	Raining or bad weather Q1	No rain or good weather Q2
Insurance d1	10	5
The company does not provide insurance d2	-30	70-20=50 (tax consideration)

As for the standard utility schedule, we obtain it by dividing the cost of the schedule by the lowest value (5) and Adding the number (6) to all the values, the table becomes as follows:

	Raining or bad weather Q1	No rain or good weather Q2
Insurance d1	8	7
The company does not provide insurance d2	0	16

-30/5=-6+6=0

10/5=2+6=8

5/5=1+6=7

50/5=10+6=16

Loss Function and Loss Table دالة الخسارة وجدول الخسارة

The loss function and loss table can be identified through the following example

Suppose that we have a coin that either has two similar sides or a regular coin that has an image on one side and a writing on the other side. The problem here is to determine whether the coin represents a regular coin or a coin that has two similar sides, in the event that it is withdrawn and in light of this there is a fine of only one dinar. In the event that our decision is wrong while there is no penalty if our

decision is correct, therefore this problem will have the following states of nature: -

1-The coin has two similar sides Q1

2- The currency is regular Q2

Possible decisions

1- **The drawn coin has two similar sides d1**
2- **The withdrawn currency is regular d2**

So the loss function will be as follows:

$L(d_i,Q_j)$, i=1,2,…,n

J=1,2,…,m

The loss function can be represented as follows:

	Two similar faces Q1	Regular Q2
Two similar faces d1	$L(d_1,Q_1)$	$L(d_1,Q_2)$
Regular d2	$L(d_2,Q_1)$	$L(d_2, Q_2)$

	Two similar faces Q1	Regular Q2
Two similar faces d1	0	1
Regular d2	1	0

If the decision is two similar faces and the state of nature is two similar faces then the decision is correct which means there is no fine

If the decision has two similar sides and the state of nature is a regular coin

So the decision is wrong

That is, there is a fine=1 dinar

Regret Function and Regret Table دالة الندم أو الأسف وجدول الندم أو الأسف

The regret function is considered the appropriate criterion for the decision maker who wants the opportunities that will be lost from him as a result of his unsuccessful choice when inappropriate circumstances or states of nature occur to be as few as possible.

Thus, he avoids part of the regret that may befall him after the expected circumstances or states of nature occur. To calculate the regret function

1-Calculating the maximum lost value for each decision alternative

2- Choose the decision that gives the smallest value for lost opportunities

Example : An investor has decisions by which he can invest an amount of money equal to 1000 dinar. The first decision is to save the money in a bank with an interest rate of 4%

The second decision is to buy shares in one of the commercial markets, and the return of those shares depends on economic changes. The value of the share may rise 20%, remain the same, or achieve a loss of 10%.

Required: Create a regret table for this issue

Solution: we notice three natural states as follows

1-Increase in stock value Q1

2-Stable stock value Q2

3-Decrease in stock value Q3

Possible decisions

1-Save the amount in the bank d1

2-Buying shares in one of the commercial markets d2

The first decision d1 will be the return on making a profit equal to 40 dinars (1000*40/100=40)Annually, regardless of market conditions or states of nature

The second decision d2 depends on the market situation, as the investor will achieve a profit of an amount 200 dinars (1000*20/100=200) if the stock rises, achieve a profit of an amount equal to zero if the value of the shares does not change or remain stable, and achieve a loss of an amount if the value of the shares decreases.

We create an utility table

The natural states as follows:-

1-Increase in stock value Q1

2-Stable stock value Q2

3-Decrease in stock value Q3

	Increase in stock value Q1	Stable stock value Q2	Decrease in stock value Q3
Savings d1	40	40	40
Buying shares d2	200	1000-1000=0	-100

To create a regret table

1-We choose the highest value from the values of each column in the utility table

Max c_{ij}=max(200,40,40)

2-We subtract the highest value we found from the rest of the column values and the results will be as follows:-

	Increase in stock value Q1	Stable stock value Q2	Decrease in stock value Q3
Savings d1	200-40=160	40-40=0	40-40=0
Buying shares d2	200-200=0	40-0=40	40-(-100)=140

Then we choose the highest value from each rows

max (d1)=max(160,0,0)=160

max(d2)=max(0,40,140)=140

min(d_i)=min(160,140)=140

The table above is called the table of regrets or the table of missed opportunities

The decision d2 is the optimal decision because it represents the lowest loss

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Types of Decisions

① Strategic Decision:- Concerned with external enviroment of the organization (Uncertainty

② Administrative Decision - Concerned with structuring and acquisition of the organization's resources so as to optimize the performance of the organization (
(Risk and Uncertainty (changing)

③ Operating Decision - Concerned with day to day operation of the organization such as pricing, production scheduling, inventory levels, etc.
(Risk)

④ Routin Decisions:- Decission enviroment (circumstances) are stable and simple as it contains a small number of similar influencing factors that remain the same during the decission making period and during its implementation, as in routine decissions.