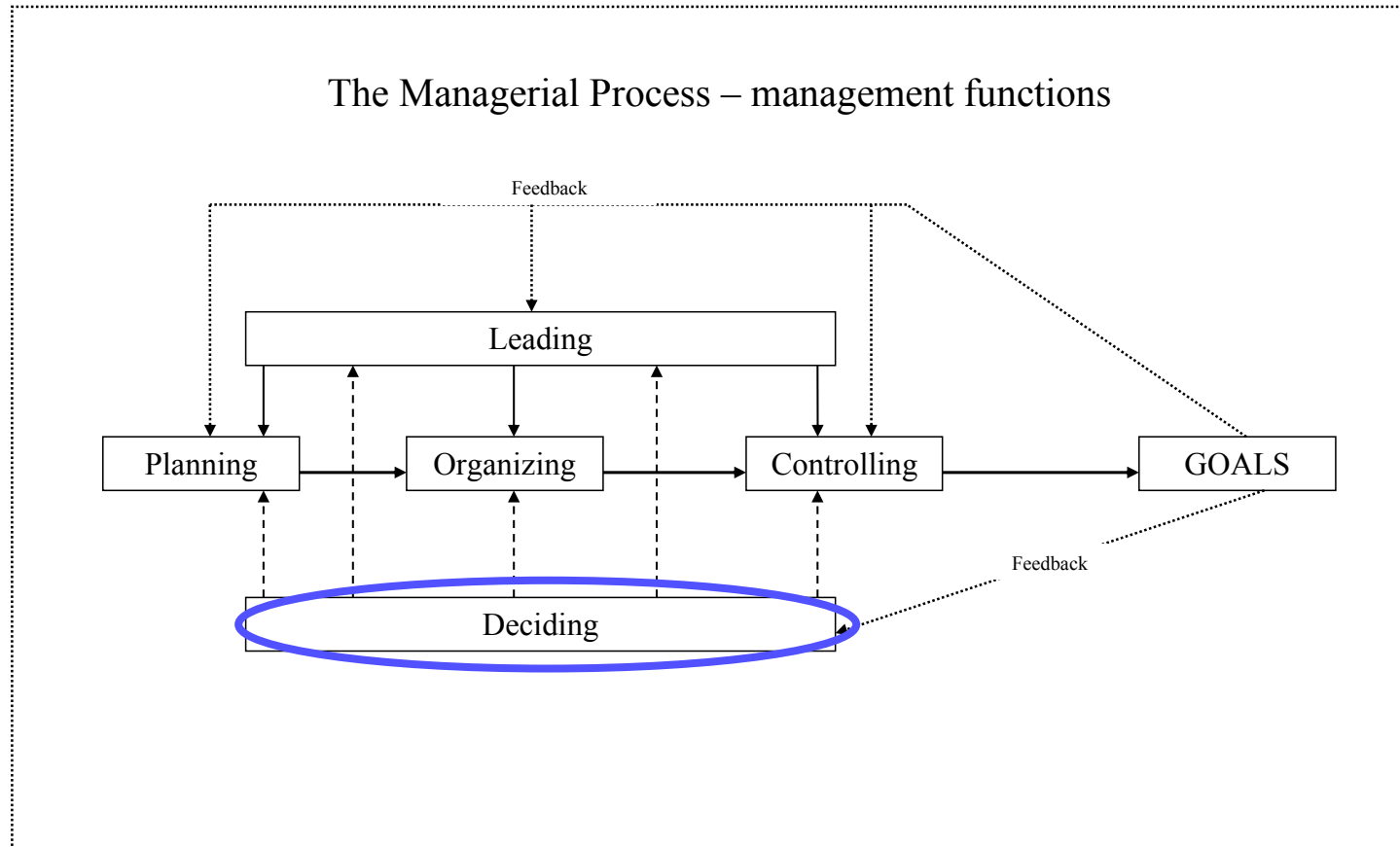# MUNI
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Decision making

Lecture 3

Agenda

- **The decision making process**
  - **Define decision and decision-making process.**
- **The manager as decision maker**
  - **(full) rationality vs. bounded rationality**
  - **decision making styles**
- **Structuring the decision making problem**
- **Methods of decision making**
  - **One-time decisions**
  - **Sequential decisions**

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Where are we?

The Managerial Process – management functions

Feedback

| Leading |

| Planning | → | Organizing | → | Controlling | → | GOALS |

Feedback

Deciding

Decisions in the management functions

Planning

- What are the organization's long-term objectives?
- What strategies will best achieve those objectives?
- What should the organization's short-term objectives be?
- How difficult should individual goals be?

Organizing

- How many employees should I have report directly to me?
- How much centralization should there be in the organization?
- How should jobs be designed?
- When should the organization implement a different structure?

Leading

- How do I handle employees who appear to be low in motivation?
- What is the most effective leadership style in a given situation?
- How will a specific change affect worker productivity?
- When is the right time to stimulate conflict?

Controlling

- What activities in the organization need to be controlled?
- How should those activities be controlled?
- When is a performance deviation significant?
- What type of management information system should the organization have?

Decision + decision making process

Decision making process

☐ making a choice from two or more alternatives (= alternative solutions to a problem).

☐ „problem" = discrepancy between an existing and desired state of affairs.

Figure 4–3
The process of decision making.

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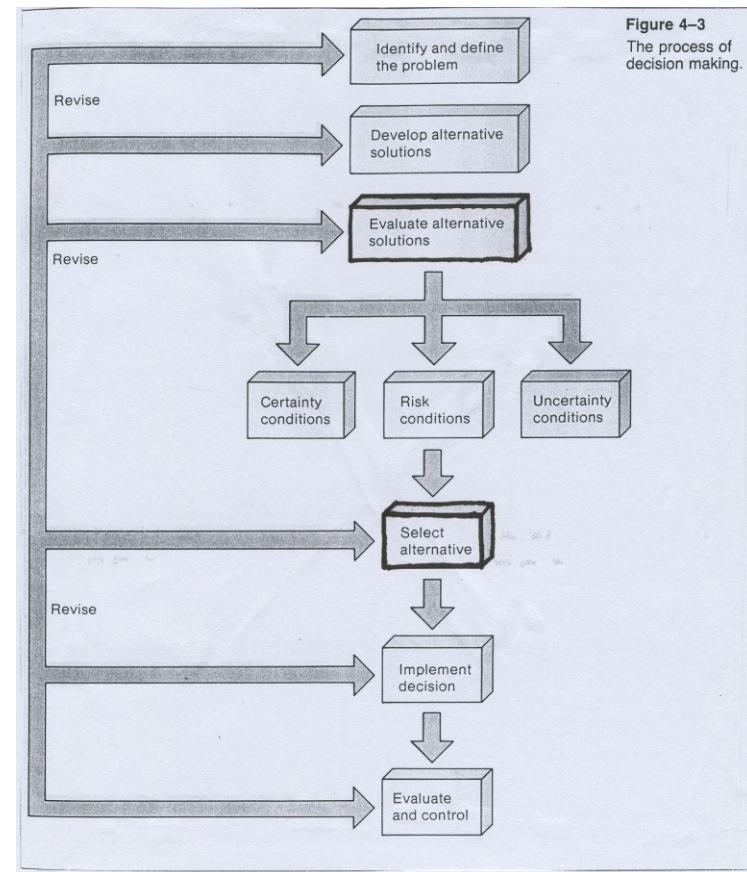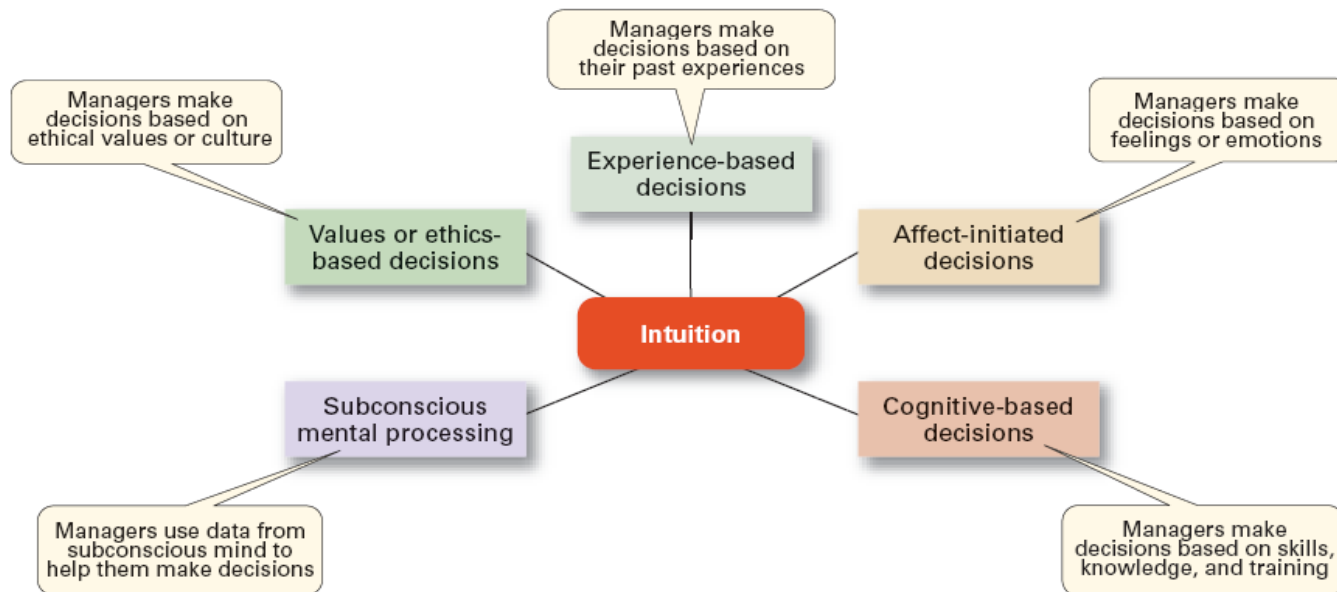
The rational decision making

(Full) Rationality

☐ Managers make consistent, value-maximizing choices with specified constraints.

☐ Assumptions are that decision makers:

➢ Are perfectly rational, fully objective, and logical.

➢ Have carefully defined the problem and identified all viable alternatives.

➢ Have a clear and specific goal

➢ Will select the alternative that maximizes outcomes in the organization's interests rather than in their personal interests.

Bounded rationality

☐ Managers make decisions rationally, but are limited (bounded) by their ability to process information.

☐ Assumptions are that decision makers:

➢ Will not seek out or have knowledge of all alternatives

➢ Will **satisfice** — choose the first alternative encountered that satisfactorily solves the problem — rather than maximize the outcome of their decision by considering all alternatives and choosing the best.

☐ Influence on decision making

➢ Escalation of commitment: an increased commitment to a previous decision despite evidence that it may have been wrong.

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Intuitive decision making

☐making decisions based on experience, feelings, and

accumulated judgment.

Decision making styles

☐Dimensions
  ☐Ways of thinking
    Rational, orderly, and consistent
    Intuitive, creative, and unique
  ☐Tolerance for ambiguity
    Low tolerance: require consistency and order
    High tolerance: multiple thoughts simultaneously

☐Types of Decision Makers
  ☐Directive
    Use minimal information and consider few alternatives.
  ☐Analytic
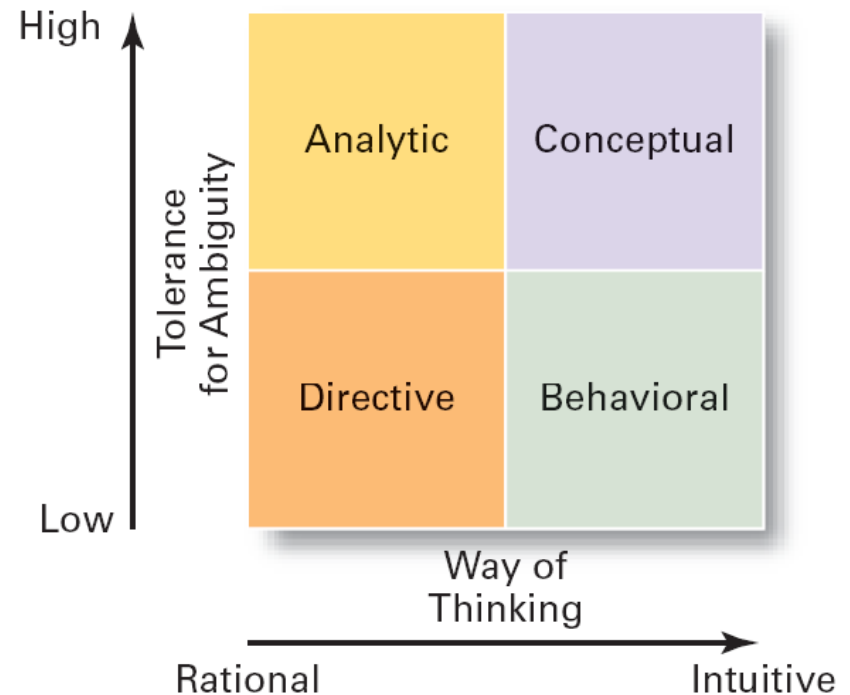   Make careful decisions in unique situations.
  ☐Conceptual
    Maintain a broad outlook and consider many
    alternatives in making decisions.
  ☐Behavioral
    Avoid conflict by working well with others and being
    receptive to suggestions.

High

Tolerance for Ambiguity

| Analytic | Conceptual |
| Directive | Behavioral |

Low

Way of Thinking

Rational   Intuitive

Structured vs. unstructured problems

Structured

☐ Structured Problems
  - ☐ Involve goals that clear.
  - ☐ Are familiar (have occurred before).
  - ☐ Are easily and completely defined— information about the problem is available and complete.

☐ Programmed Decision
  - ☐ A repetitive decision that can be handled by a routine approach.
  - ☐ Policy
    - A general guideline for making a decision about a structured problem.
  - ☐ Procedure
    - A series of interrelated steps that a manager can use to respond (applying a policy) to a structured problem.
  - ☐ Rule
    - An explicit statement that limits what a manager or employee can or cannot do.

Unstructured

☐ Unstructured Problems
  - ☐ Problems that are new or unusual and for which information is ambiguous or incomplete.
  - ☐ Problems that will require custom-made solutions.

☐ Nonprogrammed Decisions
  - ☐ Decisions that are unique and nonrecurring.
  - ☐ Decisions that generate unique responses.

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Structuring a problem

Characteristics of a DM problem

1. **List of alternatives** = possible decisions
   a. available
   b. mutually exclusive
   c. collectively exhaustive

2. **States of nature** = future conditions of events
   a. possible to happen
   b. mutually exclusive
   c. collectively exhaustive

3. **Degree of certainty =** the level of knowledge of decision maker about the states of nature.

4. **Decision criterion =** a factor relevant in a decision.

5. **Payoffs =** the value of decision criterion associated with each decision and state of nature.

Decision making matrix

Criterion	States of nature	
	Assesment of degree of certainty	
Alternatives	Payoffs	Alternative's score (according to the method used)

Decision making conditions

Certainty

A situation in which a manager can make an accurate decision because the outcome of every alternative choice is known.

Risk

A situation in which the manager is able to estimate the likelihood (probability) of outcomes that result from the choice of particular alternatives.

Uncertainty

Limited information prevents estimation of outcome probabilities for alternatives associated with the problem and may force managers to rely on intuition, hunches, and "gut feelings".

Attitude towards risk
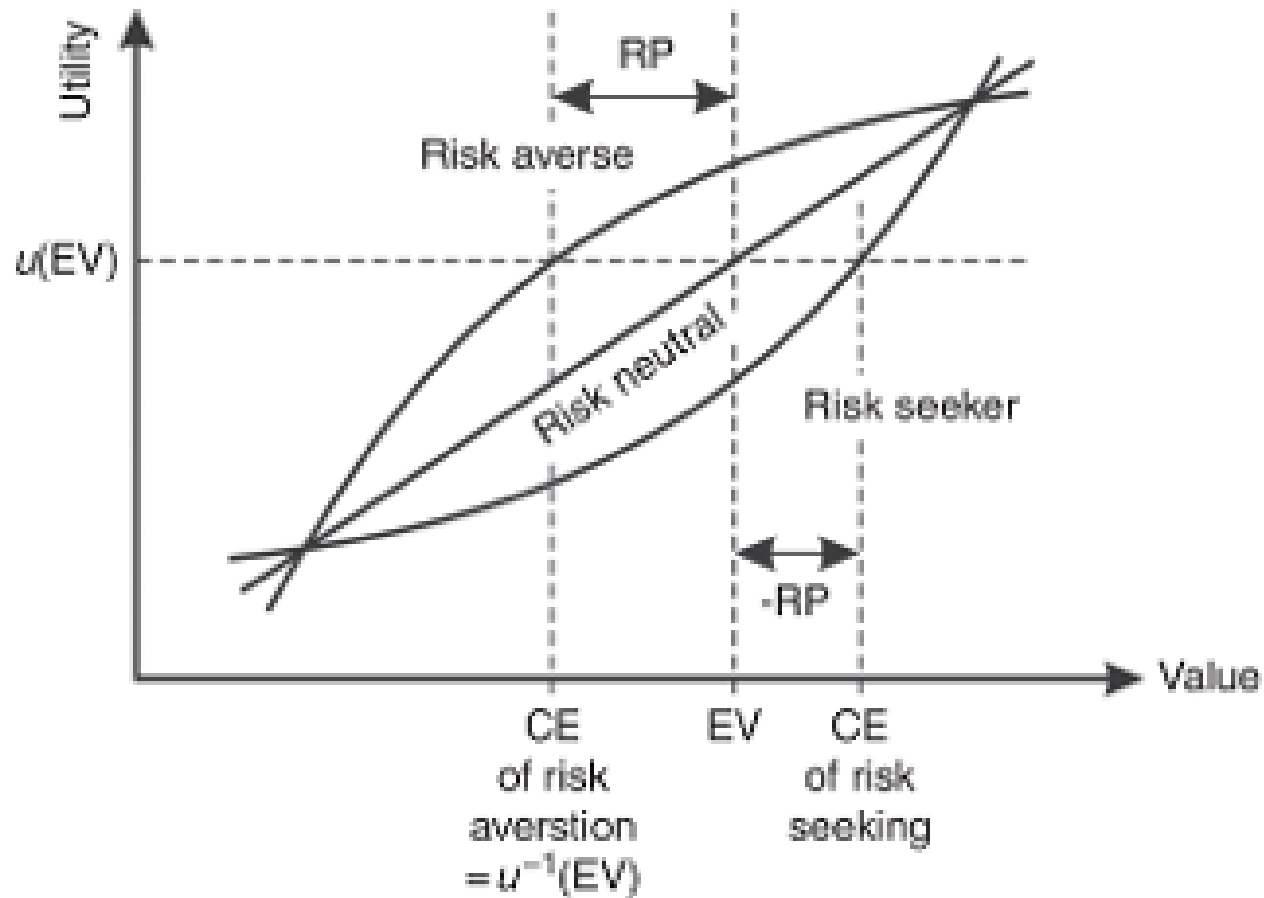
Methods of decision making

Uncertainty

- ☐ **Maximin** = conservative strategy
- selecting the best alternative of the worst payoffs;
- pessimistic view because the decision maker must assume that the worst will occur;
- it may be viewed as the protection against the worst, even though you neither expect them nor want them to occur.
- ☐ **Maximax** = optimistic strategy
- selecting the best alternative of the highest payoffs;
- you choose the alternative with the best possible payoff.
- ☐ **Principle of Insufficient Reason**
- under uncertainty, there is now reason to treat the states of nature differently $\Rightarrow$ no reason to focus on high or low payoffs;
- alternative states of nature are all equally likely;
- selecting the highest row average;

Payoffs	S_1	S_2	S_3	S_4	Maximin	Maximax
	---	---	---	---		
A_1	50	40	30	35	30	50
A_2	25	-30	65	40	-30	65
A_3	45	15	-10	55	-10	55

Payoffs	S_1	S_2	S_3	S_4	Insufficient reason (row averages)
	0,25	0,25	0,25	0,25	
A_1	50	40	30	35	38,75
A_2	25	-30	65	40	25,00
A_3	45	15	-10	55	26,25

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Methods of decision making

Risk

☐ **Expected (monetary) value**

- takes into account the weighted average payoff for each alternative

$$EMV_i = \sum_{i=0}^{k} P_j * V_{ij}$$

- selecting maximum average payoff;

Payoffs	S_1	S_2	S_3	S_4	Expected payoff	
	0,20	0,50	0,15	0,15		
A_1	50	40	30	35	39,75	50 * 0,2 + 40 * 0,5 + 30 * 0,15 + 35 * 0,15
A_2	25	-30	65	40	5,75	25 * 0,2 –30 * 0,5 + 65 * 0,15 + 40 * 0,15
A_3	45	15	-10	55	23,25	45 * 0,2 + 15 * 0,5 – 10 * 0,15 + 55 * 0,15

☐**Expected value of perfect information**

- represents an upper bound on the amount of money a decision maker would be justified in spending to obtain perfect information.

☐**EPVI = EPC – EMV**

☐That leads to decision under certainty…

Payoffs	S_1	S_2	S_3	S_4	Expected payoff under certainty (EPC)		EMV	EVPI
	0,20	0,50	0,15	0,15				
A_1	50	40	30	35	48	50*0,2+40*0,5+ 65*0,15+55*0,15	39,75	8,25
A_2	25	-30	65	40				
A_3	45	15	-10	55				

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Sequential decisions

□Oriented chart

□Decision trees can be used instead of decision matrix in order to structure the decision problems.

□Decision trees are used as a method of portraying these sequential decisions.

□decision fork → alternatives

□chance fork → states of nature

EXHIBIT II.   Decision Tree with Chains of Actions and Events

KEY
■ DECISION POINT
● CHANCE OR COMPETITIVE MOVE

DECISION POINT 1
DECISION POINT 2

YOUR PRESENT DECISION [1]

AUTHORIZE PROJECT

KILL PROJECT

DEVELOPMENT SUCCEEDS

DEVELOPMENT FAILS

(A) [2]

YOU PRODUCE COMMERCIALLY

YOU SHELVE

COMPETITOR INTRODUCES
EXPAND MARKET, HOLD YOUR SHARE

COMPETITOR DOES NOT INTRODUCE
EXPAND MARKET AND YOUR SHARE

COMPETITOR INTRODUCES
INTRODUCE LATE, SLIGHT MARKET LOSS

COMPETITOR DOES NOT INTRODUCE
NO CHANGE IN MARKET COST OF DEVELOPMENT

LICENSE PROCESS, OR TRY AGAIN TO DEVELOP

COMPETITOR INTRODUCES

COMPETITOR DOES NOT INTRODUCE
NO CHANGE IN SITUATION

LICENSE PROCESS, OR TRY THEN TO DEVELOP

COMPETITOR INTRODUCES

COMPETITOR DOES NOT INTRODUCE
NO CHANGE

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Complex sequential decision (example)

FIGURE B.
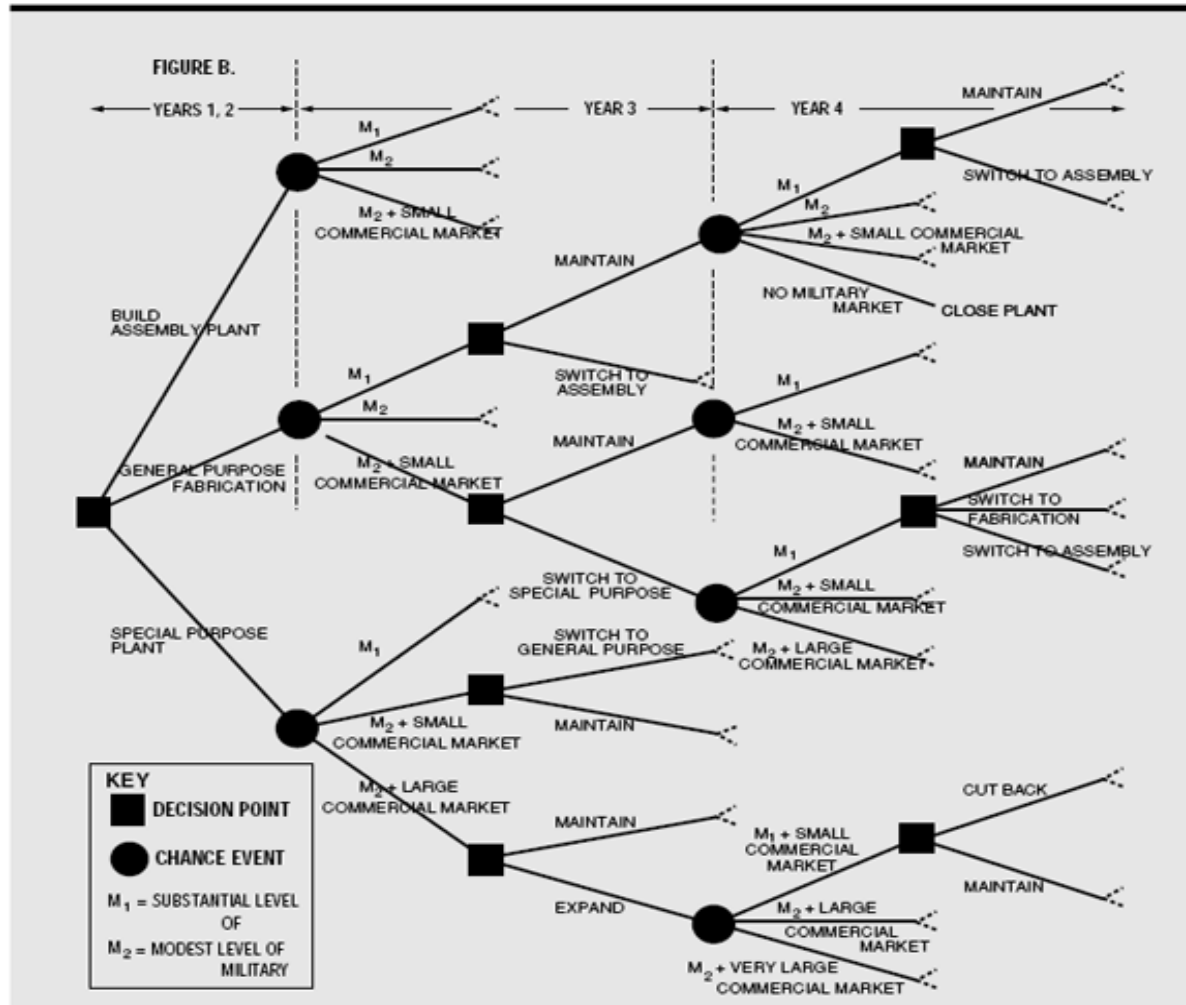
Must know - keywords

☐ decision
☐ decision-making process
☐ problem
☐ decision criteria
☐ state of nature
☐ payoff
☐ risk
☐ uncertainty
☐ decision style

☐ (bounded) rationality
☐ satisficing
☐ attitude towards risk
☐ mini-max
☐ maxi-max
☐ expected value
☐ decision tree
☐ decision matrix

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