

0.4
5
4
2

$$\text{Min}(5, 4, 2) = 2$$

a_3 is the best.

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Example: A fragrance manufacturer wants to introduce a new product. This factory has 3 different methods for manufacturing this product, which extend from using an existing method in the factory to complete converting a site in the factory to manufacture this product. Marketing research resulted in the fact that demand could be small, medium, or large. The earning schedule is as follows:-

Manufacturing methods	Request		
	Low	Medium	high
1	200	350	600
2	250	350	540
3	300	375	490

Find the best alternative using

① Hurwicz criterion $\alpha = 0.6$

② Savage criterion

Note: The above table is profit table
Solution

$$Hv(1) = 0.6(600) + 0.4(200)$$

$$Hv(2) = 0.6(540) + 0.4(250)$$

$$Hv(3) = 0.6(490) + 0.4(300)$$

$$HV(1) = 440$$

$$HV(2) = 424$$

$$HV(3) = 414$$

$$\text{Max}(440, 424, 414) \\ = 440$$

$\therefore$ The alternative (1) is the best.

② Savage criterion

Manufacturing Methods	Requests			Max
	Low 0.1	medium 0.5	high 0.4	
1	$300 - 200 = 100$	$375 - 350 = 25$	0	100
2	$300 - 250 = 50$	$375 - 350 = 25$	$600 - 540 = 60$	60
3	$300 - 300 = 0$	0	$600 - 490 = 110$	110
	Max = 300	Max = 375	Max = 600	

$$\text{Min}(100, 60, 110) = 60$$

The alternative (2) is the best.

③ Expected Opportunity Loss (EOL)

Solution

$$\text{EOL}(1) = 100(0.1) + 25(0.5) + 0(0.4) \\ = 135$$

$$\text{EOL}(2) = 50(0.1) + 25(0.5) + 60(0.4) \\ = 41.5$$

$$\text{EOL}(3) = 0 + 0 + 110(0.4) = 44$$

$$\text{Min}(135, 41.5, 44) = 41.5$$

$\therefore$ 2 is the best alternative

Example: A company that import winter fabric must order fabrics for the upcoming winter in advance. The purchasing manager must determine in advance the quantity of fabrics large, medium, small. The number that will be sold depends largely on the quality of the coming winter, whether it is very cold, normal, or light.

The following table gives Costs in thousands of dollars under the above conditions.

Quantity of purchases	Winter Conditions			Max
	Very cold 0.4	Normal 0.4	light 0.2	
large 1	$10 - 4 = 6$	$7 - 4 = 3$	$3 - 3 = 0$	6
medium 2	$8 - 4 = 4$	$8 - 4 = 4$	$6 - 3 = 3$	4
small 3	$4 - 4 = 0$	$4 - 4 = 0$	$4 - 3 = 1$	1
	Max = 4	Max = 4	Max = 3	

Which decision is better using

① the Savage criterion

Solution

$$\min(6, 4, 1) = 1$$

$\therefore$ Small quantity is the best decision

② which decision is the best using Hurwicz criterion at $\alpha = 0.4$

Solution

$$HV(1) = 3(0.4) + 10(0.6) \\ = 7.2$$

$$HV(2) = 6(0.4) + 8(0.6) \\ = 7.2$$

$$HV(3) = 4(0.4) + 0.6(4) \\ = 3.2$$

$$\text{Min}(7.2, 7.2, 3.2)$$

$$= 3.2$$

$\therefore$ Small quantity is the best decision.

③ Expect opportunity Loss (EOL)

$$EOL(1) = 6(0.4) + 3(0.4) + 0 \\ = 2.4 + 1.2 \\ = 3.6$$

$$EOL(2) = 4(0.4) + 4(0.4) + 3(0.2) \\ = 3.8$$

$$EOL(3) = 0 + 0 + 1(0.2) \\ = 0.2$$

$$\text{Min}(3.6, 3.8, 0.2) = 0.2$$

$\therefore$ 3 is the best decision

Expected Value of Complete Additional Information EVCAI

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This criterion can be calculated in two different ways depending on the nature of the decision matrix, whether for returns or costs. Below is a breakdown of that

① In the case of a decision matrix for Returns

The steps are as follows:-

The first step: choose the largest value for each alternative $\text{Max}(B_j)$

The second step:- we calculated the expected value of the values chosen according to the probabilities corresponding to each state of nature

The Third step: we calculated the absolute difference between the expected value and the expected value of profit