Forecast Value-Added

By: Anders Richter, SAS Institute, Denmark
Agenda

Introduction
Demand-Driven Planning & Optimization (DDPO)
  Common challenges and demands
  Demand synchronization
The Process
  Forecasting
  Collaborative Planning
Forecast Value-Added
(Next presentation has focus on Inventory Optimization)
WHO IS ANDERS RICHTER

Education from Copenhagen Business School:
• Master of Science in Business Administration, math, statistics and economy
• Graduate diploma in supply chain management

7 years’ experience as analytical consultant with several forecasting and inventory optimization implementations

I have had several classical roles, i.e. business advisor in the sales process, system designer, ETL coding, analytic business expert and project manager

Contributed with input to the book “Demand-Driven Inventory Optimization and Replenishment”, Chapter 8 Matas, a case study, Chapter 9 A consultant’s view of inventory optimization
REFERENCES
COMMON CHALLENGES AND DEMANDS

- Incoherent flows
- High stock values
- Many out-of-stock (OOS) situations
- Many manual processes
- Gut feeling instead of facts
- Many man-hours spent on replenishment

- Coherent replenishment flow
- Forecasting based on POS data
- Automated orders
  - Fewer man-hours
  - Higher turnover rate
- Fewer OOS situations
  - Especially on critical articles
Demand-Driven Planning & Optimization

DEMAND SYNCHRONIZATION

Three primary goals

Sense demand signals faster to changes in the marketplace.

Align supply chain faster to fluctuations in demand.

Align demand and supply with improved customer service with substantially less inventory, waste and working capital.
Demand-Driven Planning & Optimization

DEMAND SYNCHRONIZATION

Demand Sensing
Demand Shaping
Demand Shifting

Outside-in Forecasting
Focused

Proactive Process
Collaborative Planning

Customer Excellence
Lean Forecasting (FVA)

Operational Excellence
Lean Management

Market-Driven

Sales & Operations Planning

Supply-Driven

Demand-Driven

Supply Sensing
Supply Shaping
Synchronized Replenishment

Inside-out Forecasting
Focused

Reacting Process
Inventory Optimization

Selling through the channel (pull)
Selling into the channel (push)
1. Forecasts are almost always wrong!
2. Forecasts for near future are more accurate
3. Forecasts on SKU level are usually less accurate than forecasts on product group level
4. Forecasts cannot substitute calculated values
Forecasting

RESULTS OF POOR FORECASTING

Forecast Error

Over Forecast
- Excess Inventory
- Holding Cost
- Transshipment Cost
- Obsolescence
- Reduce Margin

Under Forecast
- Expediting Cost
- Higher Product Cost
- Lost Sales Cost
- Lost Companion Sales
- Customer Satisfaction
80% can be forecasted automatically

10% require extra effort

10% cannot be forecasted accurately
Hierarchies:

- Product dimension
- Customer dimension
- Network dimension
EXAMPLE FROM A HIGH-PERFORMANCE FORECASTING (HPF) INSTALLATION

- 2 levels in the forecast hierarchy
- 2 million forecasts each week for SKU/store combinations
  (52 weeks on a weekly level, based on up to 3 years of data)
- 30,000 forecasts each day on SKU level
  (52 weeks on a daily level, based on up to 3 years of data)
- Forecast is reconciled each day
- Model types: ARIMAX, ESM and pre-made naïve models
- Causal factors
  Flyer, avis, smuk, jule, uann, x_kampagne, vareOvergang,
  forside, familie_rabat, soendags_aabent, kamp_uge_1,
  kamp_uge_2 and uannon_periode
- Output is expected sales on SKU/store and SKU level, and the uncertainty of the expected sales
Gather data on the forecasts of all process steps and participants

- Statistical forecast
- Analyst override
- Collaborative / consensus process input
- Executive Approval
- (Naïve Forecast)
Focus on forecasting process efficiency

Forecast accuracy is largely a function of the “forecastability” of the demand.

We may never be able to achieve the accuracy desired.

But we can control the process used and the resources we invest.

Our objective:

*Generate forecasts as *accurate and unbiased* as we can reasonably expect them to be, and to do this as *efficiently* as possible.*
Performance must always be evaluated with respect to the alternatives

The “naïve” forecast
The naïve forecast is a baseline of performance against which all forecasting efforts must be compared.
Two commonly used naïve models are:
  - Random Walk
  - Seasonally Adjusted Random Walk

If you cannot beat a naïve forecast, then why bother?
Collaborative Planning

FORECAST VALUE-ADDED (FVA)

An example of a FVA Report

<table>
<thead>
<tr>
<th>Process Step</th>
<th>MAPE</th>
<th>Naïve</th>
<th>Statistical</th>
<th>Override</th>
<th>Consensus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naïve</td>
<td>50%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Statistical Forecast</td>
<td>45%</td>
<td>5%</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Analyst Override</td>
<td>40%</td>
<td>10%</td>
<td>5%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Consensus Forecast</td>
<td>35%</td>
<td>15%</td>
<td>10%</td>
<td>5%</td>
<td>-</td>
</tr>
<tr>
<td>Approved Forecast</td>
<td>40%</td>
<td>5%</td>
<td>5%</td>
<td>0%</td>
<td>-5%</td>
</tr>
</tbody>
</table>
Forecasting performance evaluation

Who is the best analyst and should have a bonus?

<table>
<thead>
<tr>
<th>Analyst</th>
<th>Item Type</th>
<th>Item Life Cycle</th>
<th>Seasonal</th>
<th>Promos</th>
<th>New Items</th>
<th>Demand Volatility</th>
<th>MAPE</th>
<th>Naïve MAPE</th>
<th>FVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Basic</td>
<td>Long</td>
<td>No</td>
<td>None</td>
<td>None</td>
<td>Low</td>
<td>20%</td>
<td>10%</td>
<td>-10%</td>
</tr>
<tr>
<td>B</td>
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<td>Long</td>
<td>Some</td>
<td>Few</td>
<td>Few</td>
<td>Medium</td>
<td>30%</td>
<td>30%</td>
<td>0%</td>
</tr>
<tr>
<td>C</td>
<td>Fashion</td>
<td>Short</td>
<td>Highly</td>
<td>Many</td>
<td>Many</td>
<td>High</td>
<td>40%</td>
<td>50%</td>
<td>10%</td>
</tr>
</tbody>
</table>
• FVA analysis compares the results of each process activity to the results that *would have been* achieved without doing the activity

• A *naïve* forecast provides a relevant baseline for comparing to the process activities

• Must also evaluate the performance of sequential steps in the process
Forecast Value Added

Måler prestasjonen til hvert steg og hver deltager i prognose prosessen

- Merverdi Statistisk Prognose
- Merverdi Overrides

![Forecast Accuracy (Year)](chart1)

![Forecast Value Added (FVA)](chart2)
Questions?
Anders Richter
Business Delivery Manager
Commercial & Life Sciences Division
SAS Institute Denmark
E-mail: Anders.richter@sas.com
Mobile: +45 27 21 28 21
Or follow me on LinkedIn