AHP
- Pros and Cons
- Practical Application

ANP
- Pros and Cons
- Setting up a network model

AHP or ANP?
Hierarchical Structuring of a decision problem's

Set of KPIs

Business Performance

- Order Income
- Profitability
- Overhead Costs
  - Forecast Year End
  - Cost per Order
  - Labor Cost per Employee
- Opportunity Volume
- Profit per Cost
- OI per Employee

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AHP Pros and Cons

Hierarchical Structuring

AHP

Goal

Criteria
Sub-criteria

Alternatives
Hierarchical Structuring of a decision problems

Set of KPIs

- Market
  - Order Income
  - Forecast Year End
  - Opportunity Volume

- Finance
  - Profitability
  - Cost per Order
  - Profit per Cost

- Productivity
  - Overhead Costs
  - Labor Cost per Empl.
  - OI per Employee

Goal

Criteria

Sub-criteria

Alternatives
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Hierarchical Structuring of a decision problems
Combining multiple inputs from several persons to a consolidated outcome

AHP

Pro

Con

AHP Pros and Cons

Multiple Inputs

AHP
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Consolidated AHP Input Matrix

\[
\frac{1}{2} \times 1 \times \frac{1}{4} \times \frac{1}{2} \quad \frac{1}{4} = \frac{1}{2}
\]

Multiple Input

Geometric mean

Participant 1

\[
\begin{bmatrix}
1 & \frac{1}{2} & 4 \\
2 & 1 & 1 \\
\frac{1}{4} & 1 & 1 \\
\frac{1}{3} & \frac{1}{2} & 1 \\
\end{bmatrix}
\]

Participant 2

\[
\begin{bmatrix}
1 & 1 & 3 \\
1 & 1 & 2 \\
\frac{1}{3} & \frac{1}{2} & 1 \\
\end{bmatrix}
\]

Participant 3

\[
\begin{bmatrix}
1 & \frac{1}{4} & 2 \\
4 & 1 & 2 \\
\frac{1}{2} & \frac{1}{2} & 1 \\
\end{bmatrix}
\]

Participant 4

\[
\begin{bmatrix}
1 & \frac{1}{2} & 3 \\
2 & 1 & 3 \\
\frac{1}{3} & \frac{1}{3} & 1 \\
\end{bmatrix}
\]

AHP Pros and Cons

Multiple Inputs

AHP

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Combining multiple inputs from several persons to a consolidated outcome

Plausible results: people usually agree with the outcome priorities.

Calculation of results possible using Excel sheet

Pair-wise comparison is a quite artificial way of comparing a set of items

If consistency index above 10%: problems to explain the request to reconsider inputs
When using AHP: Try to structure the model in groups of max. 4-5 criteria or sub-criteria. If possible introduce additional hierarchical levels.

Spend time to explain the use of the scale for pair wise comparisons to participants without knowledge of AHP; ask them to use the whole range of the scale 1-9.

Even with a consistency value above the recommended limit, the results usually reflect the correct ranking and still can be used.

AHP is ideal to get a consolidated result for inputs from several participants, using the geometric mean.

Once AHP is introduced and used as method for decision making, results are in general accepted, as the method is based on mathematics, and seen as “neutral” and objective.
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General approach for any kind of decision problem

Some problems can only be described by ANP

Forces precise definitions of nodes and interconnections

Ideal tool to gain deeper understanding of a specific problem and its relation to related factors

Explanation of concept & process to management extremely challenging

Requires a specific software to calculate results

Verification of result due to feedback loops and interrelations impossible

Too complex for an implementation as standard tool for practical decision making in an organization

Some problems can only be described by ANP
ANP: Setting up a model

a. Careful consideration and clear description of the decision problem
b. Thorough brainstorming to find important criteria & relevant factors
c. Clarity about criteria and factors & definition of their exact meanings
d. Systematic investigation of interconnections between nodes
e. Simplification!
f. Critical assessment of out coming results

AHP and ANP can only be as good as the model description.
AHP or ANP?

Analytic Hierarchy Process

- Goal
  - Criteria
    - Sub-criteria
  - Alternatives

Analytic Network Process

- Control Criterion
  - Cluster 1
  - Cluster 2
  - Alternatives

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