

DECISION- MAKING UNDER UNCERTAINTY AND RISK

Business Decision Making

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AGENDA

- 2 groups of decision-making methods
- Matrix of the payment
- Basic methods for decision making under uncertainty and risks

2 GROUPS OF DECISION-MAKING METHODS

Multiple criteria DM methods	DM under uncertainty and risks																									
Table of decision making <ul style="list-style-type: none"> • Alternatives • Criteria • Consequences (Values) 	Table of payments <ul style="list-style-type: none"> • Alternatives • Events (and probabilities) • Payments 																									
An example of DM problem <table border="1"> <thead> <tr> <th></th> <th>Work experience</th> <th>Education</th> <th>Interview</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>3 years</td> <td>High</td> <td>5</td> </tr> <tr> <td>P2</td> <td>5 years</td> <td>Secondary</td> <td>6</td> </tr> <tr> <td>P3</td> <td>No exp</td> <td>High</td> <td>7</td> </tr> </tbody> </table>		Work experience	Education	Interview	P1	3 years	High	5	P2	5 years	Secondary	6	P3	No exp	High	7	An example of DM problem <table border="1"> <thead> <tr> <th></th> <th>It's rain</th> <th>It isn't rain</th> </tr> </thead> <tbody> <tr> <td>Take the umbrella</td> <td>☺</td> <td>☹</td> </tr> <tr> <td>Do not take the umbrella</td> <td>☹</td> <td>☺</td> </tr> </tbody> </table>		It's rain	It isn't rain	Take the umbrella	☺	☹	Do not take the umbrella	☹	☺
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Methods: <ul style="list-style-type: none"> • Ranking, evenswaps, Electra, Promethee, Topsis, AHP, ANP, SAW (pairwise comparisons), Dex... 	Methods: <ul style="list-style-type: none"> • Laplace, Savage, Expected value, Waldo, Hurvitz, Decision tree... 																									

MATRIX OF PAYMENT

- A - Alternatives
- V - Payments
- S - Events and probabilities

	S1	S2	S3	...	Sn
A1	V11	V12	V13	...	V1n
A2	V21	V22	V23	...	V2n
A3	V31	V32	V33	...	V3n
...
Am	Vm1	Vm2	Vm3	...	Vmn



BASIC METHODS: UNCERTAINTY AND RISKS

- Theoretical methods (uncertainty)
 - Max-max (Optimistic approach, Risking approach)
 - Max-min (Pesimistic approach, Wald criterion, safe-player)
 - Hurwicz criterion of the realism
 - Savage regret criterion
- Practical methods (risk)
 - Laplace criterion
 - Expected value
 - Decision-making tree

BASIC METHODS: UNCERTAINTY AND RISKS

- **EXAMPLE:** Company X considers its expansion. There are several possible ways of the expansion. Also, one of the alternatives is status quo – not to do anything. There are three possible events in terms of the market behavior: expansion, stagnation and recession. In the matrix of the payment, there are the payments (profits and losses) that will be achieved if the company selects some option and any of the events appears (in thousands of euros)

	Expansion	Stagnation	Recession
	0,1	0,5	0,4
Big company	200	50	-120
Medium-sized c.	90	120	-30
Small company	40	30	20
Status quo	0	0	0

BASIC METHODS: UNCERTAINTY AND RISKS

	Expansion	Stagnation	Recession
Big company	200	50	-120
Medium-sized c.	90	120	-30
Small company	40	30	20
Status quo	0	0	0

Matrix of regrets	Expansion	Stagnation	Recession
Big company			
Medium-sized c.			
Small company			
Status quo			

BASIC METHODS: UNCERTAINTY AND RISKS

	Expansion	Stagnation	Recession
	1/3	1/3	1/3
	0.1	0.5	0.4
Big company	200	50	-120
Medium-sized c.	90	120	-30
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Status quo	0	0	0

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BASIC METHODS: UNCERTAINTY AND RISKS

- **EXAMPLE 2:** Game! Somebody offers you:
 - A: earn 100€ for not to do anything
 - B: you throw a dice:
 - if you get numbers 1, 2 or 3, you will earn 240 €
 - If you get numbers 4, 5 or 6, you have to pay 3€

