Nätverk för Affärsutveckling i Försörjningskedjan

Forecasting Accuracy
Webinar, 2010-11-08
Agenda

• Project background
  • Project Aim
  • Models
  • The project, how do we do it?
  • Results so far
  • Plan ahead
Project background

• Pre study initialized in 2009
• Found major problems with bad forecasting accuracy
• Found that there is a big interest in the area
• Found that there is a lot of potential savings

• Project initiated and founded by Tillväxtverket February 2010
Background

Problems identified at the suppliers

- Low transparancy of information in forecast, old demands remain in the schedules received with bull whip effect as a result
- Low forecast quality
- No common used methods of measurement and as result hard to communicate with a fact based understanding of the situation
- Additional cost for premium freight

Reasons and results

- Un-nessecary high changes in demand in close time due to wrong parameter settings (ordermultiples) or use of concepts as full load
- Long lead time in combination with low forecast accuracy creates problem as the supplier gets squeezed in between
- Low forecast accuracy forces the suppliers to take unappriciated actions as Increase safety stock, keep over capacity to cope with increase flexibility or killing the transparancy by changing the customer forecast.
Agenda

• Project background
• **Project Aim**
  • Models
  • The project, how do we do it?
• Results so far
• Plan ahead
Aim

Project aims to:

- Gather interested parties, OEMs and suppliers,
- Identify current forecast quality and its effects
- Identify potential improvements
- Propose a best practice way of working with the issues deriving from forecast quality
- Identify measurements (KPI’s) and models and potential usage to enable follow up and continuous improvement in the area.
- Participate as Swedish representative in the Odette International group in the area
- Map current forecast quality and its effects
- Visualize and bring the issue to a better "knowledge level" and increase awareness
Project participants

- Autoliv
- Bulten
- Haldex
- Lesjöfors
- Leax
- SAPA Heat Transfer
- SKF
- TitanX Engine cooling
- Volvo Group
- Volvo Parts
International project - planned members

- SKF, Luc Graux (PM)
- Odette Sweden, Meridion Johan Bystedt
- Bulten: Folke Östlund
- AB Volvo, Henry Rostén
- Bosch, Name to be confirmed
- Continental Name to be confirmed
- GALIA, Jean Francoise Tahon
- German OEM (to be confirmed),
- Iveco, Name to be confirmed
- Renault, Name to be confirmed
- SMMT, Jeff Turner
- VDA (Supplied by Werner Mock)
Agenda

- Project background
- Project Aim

**Models**
- The project, how do we do it?
- Results so far
- Plan ahead
Models

Currently we have several models of displaying data and setting values of the forecasting accuracy. We have analyzed 3 of them

• VDA (Odette)
• Volvo
• SKF
Forecast Indicators

Results of VDA-forecast project group

**Definition of forecast-quality indicators**

\[ R = \text{Reference demand, } \quad n = \text{number of forecasted demands} \]
\[ P_i = i^{th} \text{ forecasted demand volume for the demand period} \]

Forecast-quality indicator: \[ FQ = \frac{\sum_{i=1}^{n} |P_i - R|}{R \cdot n} \geq 0 \text{ [in \%]} \]

The higher the demand fluctuations, the larger the FQ value (MAPE)

Tracking Signal: \[ TS = \frac{\sum_{i=1}^{n} P_i - R}{\sum_{i=1}^{n} |P_i - R|}, \quad -1 \leq TS \leq +1 \]

Demand over- / underestimation \( \Rightarrow \) TS value = positive / negative
# Classification of forecast quality

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Demand Period</th>
<th>Forecast Period</th>
<th>FQ in %</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term</td>
<td>Days</td>
<td>Week 0 to -2</td>
<td>&lt;3%</td>
<td>good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3-8%</td>
<td>medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;8%</td>
<td>bad</td>
</tr>
<tr>
<td>Medium-term</td>
<td>Weeks</td>
<td>Week -3 to -8</td>
<td>&lt;5%</td>
<td>good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5-10%</td>
<td>medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;10%</td>
<td>bad</td>
</tr>
<tr>
<td>Long-term</td>
<td>Months</td>
<td>Week -9 to -x</td>
<td>&lt;10%</td>
<td>good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10-15%</td>
<td>medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;15%</td>
<td>bad</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Demand Period</th>
<th>Forecast Period</th>
<th>FQ in %</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term</td>
<td>Week</td>
<td>0-2 Month</td>
<td>&lt;5%</td>
<td>good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5-10%</td>
<td>medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;10%</td>
<td>bad</td>
</tr>
<tr>
<td>Medium-term</td>
<td>Month</td>
<td>3-5 Month</td>
<td>&lt;10%</td>
<td>good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10-20%</td>
<td>medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;20%</td>
<td>bad</td>
</tr>
<tr>
<td>Long-term</td>
<td>Month</td>
<td>6+ Month</td>
<td>&lt;20%</td>
<td>good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20-30%</td>
<td>medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;30%</td>
<td>bad</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Demand Period</th>
<th>Forecast Period</th>
<th>FQ in %</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term</td>
<td>Week</td>
<td>1 Month</td>
<td>To be defined:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The values seem much to tight compared to current values</td>
<td>good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>bad</td>
</tr>
<tr>
<td>Medium-term</td>
<td>Month</td>
<td>+2 Month</td>
<td>To be defined:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The values seem much to tight compared to current values</td>
<td>good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>bad</td>
</tr>
<tr>
<td>Long-term</td>
<td>Month</td>
<td>+9 Month</td>
<td>To be defined:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The values seem much to tight compared to current values</td>
<td>good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>bad</td>
</tr>
</tbody>
</table>
Pros and Cons with presented models

- Three different models – different results for same basic data
  - Does not facilitate a common understanding and communication
  - Normalization – 0 % or 100 %
  - What model to use for pilot in this project?

- Communication is one of the major identified issues
  - How to improve communication?
    - Keep 3 models
    - Get all to use same model
    - Documentation that describes differences
Agenda

• Project background
• Project Aim
• Models

• The project, how do we do it?
• Results so far
• Plan ahead
Work so far

Effects

Problems

Root causes

Actions
Overview of results from Workshop I

Identified effects of lacking forecast accuracy were groups as follows:

- Capital
- Cost
- Customer satisfaction
- Environment
- People
Effects down to actions

**Effects**
- Capital
- Cost
- Customer satisfaction
- Environment
- People

**Problems**
- Agreements
- Information/Communication
- Customer forecast planning (S&OP process)
- Tools and software
- Supply Concepts
- Stocking policies
- Market situation

**Root causes**
- Capital
- Cost
- Customer satisfaction
- Environment
- People

**Actions**
- Agreements
- Information/Communication
- Customer forecast planning (S&OP process)
- Tools and software
- Supply Concepts
- Stocking policies
- Market situation

<table>
<thead>
<tr>
<th>Categories</th>
<th>Primary causes</th>
<th>CASE Areas</th>
<th>Examples</th>
<th>Scenarios</th>
<th>Actions</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategic</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operational</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer feedback</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logistics</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demand</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forecast</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales &amp; Marketing</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer service</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer satisfaction</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>People</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tools and software</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information/Communication</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply Concepts</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stocking policies</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market situation</td>
<td>Incorrect parameter setting in order to increase sales</td>
<td>Large changes in demand</td>
<td>Other quantities could be decreased.</td>
<td>Increase order quantities to increase sales.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Action areas

- Scania
- Volvo Parts
- Volvo Group
  - Measuring
    - Haldex
    - Measuring
      - Leax
      - Measuring KPI
      - Pros/cons with measuring, and evaluation of KPI's
    - Stocking Policies Supply Concepts
  - Measuring
    - Autoliv
    - Measuring
      - Lesjöfors
      - Full-load concepts
    - Customer Forecast Planning (S&OP Process) Tools and Software
      - Is our own process for creating forecast part of the problem?
  - Measuring
    - SKF
    - Bulten
    - Agreements Information/ Communication
    - SAPA
      - Market Situation

Agenda

• Project background
• Project Aim
• Models
• The project, how do we do it?

• Results so far
• Plan ahead
Results so far

- All companies in the group are measuring
- The implementation guideline is under construction
- European project still under coordination but not up and running
Agenda

- Project background
- Project Aim
- Models
- The project, how do we do it?
- Results so far
- Plan ahead
Plan ahead

Next meeting 24 november in Gothenburg

How should we spread information about this project and its findings?

• Information letter to be used internally and externally to inform about the project and its aims

• Participation at international meetings – Odette International?
• Publication in newspaper?
• Open seminars?