Planning for success?

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Motivation

• Lack of real-world OR-applications
  – Generally in OR
  – Especially in Stochastic Optimization

• WHY?
Goal

- Discuss some traditional explanations
- Present a Stochastic-optimization-specific explanation
- This is done by the aid of a simple example
**Example**

**Exp.profits**

<table>
<thead>
<tr>
<th>High demand (0.2)</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>46</td>
<td>67</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Low demand (0.8)</th>
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<tbody>
<tr>
<td>45</td>
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<td>45</td>
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</tbody>
</table>
Solution

Expand.

High demand (0.2)

Low demand (0.8)

yes
R. Ackoff’s arguments

- ... and executives were not fools enough to use them ...
- ... not as obsessed with the techniques nor as immune to reality as the professionals.
- A second effect of the technical perversion of OR ...
- ... is that OR has been equated by managers to mathematical masturbation
  - from «The future of operational research is the past» and «Presidents symposium: or, a Post mortem»
Stochastic Optimization

- The need for more data
- The «real» cost of contingent solutions
- The competitive argument
The need for more data

• Introduction of stochastic variables leads to:
  – more data to be gathered
  – more estimation to be made
    → increased costs

• Hence;
  – more disagreeing possibilities between agents
    → increased costs
The «real» cost of contingent solutions

- Contingent (stochastic) solutions - depends on future events
- Non-contingent (deterministic) solutions - independent of future events
  → «contingency costs»
«Contingency costs»

- Deterministic solution to the example:
  - Build a large factory in a certain year at a cost $C(D)$

- Stochastic solution to the example:
  - Build an expandable factory in a certain year and if the next years demand is high, expand the factory if not, do nothing.

- What is the cost of this ($C(S)$)
  - Is $C(S) > C(D)$?
Different «contingency costs»?

- If $C(S) > C(D)$
  - $C(S1)$ differs from $C(S2)$
  - Huge cost estimating problem
The competitive argument

Assumptions:

- Several agents, some without knowledge of stochastic optimization. To types:
  - Sane (choose the large factory)
  - Insane (choose the small factory)

- Situation - «winner takes all»
  - Insanity may just mean an subjective estimate of the probability of high demand < 0.1
### Ex-post profits for various agents

<table>
<thead>
<tr>
<th>Factory Type</th>
<th>Demand</th>
<th>Ex-post profits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>High</td>
<td>90</td>
</tr>
<tr>
<td>Expandable</td>
<td>Demand</td>
<td>87</td>
</tr>
<tr>
<td>Small</td>
<td>Low</td>
<td>45</td>
</tr>
<tr>
<td>Expandable</td>
<td>Demand</td>
<td>42</td>
</tr>
</tbody>
</table>
Consequences

- The stochastic strategy is not \textit{ex-post} optimal (which it also should not be)
- The stochastic strategy is a sure \textit{loosing-strategy}
Final comments

- Existence of stochastic elements does need to imply hedging strategies
- Stochastic optimization may be the worst tool to use in certain situations
- Manager’s reluctancy to use SO may be linked to these considerations
- Managers may not be as foolish as some of us like to believe