A planning framework to create impact in uncertain and volatile markets.

We see trends such as global changes in supply and demand, higher volatility in demand patterns and more focus on customer centricity. Because the world is changing and we are moving towards a “new normal” state, we need new perspectives on planning, supply chain management and risk. In the figure below, we have summed up the most significant trends that we see in global supply chains.

Sales & Operations Planning (S&OP) processes and supply chain risk management (SCRM) have become increasingly important when developing a shared view on how to run a company. S&OP processes and SCRM provide companies with the opportunity to be proactive and in better control of the future.
As a result of this "new normal" world, we are experiencing that forecasting and planning become difficult, and we need new ways of working to:

1. Improve the dialogue and decision making that take place during the S&OP process
2. Assess and manage risk

In uncertain business environments where planning cannot be performed in a steady state, scenario planning can help improve the dialogue and decisionmaking process and ideally work as a competitive advantage to the company. The different objectives, higher efficiency and lower costs versus a resilient and agile supply chain can be supported by a well-implemented global S&OP process with scenario planning as a vital part.

Scenario planning

- Why should we do it?
  The increasing uncertainty and volatility in supply and demand make forecasting challenging. Decision-making becomes harder when planning is not in a steady state. A high level of uncertainty is created by new products, tenders and high growth rates combined with traditional long-term planning that makes the forecasting process even more challenging. Therefore, a different approach, which is based on qualified assumptions rather than historical data, is required, and a structured process for scenario planning is needed. We need to understand what drives uncertainty and the root causes of risk. Then we will be able to define the relevant scenarios and options to solve the issues in those scenarios. The overall goal is to create the best possible decision proposal to support the S&OP process and, more importantly, the business strategy. An S&OP process with scenario planning will contribute to decisions about new opportunities, growth or gap closures. It will also provide reliable and high-quality decision proposals for contributing to and supporting the management's focus on the strategic goals.

- What is it?
  Scenario planning enables you to be one step ahead of coming events; risks as well as opportunities. Moreover, scenario planning helps to create strong and reliable decision proposals to counter
and/or exploit upcoming events in order to support the overall strategy of the company. It is important to highlight the fact that scenario planning can also be used to evaluate future opportunities to secure successful exploitation. Scenario planning is a great discipline for supporting the dialogue and decision-making at S&OP meetings in a complex and volatile environment where emerging markets and long supply lead time continue to be an increasingly important factor. Scenario planning provides a structured approach to identifying drivers, scenarios and possible outcomes.

### How do we use it?

When working with scenario planning, we focus on those risks where the consequence is high, meaning that risk events with low consequences are not important to deal with from a planning perspective, as they should be part of the natural uncertainty and flexibility within the base case plan. We distinguish risk events from the structural supply chain vulnerability and impact. In order to be able to work with scenario planning in a structured way, we have defined the 5 steps illustrated in the figure below.

#### The 5 steps of scenario planning

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Identify drivers for scenarios</td>
<td>Identify critical uncertainties that drive change/assumptions (risk identification)</td>
</tr>
<tr>
<td>2. Produce scenarios</td>
<td>Identify and describe scenarios based on different assumptions and understand if they are interlinked. What does each assumption represent? Produce 2-3 realistic core scenarios and define probability for each</td>
</tr>
<tr>
<td>3. Describe possible options</td>
<td>Identify and describe the option range for 2-3 core scenarios</td>
</tr>
<tr>
<td>4. Assess risk and impact</td>
<td>List and assess risks (probability X consequence) for each combination of scenario and option</td>
</tr>
<tr>
<td>5. Create decision proposal</td>
<td>Create a one-pager template with supporting appendices</td>
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</tbody>
</table>

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— What benefits can we expect from this?

Scenario planning entails a number of advantages. First, risk management becomes the key focus of the decision-making process. It also improves the forecasting quality in a highly uncertain environment. Moreover, it shifts focus to the consequences for the business (cost, utilisation, service levels, lead time). It also allows for addressing opportunities rather than discussing bias.

Step 1: Scenario triggers
Identify drivers for scenarios

First, we need to understand which factors can or will trigger a new scenario. We normally work with 4 types of triggers for scenarios, as shown to the right.

When the drivers have been evaluated, they can be linked together into a meaningful framework, usually with 5 – 10 logical groupings of drivers.

<table>
<thead>
<tr>
<th>Trigger (examples)</th>
<th>Type of trigger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bias in forecasts (demand)</td>
<td>Historical performance</td>
</tr>
<tr>
<td>Extreme supply unreliability such as constraints on work supply of key raw material/component (supply)</td>
<td>Drives for assumptions</td>
</tr>
<tr>
<td>Impact of capacity breakdown, constraints or uncertain supply assumptions, e.g. utilisation (supply)</td>
<td>Future events</td>
</tr>
<tr>
<td>New types of marketing campaigns or markets (demand)</td>
<td>Overall supply chain risk assessment and mitigation</td>
</tr>
<tr>
<td>Large-impact projects such as tenders, NPIs (demand)</td>
<td>Stay ahead of capacity curve</td>
</tr>
<tr>
<td>Long-term forecasting aligned to strategy (demand)</td>
<td></td>
</tr>
<tr>
<td>Understanding general risk (footprint and SC network)</td>
<td></td>
</tr>
<tr>
<td>Winning or losing big accounts/markets</td>
<td></td>
</tr>
<tr>
<td>Continuous assessment to secure overcapacity in agile and responsive supply chains (supply and demand)</td>
<td></td>
</tr>
</tbody>
</table>
**Step 2: Worst case / best case**

**Produce scenarios**

When we have identified and understood our scenario drivers, the next step is to identify and describe the different scenarios – the most important thing is to ensure that each reasonably foreseeable scenario has been identified and considered. It is important to investigate and understand if the different scenarios are interlinked. The goal is to have 2 – 3 realistic core scenarios with a clear probability and consequence assessment, but we also need to consider the speed of change or the speed with which we need to make a decision.

**Step 3: Identify possible options using the game board method**

**Describe possible options**

When searching for potential options to risky scenarios, doing a brainstorming is often the best idea. However, the brainstorming session benefits from a set of guiding option alternatives, which can be brought to the table after the initial brainstorming.

The next step is to design and describe the option ranges of the core scenarios. When the options have been described, the “game board” can be designed. The game board is a combination of scenarios and options with a clear link between the different scenarios. If the scenarios are not interlinked, you can advantageously create a game board for each group of scenarios.

As shown below an example of possible options that have been identified.

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**Diagram:**

- Best Case
- Base Case
- Worst Case

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**Risk mitigation options**

- Smaller/larger safety stock
- Manning
- Optimisation/Lean initiatives
- New/less/fewer equipment/machines
- Build/close factories

**Demand shaping**

- Substitution of products (sell something else)
- Pricing (increase/reduce)
- Level of demand (phasing)
- Increase/decrease marketing activities
- Prioritise customers (say “no”)
- Change launch time of new products
Step 4: Risk and impact matrix
Assess risk and impact

When a list of options has been found, the next step is to identify the upside and downside of each suggested option. This assessment is conducted by creating a matrix showing the three most critical scenarios in the upper row and the three best option alternatives in the first column.

A group discussion that clarifies the upside and downside of the option to each scenario will help everyone see the possible risks of and gains by selecting a specific option or doing nothing at all. Finance should be involved to estimate the financial implications. Below, an example of a risk and impact matrix is shown.

<table>
<thead>
<tr>
<th>Scenarios</th>
<th>Base case (util. 90% + growth 2%)</th>
<th>Scenario 1 (util. 90% + growth 5%)</th>
<th>Scenario 2 (util. 85% + growth 5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option A: Status quo – Do nothing</td>
<td>Capacity just balanced&lt;br&gt;No flexibility&lt;br&gt;Risk of stockout</td>
<td>Under capacity&lt;br&gt;Stock-out</td>
<td>Severe under capacity&lt;br&gt;Bad delivery performance X%</td>
</tr>
<tr>
<td>Option B: Site shifts</td>
<td>Capacity balanced and incl. flexibility</td>
<td>Capacity balanced and incl. flexibility</td>
<td>Extra costs for transport mDKK Y&lt;br&gt;Sales ok</td>
</tr>
<tr>
<td>Option C: Prioritise customers</td>
<td>Not relevant</td>
<td></td>
<td>Say “no” to customers&lt;br&gt;Lost sales mDKK Z</td>
</tr>
</tbody>
</table>

Step 5: Create decision proposal

The final step is to evaluate the speed of decision based on well-defined decision horizons for typical options. Do we need a decision now or can we consider the scenario analysis as an early warning? If we need to act on the risk, it is time to create a one-page decision proposal per scenario to support the dialogue and decision-making at the S&OP meeting. The one-pager should include:

- The decision proposal (supported by an appendix containing further analysis)
- High level business case and risk impacts for each option
- Recommendations
- Plan for monitoring
- Proposal for risk mitigation
- Contingency planning

Scenario planning enables a company to discuss and evaluate the early warnings of a wide range of risk events.

The scenarios that have been assessed as early warnings need to be monitored to see how they have evolved and most likely will evolve.
Facts

Black swan events as defined by Taleb are characterised by:

- The disproportionate role of high-profile, hard-to-predict and rare events that are beyond the realm of normal expectations in history, science, finance, and technology.

- The non-computability of the probability of the consequential rare events using scientific methods (owing to the very nature of small probabilities).

- The psychological biases that blind people, individually and collectively, to uncertainty and to a rare event’s massive role in historical affairs.

How to support scenario planning from an application perspective

In many large organisations, the ability to execute a structured S&OP process, including scenario planning, and to implement the consequential decisions is a major challenge. Many departments that each supply their own data and calculations are involved, and executing the conclusions reached will often be an intricate set of interlinked actions across the whole business unit. To battle this challenge, SAP provides a strong S&OP tool via Integrated Business Planning based on the S/4HANA database technology. The major advantages include:

1. Full flexibility in data modelling, i.e. the business decides on the data model and which master data is required. With this level of flexibility, it is possible to attain one version of numbers and figures to bridge the gap between several functions such as planning, finance, marketing and sales etc. Calculations of forecast, capacity constraints and derived consequences for turnover, profit and risk can be incorporated into one system, and input data is collected in another system.

2. The S&OP process as well as the underlying processes such as forecasting, capacity calculations etc. can be incorporated via the SAP Jam tool. Hence, it will be visible to all participants, i.e. you can contain both the S&OP and scenario planning processes as well as all data on quantifications in a one-system environment.

3. Simple and user-friendly front end via XLS plug-in and web browser with easy and flexible dashboard analytics.

4. The S/4HANA technology provides unequalled speed in handling data and calculations, i.e. an S&OP analysis can be executed on the fly on massive amounts of data, providing a correct basis for decision-making at all times.

5. The IBP S&OP tool contains functionality that enables planning in different versions, scenarios in each version and snapshots of data for comparison of results.

Use scenario planning to understand the WHY behind the WHY for strategic purposes

Traditional forecasting techniques often fail to predict significant changes in the environment that companies operate in, especially in case of rapid changes or when information is limited. Consequently, severe challenges or great opportunities may be overlooked, and the company’s overall performance and strategy may suffer. Scenario planning supports different strategies, e.g. growth or improved profitability, but there are also several other benefits to be gained:
“ENTER INTO AN HONEST DIALOGUE ON STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS”

- Encourages strategic conversations among key management stakeholders
- Aligns strategic planning activities across the different levels of the company
- Enhances responsiveness to emerging challenges or opportunities
- Generates, evaluates and communicates innovative strategies
- Changes the mindset to take a broader view when searching for options

The key factor in implementing a successful scenario planning process is to get broad and meaningful involvement of key stakeholders, enter into an honest dialogue on strengths, weaknesses, opportunities and threats to the company and find a balance between plausibility and spread this kind of thinking throughout the entire company.
Case example

Novozymes

Utilisation scenarios that impact the capacity situation

The challenge
The monthly Sales & Operations Planning process showed significant under-capacity for the coming 12 months for one production line. It would be very difficult for production to react to any unexpected issues or market opportunities. The target is to have 10% capacity surplus to manage monthly variations, product mix changes and demand uncertainty. The base plan showed 5% capacity surplus. Hence, capacity-enhancing activities were needed.

In parallel, the forecast was evaluated as being too low compared to the strategic targets and, moreover, the utilisation assumptions behind the capacity plan were evaluated as being too optimistic. Both of these factors had a negative impact on under capacity compared to the base plan. In order to understand the severity and additional risk of this situation, scenario planning was applied.

Scenario planning

Step 1 – drivers: The key drivers of uncertainty were already identified as bias in the demand forecast as well as the level of utilisation.

Step 2 – scenarios: Demand scenarios included a best-case and a worst-case scenario. The best-case scenario was based on the strategic target of growth in the company transformed into target volume increases (+y% compared to last year). The worst-case scenario was based on the current forecasts in SAP (+x% compared to last year).

Supply scenarios also included a best-case and a worst-case scenario. The best-case scenario was based on the optimistic utilisation assumption, which was included in the base plan (index 100%). The worst-case scenario was based on the average of historic utilisation in the last 12 months (index 94%). These combinations and their impact on the capacity surplus were illustrated by a 2 x 2 diagram.

“SCENARIO PLANNING HAS ENABLED US TO BE MORE PROACTIVE IN UNDERSTANDING RISK AND MAKING DECISIONS IN DUE TIME.”

Step 3 – option scenarios: Short-term capacity extension to create more surplus. However, this is not included in the risk assessment, but is part of the final recommendation.

Step 4 – risk and impact: Probability was estimated for each of the 4 quadrants in the 2x2 diagram, and the most likely outcome was evaluated as “high demand and low utilisation”, which has the worst possible impact on capacity surplus and emphasises that capacity needs to be extended by approx. 10%.

Step 5 – recommendation: A decision proposal was created, and key messages included:

- Sales was asked to re-evaluate demand plans for the coming year, identify what is most realistic and adjust forecasts according to this. Sales should prepare a customer priority list in case undercapacity could not be fully solved.
Ask the factory for a gross list of potential capacity extension: Increase manning or postpone planned maintenance shutdown.

**Impact**
A quick decision-making situation leading to a significant increase in short-term capacity at the factory, thereby avoiding potential delivery issues and lost sales. All cross-functional departments understood the situation and were proactive in relation to risks (and opportunities) and making the extension happen.

**Fast Facts About Implement**
- Founded: 1996
- Number of employees: 850
- Headquarters: Copenhagen
- Offices: Aarhus, Stockholm, Malmo, Oslo, Zurich and Munich
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