0,5	1	0,7	0,7	0,8
A2	0,8	0,7	1	0,5	1
A3	1	0,3	0,4	0,7	1
A4	0,2	1	0,5	0,9	0,7
A5	1	0,7	0,4	0,7	1

2. Menentukan Solusi Rata-rata Average Solution (AV)

$$AV_1 = \frac{0,5+0,8+1+0,2+1}{5} = \frac{3,5}{5} = 0,7$$

$$AV_2 = \frac{1+0,7+0,3+1+0,7}{5} = \frac{3,7}{5} = 0,74$$

$$AV_3 = \frac{0,7+1+0,4+0,5+0,4}{5} = \frac{3}{5} = 0,6$$

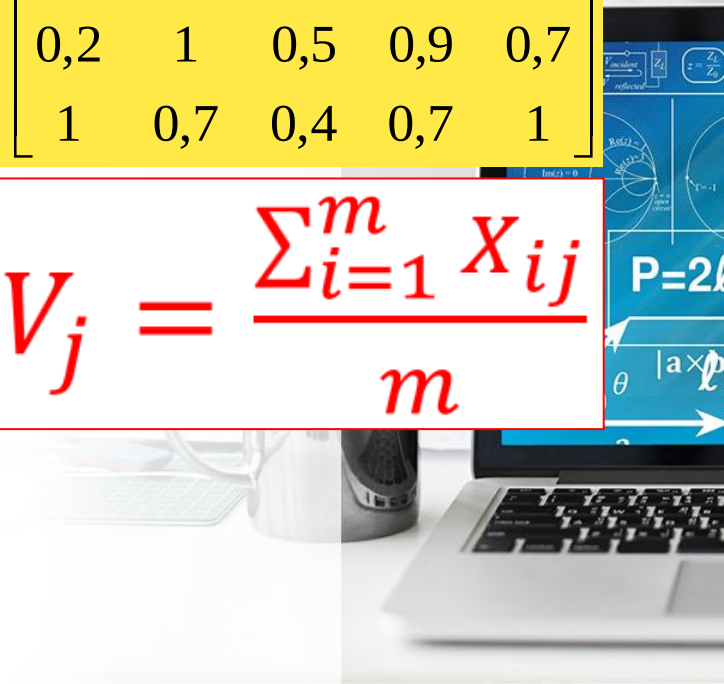
$$AV_4 = \frac{0,7+0,5+0,7+0,9+0,7}{5} = \frac{3,5}{5} = 0,7$$

$$AV_5 = \frac{0,8+1+1+0,7+1}{5} = \frac{4,5}{5} = 0,9$$

$$AV = [0,7 \;\; 0,74 \;\; 0,6 \;\; 0,7 \;\; 0,9]$$

$$X = \begin{bmatrix} 0,5 & 1 & 0,7 & 0,7 & 0,8 \\ 0,8 & 0,7 & 1 & 0,5 & 1 \\ 1 & 0,3 & 0,4 & 0,7 & 1 \\ 0,2 & 1 & 0,5 & 0,9 & 0,7 \\ 1 & 0,7 & 0,4 & 0,7 & 1 \end{bmatrix}$$

$$AV_j = \frac{\sum_{i=1}^{m} X_{ij}}{m}$$



3. Menentukan Jarak Positif/Negatif dari Rata-rata (PDA)

$$PDA_{ij} = \left\{ \frac{\max\left(0, (x_{ij} - AV_j)\right)}{AV_j} \right\} kriteria\ benefit$$

$$PDA_{ij} = \left\{ \frac{\max\left(0, (AV_j - x_{ij})\right)}{AV_j} \right\} kriteria\ cost$$

$$X = \begin{bmatrix} 0{,}5 & 1 & 0{,}7 & 0{,}7 & 0{,}8 \\ 0{,}8 & 0{,}7 & 1 & 0{,}5 & 1 \\ 1 & 0{,}3 & 0{,}4 & 0{,}7 & 1 \\ 0{,}2 & 1 & 0{,}5 & 0{,}9 & 0{,}7 \\ 1 & 0{,}7 & 0{,}4 & 0{,}7 & 1 \end{bmatrix}$$

$$AV = [0{,}7 \quad 0{,}74 \quad 0{,}6 \quad 0{,}7 \quad 0{,}9]$$

Kriteria C1 :

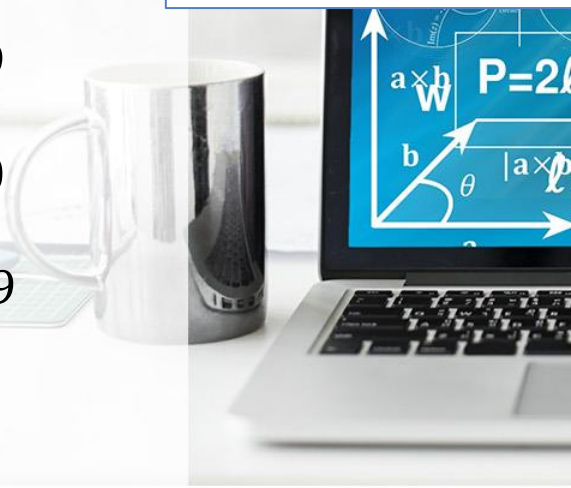
$$PDA_{11} = \max\left(0, \frac{(0{,}5-0{,}7)}{0{,}7}\right) = \left(0, \frac{-0{,}2}{0{,}7}\right) = (0,\ -0{,}286) = 0$$

$$PDA_{21} = \max\left(0, \frac{(0{,}8-0{,}7)}{0{,}7}\right) = \left(0, \frac{0{,}1}{0{,}7}\right) = (0,\ 0{,}143) = 0{,}143$$

$$PDA_{31} = \max\left(0, \frac{(1-0{,}7)}{0{,}7}\right) = \left(0, \frac{0{,}3}{0{,}7}\right) = (0,\ 0{,}429) = 0{,}429$$

$$PDA_{41} = \max\left(0, \frac{(0{,}2-0{,}7)}{0{,}7}\right) = \left(0, \frac{-0{,}5}{0{,}7}\right) = (0,\ -0{,}714) = 0$$

$$PDA_{51} = \max\left(0, \frac{(1-0{,}7)}{0{,}7}\right) = \left(0, \frac{0{,}3}{0{,}7}\right) = (0,\ 0{,}429) = 0{,}429$$



3. Menentukan Jarak Positif/Negatif dari Rata-rata (PDA)

$$PDA_{ij} = \left\{ \frac{\max\left(0, (x_{ij} - AV_j)\right)}{AV_j} \right\} \text{kriteria benefit}$$

$$PDA_{ij} = \left\{ \frac{\max\left(0, (AV_j - x_{ij})\right)}{AV_j} \right\} \text{kriteria cost}$$

$$X = \begin{bmatrix} 0{,}5 & 1 & 0{,}7 & 0{,}7 & 0{,}8 \\ 0{,}8 & 0{,}7 & 1 & 0{,}5 & 1 \\ 1 & 0{,}3 & 0{,}4 & 0{,}7 & 1 \\ 0{,}2 & 1 & 0{,}5 & 0{,}9 & 0{,}7 \\ 1 & 0{,}7 & 0{,}4 & 0{,}7 & 1 \end{bmatrix}$$

$$AV = [0{,}7 \;\; 0{,}74 \;\; 0{,}6 \;\; 0{,}7 \;\; 0{,}9]$$

Kriteria C2 :

$$PDA_{12} = \max\left(0, \frac{(1-0{,}74)}{0{,}74}\right) = \left(0, \frac{0{,}26}{0{,}74}\right) = (0, \; 0{,}351) = 0{,}351$$

$$PDA_{22} = \max\left(0, \frac{(0{,}7-0{,}74)}{0{,}74}\right) = \left(0, \frac{-0{,}04}{0{,}74}\right) = (0, \; -0{,}054) = 0$$

$$PDA_{32} = \max\left(0, \frac{(0{,}3-0{,}74)}{0{,}74}\right) = \left(0, \frac{-0{,}44}{0{,}74}\right) = (0, \; -0{,}595) = 0$$

$$PDA_{42} = \max\left(0, \frac{(1-0{,}74)}{0{,}74}\right) = \left(0, \frac{0{,}26}{0{,}74}\right) = (0, \; 0{,}351) = 0{,}351$$

$$PDA_{52} = \max\left(0, \frac{(0{,}7-0{,}74)}{0{,}74}\right) = \left(0, \frac{-0{,}04}{0{,}74}\right) = (0, \; -0{,}054) = 0$$

3. Menentukan Jarak Positif/Negatif dari Rata-rata (PDA)

$$PDA_{ij} = \left\{ \frac{\max\left(0, (x_{ij} - AV_j)\right)}{AV_j} \right\} \text{kriteria benefit}$$

$$PDA_{ij} = \left\{ \frac{\max\left(0, (AV_j - x_{ij})\right)}{AV_j} \right\} \text{kriteria cost}$$

$$X = \begin{bmatrix} 0{,}5 & 1 & 0{,}7 & 0{,}7 & 0{,}8 \\ 0{,}8 & 0{,}7 & 1 & 0{,}5 & 1 \\ 1 & 0{,}3 & 0{,}4 & 0{,}7 & 1 \\ 0{,}2 & 1 & 0{,}5 & 0{,}9 & 0{,}7 \\ 1 & 0{,}7 & 0{,}4 & 0{,}7 & 1 \end{bmatrix}$$

$$AV = [0{,}7 \quad 0{,}74 \quad 0{,}6 \quad 0{,}7 \quad 0{,}9]$$

Kriteria C3 :

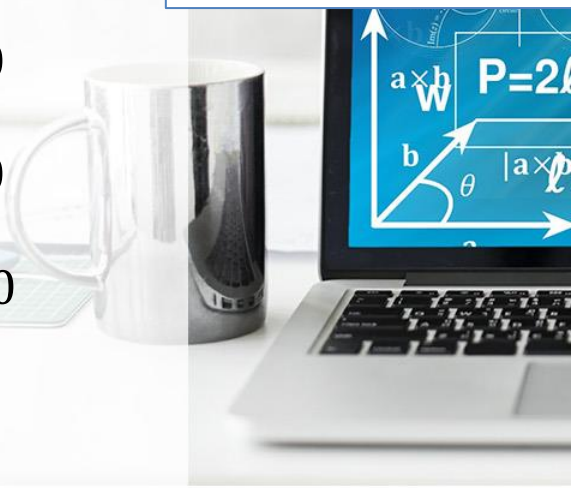
$$PDA_{12} = \max\left(0, \frac{(0{,}7 - 0{,}6)}{0{,}6}\right) = \left(0, \frac{0{,}1}{0{,}6}\right) = (0, \quad 0{,}167) = 0{,}167$$

$$PDA_{22} = \max\left(0, \frac{(1 - 0{,}6)}{0{,}6}\right) = \left(0, \frac{0{,}4}{0{,}6}\right) = (0, \quad 0{,}667) = 0{,}667$$

$$PDA_{32} = \max\left(0, \frac{(0{,}4 - 0{,}6)}{0{,}6}\right) = \left(0, \frac{-0{,}2}{0{,}6}\right) = (0, \quad -0{,}333) = 0$$

$$PDA_{42} = \max\left(0, \frac{(0{,}5 - 0{,}6)}{0{,}6}\right) = \left(0, \frac{-0{,}1}{0{,}6}\right) = (0, \quad -0{,}167) = 0$$

$$PDA_{52} = \max\left(0, \frac{(0{,}4 - 0{,}6)}{0{,}6}\right) = \left(0, \frac{-0{,}2}{0{,}6}\right) = (0, \quad -0{,}333) = 0$$



3. Menentukan Jarak Positif/Negatif dari Rata-rata (PDA)

$$PDA_{ij} = \left\{ \frac{\max\left(0, (x_{ij} - AV_j)\right)}{AV_j} \right\} kriteria\ benefit$$

$$PDA_{ij} = \left\{ \frac{\max\left(0, (AV_j - x_{ij})\right)}{AV_j} \right\} kriteria\ cost$$

$$X = \begin{bmatrix} 0{,}5 & 1 & 0{,}7 & 0{,}7 & 0{,}8 \\ 0{,}8 & 0{,}7 & 1 & 0{,}5 & 1 \\ 1 & 0{,}3 & 0{,}4 & 0{,}7 & 1 \\ 0{,}2 & 1 & 0{,}5 & 0{,}9 & 0{,}7 \\ 1 & 0{,}7 & 0{,}4 & 0{,}7 & 1 \end{bmatrix}$$

$$AV = [0{,}7 \quad 0{,}74 \quad 0{,}6 \quad 0{,}7 \quad 0{,}9]$$

Kriteria C4 :

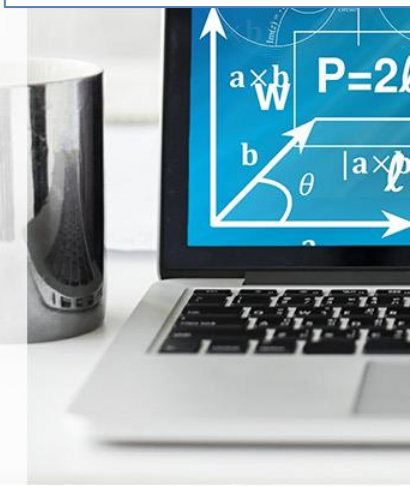
$$PDA_{11} = \max\left(0, \frac{(0{,}7 - 0{,}7)}{0{,}7}\right) = \left(0, \frac{0}{0{,}7}\right) = (0,\ 0) = 0$$

$$PDA_{21} = \max\left(0, \frac{(0{,}7 - 0{,}5)}{0{,}7}\right) = \left(0, \frac{0{,}2}{0{,}7}\right) = (0,\ 0{,}286\ ) = 0{,}286$$

$$PDA_{31} = \max\left(0, \frac{(0{,}7 - 0{,}7)}{0{,}7}\right) = \left(0, \frac{0}{0{,}7}\right) = (0,\ 0\ ) = 0$$

$$PDA_{41} = \max\left(0, \frac{(0{,}7 - 0{,}9)}{0{,}7}\right) = \left(0, \frac{-0{,}2}{0{,}7}\right) = (0,\ -0{,}286\ ) = 0$$

$$PDA_{51} = \max\left(0, \frac{(0{,}7 - 0{,}7)}{0{,}7}\right) = \left(0, \frac{0}{0{,}7}\right) = (0,\ \ 0\ ) = 0$$



3. Menentukan Jarak Positif/Negatif dari Rata-rata (PDA)

$$PDA_{ij} = \left\{ \frac{\max\left(0, (x_{ij} - AV_j)\right)}{AV_j} \right\} kriteria\ benefit$$

$$PDA_{ij} = \left\{ \frac{\max\left(0, (AV_j - x_{ij})\right)}{AV_j} \right\} kriteria\ cost$$

$$X = \begin{bmatrix} 0{,}5 & 1 & 0{,}7 & 0{,}7 & 0{,}8 \\ 0{,}8 & 0{,}7 & 1 & 0{,}5 & 1 \\ 1 & 0{,}3 & 0{,}4 & 0{,}7 & 1 \\ 0{,}2 & 1 & 0{,}5 & 0{,}9 & 0{,}7 \\ 1 & 0{,}7 & 0{,}4 & 0{,}7 & 1 \end{bmatrix}$$

$$AV = [0{,}7 \quad 0{,}74 \quad 0{,}6 \quad 0{,}7 \quad 0{,}9]$$

Kriteria C5 :

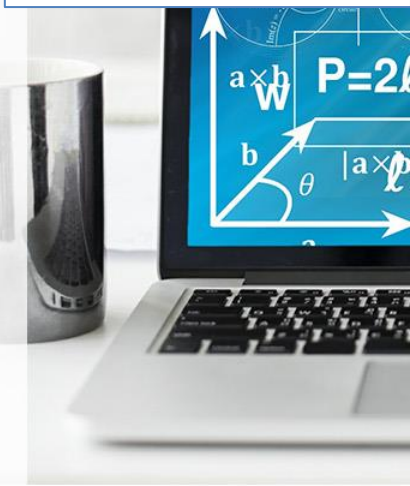
$$PDA_{12} = \max\left(0, \frac{(0{,}9 - 0{,}8)}{0{,}9}\right) = \left(0, \frac{0{,}1}{0{,}9}\right) = (0,\ 0{,}111) = 0{,}111$$

$$PDA_{22} = \max\left(0, \frac{(0{,}9 - 1)}{0{,}9}\right) = \left(0, \frac{-0{,}1}{0{,}9}\right) = (0,\ -0{,}111) = 0$$

$$PDA_{32} = \max\left(0, \frac{(0{,}9 - 1)}{0{,}9}\right) = \left(0, \frac{-0{,}1}{0{,}9}\right) = (0,\ -0{,}111\ ) = 0$$

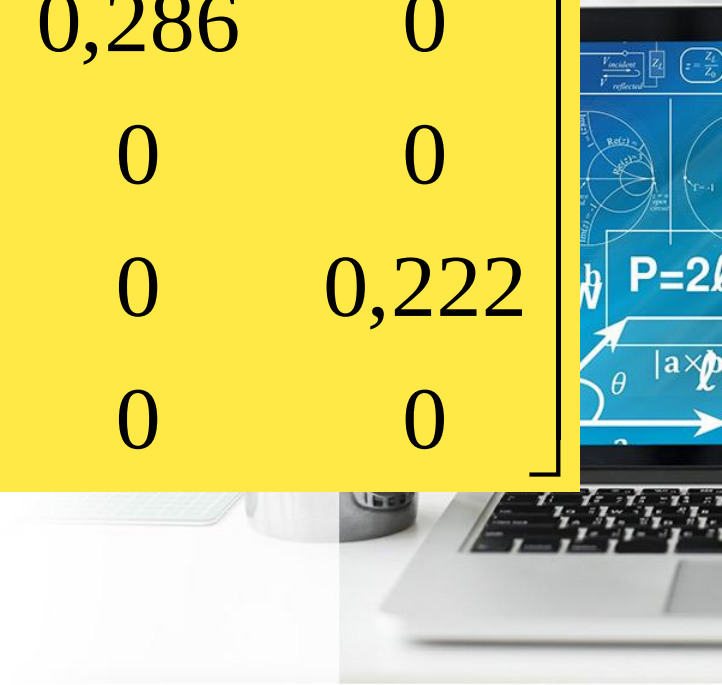
$$PDA_{42} = \max\left(0, \frac{(0{,}9 - 0{,}7)}{0{,}9}\right) = \left(0, \frac{0{,}2}{0{,}9}\right) = (0,\ 0{,}222) = 0{,}222$$

$$PDA_{52} = \max\left(0, \frac{(0{,}9 - 1)}{0{,}9}\right) = \left(0, \frac{-0{,}1}{0{,}9}\right) = (0,\ -0{,}111) = 0$$



Data jarak positif dari solusi rata-rata (PDA) :

$$PDA_{ij} = \begin{bmatrix} 0 & 0{,}351 & 0{,}167 & 0 & 0{,}111 \\ 0{,}143 & 0 & 0{,}667 & 0{,}286 & 0 \\ 0{,}429 & 0 & 0 & 0 & 0 \\ 0 & 0{,}351 & 0 & 0 & 0{,}222 \\ 0{,}429 & 0 & 0 & 0 & 0 \end{bmatrix}$$



3. Menentukan Jarak Positif/Negatif dari Rata-rata (NDA)

$$NDA_{ij} = \left\{ \frac{\max\left(0, (AV_j - x_{ij})\right)}{AV_j} \right\} kriteria\ benefit$$

$$NDA_{ij} = \left\{ \frac{\max\left(0, (x_{ij} - AV_j)\right)}{AV_j} \right\} kriteria\ cost$$

$$X = \begin{bmatrix} 0{,}5 & 1 & 0{,}7 & 0{,}7 & 0{,}8 \\ 0{,}8 & 0{,}7 & 1 & 0{,}5 & 1 \\ 1 & 0{,}3 & 0{,}4 & 0{,}7 & 1 \\ 0{,}2 & 1 & 0{,}5 & 0{,}9 & 0{,}7 \\ 1 & 0{,}7 & 0{,}4 & 0{,}7 & 1 \end{bmatrix}$$

$$AV = [0{,}7 \quad 0{,}74 \quad 0{,}6 \quad 0{,}7 \quad 0{,}9]$$

Kriteria C1 :

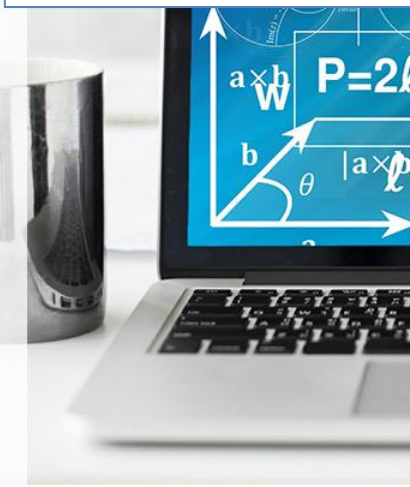
$$NDA_{11} = \max\left(0, \frac{(0{,}7 - 0{,}5)}{0{,}7}\right) = \left(0, \frac{0{,}2}{0{,}7}\right) = (0, \ \ 0{,}286) = 0{,}286$$

$$NDA_{21} = \max\left(0, \frac{(0{,}7 - 0{,}8)}{0{,}7}\right) = \left(0, \frac{-0{,}1}{0{,}7}\right) = (0, \ -0{,}143) = 0$$

$$NDA_{31} = \max\left(0, \frac{(0{,}7 - 1)}{0{,}7}\right) = \left(0, \frac{-0{,}3}{0{,}7}\right) = (0, \ -0{,}429) = 0$$

$$NDA_{41} = \max\left(0, \frac{(0{,}7 - 0{,}2)}{0{,}7}\right) = \left(0, \frac{0{,}5}{0{,}7}\right) = (0, \ 0{,}714) = 0{,}714$$

$$NDA_{51} = \max\left(0, \frac{(0{,}7 - 1)}{0{,}7}\right) = \left(0, \frac{-0{,}3}{0{,}7}\right) = (0, \ \ -0{,}429) = 0$$



3. Menentukan Jarak Positif/Negatif dari Rata-rata (NDA)

$$NDA_{ij} = \left\{ \frac{\max\left(0, (AV_j - x_{ij})\right)}{AV_j} \right\} \text{kriteria benefit}$$

$$NDA_{ij} = \left\{ \frac{\max\left(0, (x_{ij} - AV_j)\right)}{AV_j} \right\} \text{kriteria cost}$$

Kriteria C2 :

$$X = \begin{bmatrix} 0{,}5 & 1 & 0{,}7 & 0{,}7 & 0{,}8 \\ 0{,}8 & 0{,}7 & 1 & 0{,}5 & 1 \\ 1 & 0{,}3 & 0{,}4 & 0{,}7 & 1 \\ 0{,}2 & 1 & 0{,}5 & 0{,}9 & 0{,}7 \\ 1 & 0{,}7 & 0{,}4 & 0{,}7 & 1 \end{bmatrix}$$

$$AV = [0{,}7 \quad 0{,}74 \quad 0{,}6 \quad 0{,}7 \quad 0{,}9]$$

$$NDA_{12} = \max\left(0, \frac{(0{,}74-1)}{0{,}74}\right) = \left(0, \frac{-0{,}26}{0{,}74}\right) = (0, \ -0{,}351) = 0$$

$$NDA_{22} = \max\left(0, \frac{(0{,}74-0{,}7)}{0{,}74}\right) = \left(0, \frac{0{,}04}{0{,}74}\right) = (0, \ 0{,}054) = 0{,}054$$

$$NDA_{32} = \max\left(0, \frac{(0{,}74-0{,}3)}{0{,}74}\right) = \left(0, \frac{0{,}44}{0{,}74}\right) = (0, \ 0{,}595) = 0{,}595$$

$$NDA_{42} = \max\left(0, \frac{(0{,}74-1)}{0{,}74}\right) = \left(0, \frac{-0{,}26}{0{,}74}\right) = (0, \ -0{,}351) = 0$$

$$NDA_{52} = \max\left(0, \frac{(0{,}74-0{,}7)}{0{,}74}\right) = \left(0, \frac{0{,}04}{0{,}74}\right) = (0, \ 0{,}054) = 0{,}054$$

3. Menentukan Jarak Positif/Negatif dari Rata-rata (NDA)

$$NDA_{ij} = \left\{ \frac{\max\left(0, (AV_j - x_{ij})\right)}{AV_j} \right\} \text{kriteria benefit}$$

$$NDA_{ij} = \left\{ \frac{\max\left(0, (x_{ij} - AV_j)\right)}{AV_j} \right\} \text{kriteria cost}$$

$$X = \begin{bmatrix} 0{,}5 & 1 & 0{,}7 & 0{,}7 & 0{,}8 \\ 0{,}8 & 0{,}7 & 1 & 0{,}5 & 1 \\ 1 & 0{,}3 & 0{,}4 & 0{,}7 & 1 \\ 0{,}2 & 1 & 0{,}5 & 0{,}9 & 0{,}7 \\ 1 & 0{,}7 & 0{,}4 & 0{,}7 & 1 \end{bmatrix}$$

$$AV = [0{,}7 \quad 0{,}74 \quad 0{,}6 \quad 0{,}7 \quad 0{,}9]$$

Kriteria C3 :

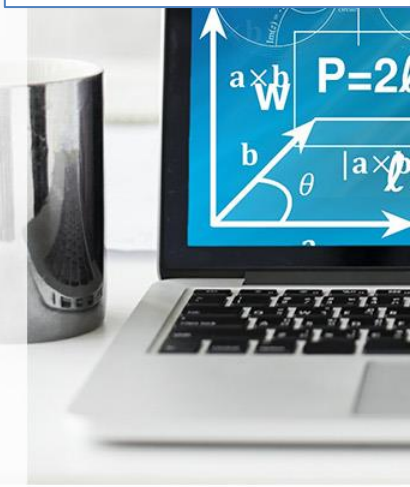
$$NDA_{12} = \max\left(0, \frac{(0{,}6-0{,}7)}{0{,}6}\right) = \left(0, \frac{-0{,}1}{0{,}6}\right) = (0, \ -0{,}167) = 0$$

$$NDA_{22} = \max\left(0, \frac{(0{,}6-1)}{0{,}6}\right) = \left(0, \frac{-0{,}4}{0{,}6}\right) = (0, \ -0{,}667) = 0$$

$$NDA_{32} = \max\left(0, \frac{(0{,}6-0{,}4)}{0{,}6}\right) = \left(0, \frac{0{,}2}{0{,}6}\right) = (0, \ 0{,}333) = 0{,}333$$

$$NDA_{42} = \max\left(0, \frac{(0{,}6-0{,}5)}{0{,}6}\right) = \left(0, \frac{0{,}1}{0{,}6}\right) = (0, \ 0{,}167) = 0{,}167$$

$$NDA_{52} = \max\left(0, \frac{(0{,}6-0{,}4)}{0{,}6}\right) = \left(0, \frac{0{,}2}{0{,}6}\right) = (0, \ 0{,}333) = 0{,}333$$



3. Menentukan Jarak Positif/Negatif dari Rata-rata (NDA)

$$NDA_{ij} = \left\{ \frac{\max\left(0, (AV_j - x_{ij})\right)}{AV_j} \right\} kriteria\ benefit$$

$$NDA_{ij} = \left\{ \frac{\max\left(0, (x_{ij} - AV_j)\right)}{AV_j} \right\} kriteria\ cost$$

$$X = \begin{bmatrix} 0{,}5 & 1 & 0{,}7 & 0{,}7 & 0{,}8 \\ 0{,}8 & 0{,}7 & 1 & 0{,}5 & 1 \\ 1 & 0{,}3 & 0{,}4 & 0{,}7 & 1 \\ 0{,}2 & 1 & 0{,}5 & 0{,}9 & 0{,}7 \\ 1 & 0{,}7 & 0{,}4 & 0{,}7 & 1 \end{bmatrix}$$

$$AV = [0{,}7 \quad 0{,}74 \quad 0{,}6 \quad 0{,}7 \quad 0{,}9]$$

Kriteria C4 :

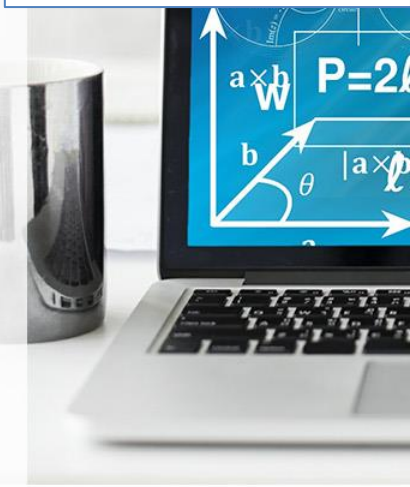
$$NDA_{11} = \max\left(0, \frac{(0{,}7 - 0{,}7)}{0{,}7}\right) = \left(0, \frac{0}{0{,}7}\right) = (0,\ 0) = 0$$

$$NDA_{21} = \max\left(0, \frac{(0{,}5 - 0{,}7)}{0{,}7}\right) = \left(0, \frac{-0{,}2}{0{,}7}\right) = (0,\ -0{,}286) = 0$$

$$NDA_{31} = \max\left(0, \frac{(0{,}7 - 0{,}7)}{0{,}7}\right) = \left(0, \frac{0}{0{,}7}\right) = (0,\ 0) = 0$$

$$NDA_{41} = \max\left(0, \frac{(0{,}9 - 0{,}7)}{0{,}7}\right) = \left(0, \frac{0{,}2}{0{,}7}\right) = (0,\ 0{,}286) = 0{,}286$$

$$NDA_{51} = \max\left(0, \frac{(0{,}7 - 0{,}7)}{0{,}7}\right) = \left(0, \frac{0}{0{,}7}\right) = (0,\ 0) = 0$$



3. Menentukan Jarak Positif/Negatif dari Rata-rata (NDA)

$$NDA_{ij} = \left\{ \frac{\max\left(0, (AV_j - x_{ij})\right)}{AV_j} \right\} kriteria\ benefit$$

$$NDA_{ij} = \left\{ \frac{\max\left(0, (x_{ij} - AV_j)\right)}{AV_j} \right\} kriteria\ cost$$

$$X = \begin{bmatrix} 0{,}5 & 1 & 0{,}7 & 0{,}7 & 0{,}8 \\ 0{,}8 & 0{,}7 & 1 & 0{,}5 & 1 \\ 1 & 0{,}3 & 0{,}4 & 0{,}7 & 1 \\ 0{,}2 & 1 & 0{,}5 & 0{,}9 & 0{,}7 \\ 1 & 0{,}7 & 0{,}4 & 0{,}7 & 1 \end{bmatrix}$$

$$AV = [0{,}7 \quad 0{,}74 \quad 0{,}6 \quad 0{,}7 \quad 0{,}9]$$

Kriteria C5 :

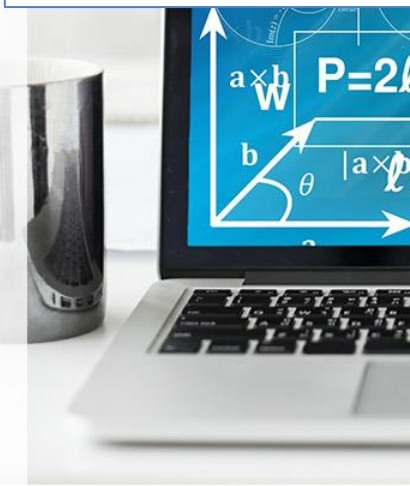
$$NDA_{12} = \max\left(0, \frac{(0{,}8-0{,}9)}{0{,}9}\right) = \left(0, \frac{-0{,}1}{0{,}9}\right) = (0, \ -0{,}111) = 0$$

$$NDA_{22} = \max\left(0, \frac{(1-0{,}9)}{0{,}9}\right) = \left(0, \frac{0{,}1}{0{,}9}\right) = (0, \ 0{,}111) = 0{,}111$$

$$NDA_{32} = \max\left(0, \frac{(1-0{,}9)}{0{,}9}\right) = \left(0, \frac{0{,}1}{0{,}9}\right) = (0, \ 0{,}111) = 0{,}111$$

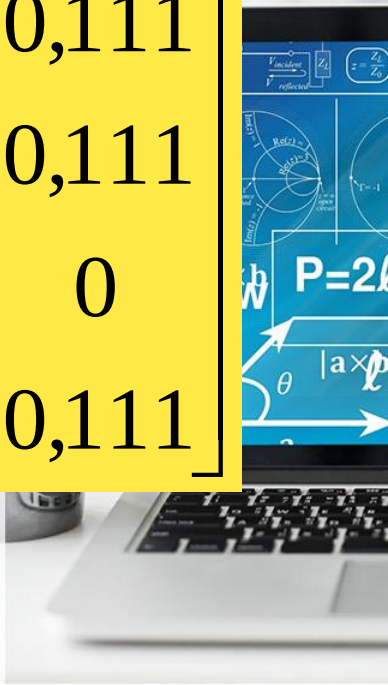
$$NDA_{42} = \max\left(0, \frac{(0{,}7-0{,}9)}{0{,}9}\right) = \left(0, \frac{-0{,}2}{0{,}9}\right) = (0, \ -0{,}222) = 0$$

$$NDA_{52} = \max\left(0, \frac{(1-0{,}9)}{0{,}9}\right) = \left(0, \frac{0{,}1}{0{,}9}\right) = (0, \ 0{,}111) = 0{,}111$$



Data jarak negatif dari solusi rata-rata (NDA) :

$$NDA_{ij} = \begin{bmatrix} 0,286 & 0 & 0 & 0 & 0 \\ 0 & 0,054 & 0 & 0 & 0,111 \\ 0 & 0,595 & 0,333 & 0 & 0,111 \\ 0,714 & 0 & 0,167 & 0,286 & 0 \\ 0 & 0,054 & 0,333 & 0 & 0,111 \end{bmatrix}$$



4. Menentukan Jumlah Terbobot dari PDA/NDA (SP/SN)

$$SP_i = \sum_{j=1}^{n} w_j \times PDA_{ij}$$

$$SN_i = \sum_{j=1}^{n} w_j \times NDA_{ij}$$

SP_1 = (0,3*0)+(0,2*0,351)+(0,2*0,167)+(0,15*0)+(0,15*0,111) = 0,120

SP_2 = (0,3*0,143)+(0,2*0)+(0,2*0,667)+(0,15*0,286)+(0,15*0) = 0,219

SP_3 = (0,3*0,429)+(0,2*0)+(0,2*0)+(0,15*0)+(0,15*0) = 0,129

SP_4 = (0,3*0)+(0,2*0,351)+(0,2*0)+(0,15*0)+(0,15*0,222) = 0,104

SP_5 = (0,3*0,429)+(0,2*0)+(0,2*0)+(0,15*0)+(0,15*0) = 0,129

SN_1 = (0,3*0,286)+(0,2*0)+(0,2*0)+(0,15*0)+(0,15*0) = 0,086

SN_2 = (0,3*0)+(0,2*0,054)+(0,2*0)+(0,15*0)+(0,15*0,111) = 0,027

SN_3 = (0,3*0)+(0,2*0,595)+(0,2*0,333)+(0,15*0)+(0,15*0,111) = 0,202

SN_4 = (0,3*0,714)+(0,2*0)+(0,2*0,167)+(0,15*0,286)+(0,15*0) = 0,290

SN_5 = (0,3*0)+(0,2*0,054)+(0,2*0,333)+(0,15*0)+(0,15*0,111) = 0,094

$$PDA_{ij} = \begin{bmatrix} 0 & 0,351 & 0,167 & 0 & 0,111 \\ 0,143 & 0 & 0,667 & 0,286 & 0 \\ 0,429 & 0 & 0 & 0 & 0 \\ 0 & 0,351 & 0 & 0 & 0,222 \\ 0,429 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$NDA_{ij} = \begin{bmatrix} 0,286 & 0 & 0 & 0 & 0 \\ 0 & 0,054 & 0 & 0 & 0,111 \\ 0 & 0,595 & 0,333 & 0 & 0,111 \\ 0,714 & 0 & 0,167 & 0,286 & 0 \\ 0 & 0,054 & 0,333 & 0 & 0,111 \end{bmatrix}$$

Kriteria	Bobot
C1	0,3
C2	0,2
C3	0,2
C4	0,15
C5	0,15

4. Menentukan Jumlah Terbobot dari PDA/NDA (SP/SN)

$$SP_i = \sum_{j=1}^{n} w_j \times PDA_{ij}$$

$$SN_i = \sum_{j=1}^{n} w_j \times NDA_{ij}$$

$SP_1 = 0{,}120$ $SN_1 = 0{,}086$

$SP_2 = 0{,}219$ $SN_2 = 0{,}027$

$SP_3 = 0{,}129$ $SN_3 = 0{,}202$

$SP_4 = 0{,}104$ $SN_4 = 0{,}290$

$SP_5 = 0{,}129$ $SN_5 = 0{,}094$

5. Normalisasi Nilai SP/SN (NSP/NSN)

$$NSP_i = \frac{SP_i}{\max(SP_i)}$$

$$NSN_i = 1 - \frac{SN_i}{\max(SN_i)}$$

$SP_1 = 0{,}120$	$SN_1 = 0{,}086$
$SP_2 = 0{,}219$	$SN_2 = 0{,}027$
$SP_3 = 0{,}129$	$SN_3 = 0{,}202$
$SP_4 = 0{,}104$	$SN_4 = 0{,}290$
$SP_5 = 0{,}129$	$SN_5 = 0{,}094$

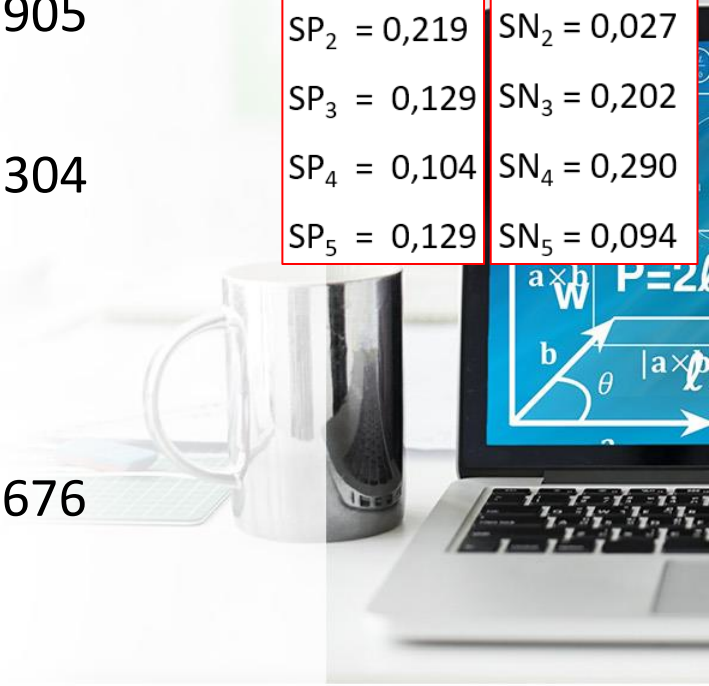
$$NSP_1 = \frac{0{,}120}{0{,}219} = 0{,}549 \qquad NSN_1 = 1 - \frac{0{,}086}{0{,}290} = 0{,}705$$

$$NSP_2 = \frac{0{,}219}{0{,}219} = 1 \qquad NSN_2 = 1 - \frac{0{,}027}{0{,}290} = 0{,}905$$

$$NSP_3 = \frac{0{,}129}{0{,}219} = 0{,}587 \qquad NSN_3 = 1 - \frac{0{,}202}{0{,}290} = 0{,}304$$

$$NSP_4 = \frac{0{,}104}{0{,}219} = 0{,}473 \qquad NSN_4 = 1 - \frac{0{,}290}{0{,}290} = 0$$

$$NSP_5 = \frac{0{,}129}{0{,}219} = 0{,}587 \qquad NSN_5 = 1 - \frac{0{,}094}{0{,}290} = 0{,}676$$



5. Normalisasi Nilai SP/SN (NSP/NSN)

$NSP_1 = 0{,}549$ $NSN_1 = 0{,}705$

$NSP_2 = 1$ $NSN_2 = 0{,}905$

$NSP_3 = 0{,}587$ $NSN_3 = 0{,}304$

$NSP_4 = 0{,}473$ $NSN_4 = 0$

$NSP_5 = 0{,}587$ $NSN_5 = 0{,}676$

6. Menghitung Nilai Skor Penilaian (AS)

$AS_1 = \frac{1}{2}(0{,}549 + 0{,}705) = 0{,}627$

$AS_2 = \frac{1}{2}(1 + 0{,}905) = 0{,}953$

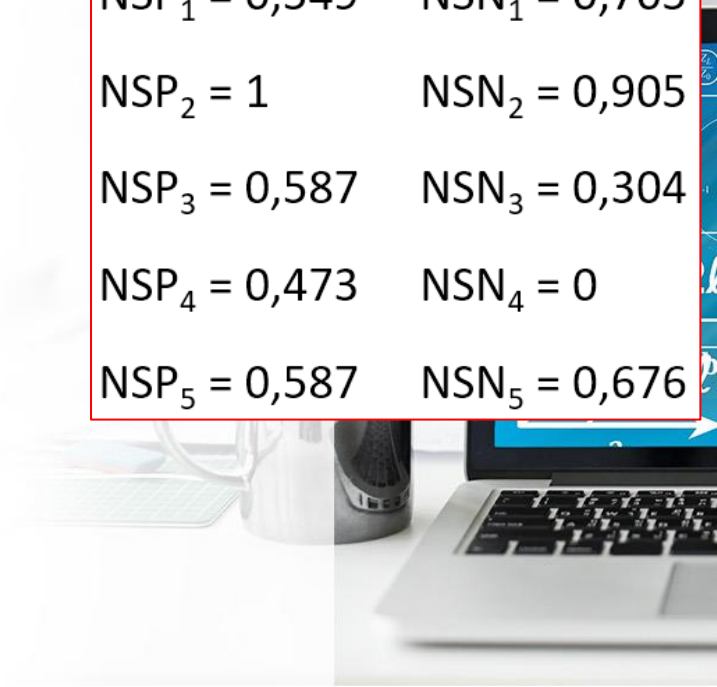
$AS_3 = \frac{1}{2}(0{,}587 + 0{,}304) = 0{,}445$

$AS_4 = \frac{1}{2}(0{,}473 + 0) = 0{,}236$

$AS_5 = \frac{1}{2}(0{,}587 + 0{,}676) = 0{,}631$

$$AS_i = \frac{1}{2}(NSP_i + NSN_i)$$

$NSP_1 = 0{,}549$	$NSN_1 = 0{,}705$
$NSP_2 = 1$	$NSN_2 = 0{,}905$
$NSP_3 = 0{,}587$	$NSN_3 = 0{,}304$
$NSP_4 = 0{,}473$	$NSN_4 = 0$
$NSP_5 = 0{,}587$	$NSN_5 = 0{,}676$



7. Perankingan Alternatif

$AS_1 = 0,627$

$AS_2 = 0,953$

$AS_3 = 0,445$

$AS_4 = 0,236$

$AS_5 = 0,631$

- Nilai terbesar ada pada A2 = 0,953 dan A5 = 0,631 sehingga Dion Pratama dan Danu Nugraha adalah alternatif yang terpilih sebagai alternatif terbaik.
- Dengan kata lain, Dion Pratama dan Danu Nugraha terpilih untuk posisi operator mesin.

Reference:

- A novel EDAS approach on intuitionistic fuzzy set for assessment of health-care waste disposal technology using new parametric divergence measures-Arunodaya Raj Mishra, Abbas Mardani, Pratibha Rani, Edmundas Kazimieras Zavadskas (2020).
- Multi-Criteria Inventory Classification Using a New Method of Evaluation Based on Distance from Average Solution (EDAS)-Mehdi KESHAVARZ GHORABAEE,Edmundas Kazimieras ZAVADSKAS, Laya OLFAT,Zenonas TURSKIS (2015).
- Prioritization of sustainable mobility sharing systems using integrated fuzzy DIBR and fuzzy-rough EDAS model-Dragan Pamucar, Vladimir Simic, Dragan Lazarevi, Momˇcilo Dobrodolac, Muhammet Deveci (2022).

Reference :

- A multi-criteria based analytic framework for exploring the impact of Covid-19 on firm performance in emerging market- Sanjib Biswas, Gautam Bandyopadhyay, Jayanta Nath Mukhopadhyaya (2022).
- Optimization of ultrasonic machining (USM) parameters on micro hole drilling of graphene oxide/pineapple leaf filler reinforced epoxy hybrid composite using evaluation based on distance from average solution (EDAS) method-Angkan Bania, Divya Zindani, Saikat Ranjan Maity (2020).