

TYPES OF DECISION/MAKING ENVIRONMENTS

- ① Decision Making under certainty
- ② Decision Making under uncertainty
- ③ Decision making under risk

Six Steps in Decision Making:

- ① Clearly define the problem in hand
- ② List the possible alternatives.
- ③ Identify the possible outcomes or states of nature
- ④ List the payoff or profit of each combination of alternatives and outcomes.
- ⑤ Select one of the mathematical decision theory models
- ⑥ Apply the model and make your decision

Decision Making Under Certainty:-

Decision makers know with certainty the consequence of every alternative or decision choice. Naturally they will choose the alternative that will result in the best outcome. Example is making a fixed deposit in a bank.

The most important quantitative models adopted in comparing strategic decisions are detailed according to the decision making environment under complete certainty.

Through the following: -

The state of nature in a state of complete certainty is mutually exclusive, this is because if one of the possible states is achieved, the rest of the state will not necessarily be achieved, so we will not find any trace of the possibility that we achieve each state of nature in the case of complete certainty on the basis that achieving the state of nature is equal to one ($P_i = 1$)

In order to find solutions to his decision-making issue under conditions of complete certainty, the decision maker relies on adopting the principle of Maximizing his profits and returns available from available alternatives and strategies. It also seeks to minimize the costs required to implement each of the available alternatives.

Example: The decision maker has available information that suggests that his business environment is characterized by complete certainty, that is economic prosperity prevails, as the decision maker seeks to invest his financial surpluses (الرواج المالي) in one of the following alternatives

Alternatives/ Returns	Returns
d_1	25 000
d_2	48 000
d_3	100 000

Required:- what's the best alternative from the above available alternatives?

Solution:- Since the business environment is characterized by complete certainty the probability of achieving economic prosperity is equal to One ($P_I=1$) and no other state of nature can prevail and since the decision matrix includes returns, the decision maker will want to maximize his available returns from

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the alternatives shown above as follows:-

The best decision is d_3 because

$$d_3 > d_2 > d_1$$

$$\text{Max } R = 100000$$

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الخيار، الأم فقط.

Example:- The decision maker had information about four available alternatives regarding the costs of producing and marketing four pharmaceutical products in a business environment characterized by complete certainty, as the costs of producing each product were as shown in the table below

Alternatives/costs	The costs of producing and marketing the product			
25000	Pharmaceutical product 1			
50000	"	"	2	
20000	"	"	3	
60000	"	"	4	

what's the best decision?

Solution: since the decision matrix includes the costs of producing and marketing the product, the decision maker will work to minimize his costs

then, the best decision is compute as follows:-

$$\min(25000, 50000, 20000, 60000) =$$

20000

the best decision is d_3

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Decision Making Under Uncertainty

In case of uncertainty, the decision maker can rely on quantitative criteria that help him make his decisions, due to the multiplicity of natural states and the lack of sufficient information about the decision making issue related to the environment.

These criteria are represented in:-

- 1- Optimism criteria
- 2- Pessimistic criteria (Wald)
- 3- Laplace criteria (Equally likely)
- 4- Coefficient criteria (Hurwicz)
- 5- Regret Criteria.

1- Optimism Criteria: it called MaxMax in profit payoff matrix. First locate the maximum payoff for each alternative and then pick that alternative with the maximum number.

This criteria is called MinMin in losses or cost payoff. First locate the minimize payoff for each alternative and then pick that alternative with the minimum number.