

جدول 1، أ ب ج

	Economic boom	Natural Economic	Economic depression
Acquiring a new machine d_1	42000	33000	-5000
Creating a new production line d_2	27000	36000	21000
Establishing a new factory d_3	13000	16000	17000
Increasing daily working hours d_4	25000	15000	10000

Solution: Optimist Criterion

	S_1	S_2	S_3	Max	MaxMax
d_1	42000	33000	-5000	42000	42000
d_2	27000	36000	21000	36000	
d_3	13000	16000	17000	17000	
d_4	25000	15000	10000	25000	

The best alternative is d_1 (Acquiring a new machine)

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2 - pessimist criterion (Wald)

	S_1	S_2	S_3	Min	Max Min
d_1	42000	33000	-5000	-5000	
d_2	27000	36000	21000	21000	21000
d_3	13000	16000	17000	13000	
d_4	25000	15000	10000	10000	

The best decision is d_2 (creating a new production Line).

3 - Laplace

Here we take the mean for all strategy

$$\begin{aligned}\text{Mean } d_1 &= (42000 + 33000 + (-5000)) / 3 \\ &= 23333.334\end{aligned}$$

$$\begin{aligned}\text{Mean } d_2 &= (27000 + 36000 + 21000) / 3 \\ &= 28000\end{aligned}$$

$$\begin{aligned}\text{Mean } d_3 &= (13000 + 16000 + 17000) / 3 \\ &= 15333.334\end{aligned}$$

$$\text{Mean } d_4 = (25000 + 15000 + 10000) / 3$$

$$= 16666.667$$

$$\text{Max}(:23333.334, 28000, 15333.334, 16666.667)$$

$$= 28000$$

The best decision is d_2 (Creating a new production line)

4 - Regret Matrix

	S_1	S_2	S_3	Max	Min
d_1	0	3000	26000	26000	
d_2	15000	0	0	15000	15000
d_3	29000	20000	4000	29000	
d_4	17000	21000	11000	21000	

The best decision is d_2 (Creating a new production line)

بما ان الجدول هو مصفوفة ارباع فيها نأخذ اعمدة من كل عمود ويظهر فيها باقي عناصر العمود

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5- Hurwicz criterion

$$Hv(d_i) = \alpha (\text{best alternative}) + (1-\alpha) (\text{worst alternative})$$

$$Hv(d_1) = 0.7(42000) + (1-0.7)(-5000) \\ = 27900$$

$$Hv(d_2) = 36000(0.7) + 0.3(21000) \\ = 31500$$

$$Hv(d_3) = 17000(0.7) + 13000(0.3) \\ = 15800$$

$$Hv(d_4) = 25000(0.7) + 10000(0.3) \\ = 20500$$

$$\text{Max}(27900, 31500, 15800, 20500) \\ = 31500$$

The best decision is d_2 (creating a new production Line).

Example 2: Let us have a cost decision matrix that includes three available strategies under three normal situations

Alternatives / N.S	state of nature 1	state of Nature 2	state of Nature 3
Alternative 1 a_1	24000	21000	17500
Alternative 2 a_2	15000	27500	29000
Alternative 3 a_3	25000	10000	31000

Required: what's the best alternative using

- 1- Optimist criterion
- 2- pessimist criterion
- 3- Laplace criterion
- 4- Hurwicz criterion
- 5- Regret Matrix criterion

Solution:

1- Optimist criterion

$$\text{Min } a_1 = \text{Min } (24000, 21000, 17500) = 17500$$

$$\text{Min } a_2 = \text{Min } (15000, 27500, 29000) = 15000$$

$$\text{Min } a_3 = \text{Min } (25000, 10000, 31000) = 10000$$

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The best alternative is done by

$$\text{Min}(17500, 15000, 10000) = 10000$$

a_3 is the best alternative

2-pessimist criterion

$$\text{Max } a_1 = \text{Max}(17500, 21000, 24000) = 24000$$

$$\text{Max } a_2 = \text{Max}(29000, 27500, 15000) = 29000$$

$$\text{Max } a_3 = \text{Max}(31000, 10000, 25000) = 31000$$

$$\text{Min}(24000, 29000, 31000) = 24000$$

a_1 is the best alternative because it satisfies the minimum cost

3-Laplace criterion

$$\text{Mean } a_1 = (17500 + 21000 + 24000)/3 = 20834$$

$$\text{Mean } a_2 = (15000 + 27500 + 29000)/3 = 23834$$

$$\text{Mean } a_3 = (25000 + 10000 + 31500)/3 = 22000$$

The best alternative is done by

$$\text{Min}(20834, 23834, 22000) = 20834$$

a_1 is the best alternative.