SAS® FORUM
RUSSIA 2015

Forecast Value-Added

By: Anders Richter, SAS Institute, Denmark

Copyright © 2015, SAS Institute Inc. All right reserved.

THE POWER TO KNOW.

Agenda

SAS FORUM RUSSIA 2015

- 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)

Copyright © 2015, SAS Institute Inc. All right reserved.

WHO IS ANDERS RICHTER

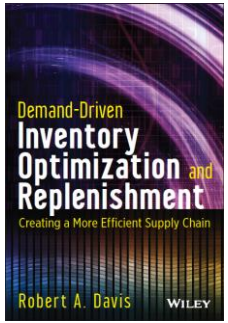
Education from Copenhagen Business School:

- 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



Copyright © 2015, SAS Institute Inc. All right reserved.

Demand-Driven Planning & Optimization

REFERENCES

SAS FORUM RUSSIA 2015

CV Vooruit
DAIKIN
ERICSSON TAKING YOU FORWARD
FedEx
ESCAPO
Magasin
TELUS the future is friendly
CSX
MITSUBISHI
CANADIAN PACIFIC RAILWAY
Nestlé Good Food, Good Life
MillerCoors
HONDA
Arcus
Enel L'ENERGIA
STORAENSO
Hanes
Kellogg's
Mobistar
ConAgra Foods Food you love
TATA MOTORS
LEVI'S
RUSTA
RWE The energy to lead
Amway
inter cars
Electrolux
wistron
Kverneland
ucb
Bell Mobility
LI-NING
matas
SPIRIT AEROSYSTEMS
HITACHI
NORITSU
KFC
GE Transport
newegg.com
NIPPON PAPER GROUP
SHOPPERS DRUG MART
TØJ eksperten
beml NEW FRONTIERS. NEW DREAMS
WAGNER

Copyright © 2015, SAS Institute Inc. All right reserved.

sas THE POWER TO KNOW.

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

Copyright © 2015, SAS Institute Inc. All right reserved.

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

Copyright © 2015, SAS Institute Inc. All right reserved.

Demand-Driven Planning & Optimization

DEMAND SYNCHRONIZATION

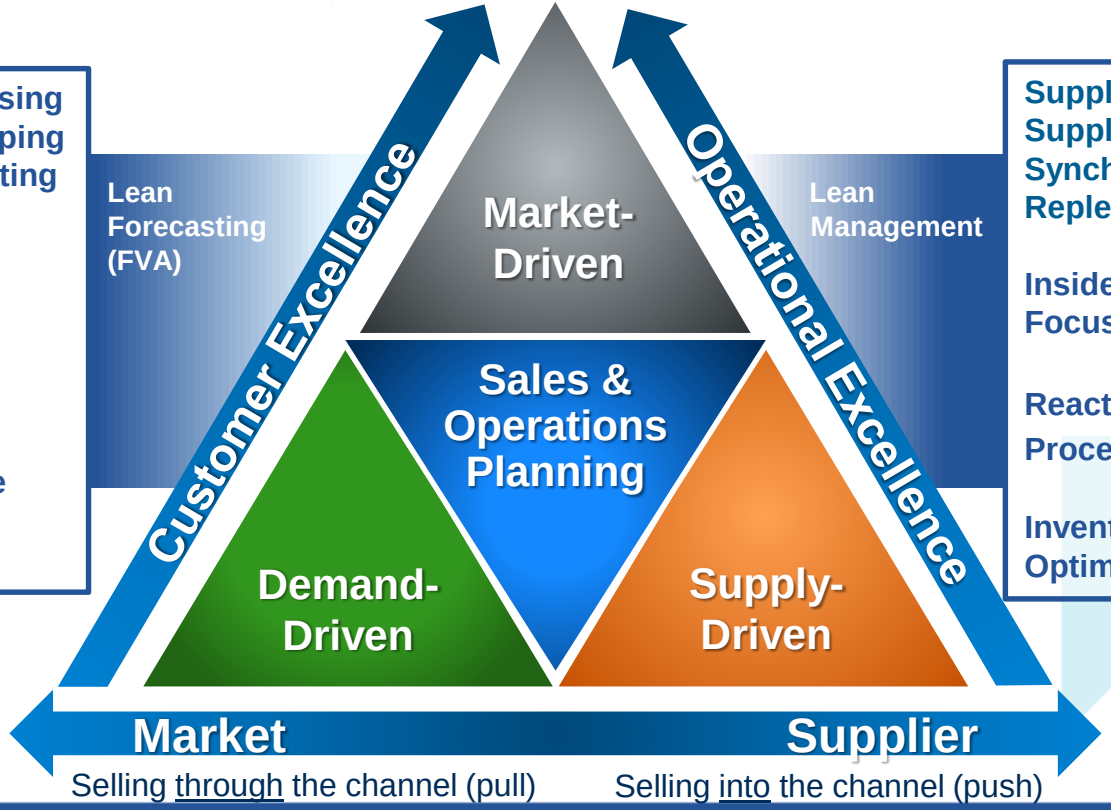
SAS FORUM RUSSIA 2015

Demand Sensing
Demand Shaping
Demand Shifting

Outside-in Focused

Proactive Process

Collaborative Planning



Supply Sensing
Supply Shaping
Synchronized Replenishment

Inside-out Focused

Reactive Process

Inventory Optimization

Copyright © 2015, SAS Institute Inc. All right reserved.

sas THE POWER TO KNOW.

Demand-Driven Planning & Optimization

THE PROCESS

SAS FORUM RUSSIA 2015

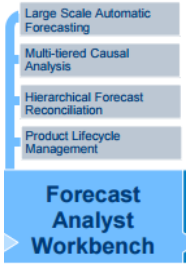
Copyright © 2015, SAS Institute Inc. All right reserved.

sas THE POWER TO KNOW.

Forecasting

THE LAWS OF FORECASTING

SAS FORUM RUSSIA 2015



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

Copyright © 2015, SAS Institute Inc. All right reserved.

Forecasting

RESULTS OF POOR FORECASTING

SAS FORUM RUSSIA 2015

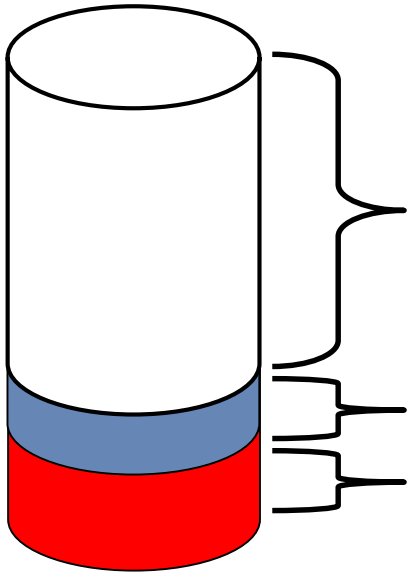
- Forecast Error
  - Over Forecast
    - Excess Inventory
    - Holding Cost
    - Transshipment Cost
    - Obsolescence
    - Reduce Margin
  - Under Forecast
    - Expediting Cost
    - Higher Product Cost
    - Lost Sales Cost
    - Lost Companion Sales
    - Customer Satisfaction

Copyright © 2015, SAS Institute Inc. All right reserved.

Forecasting

LARGE-SCALE FORECASTING

SAS FORUM RUSSIA 2015

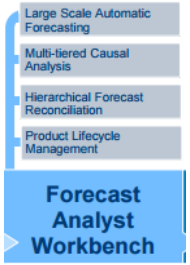


80% can be forecasted automatically

10% require extra effort

10% cannot be forecasted accurately

Time Series Data



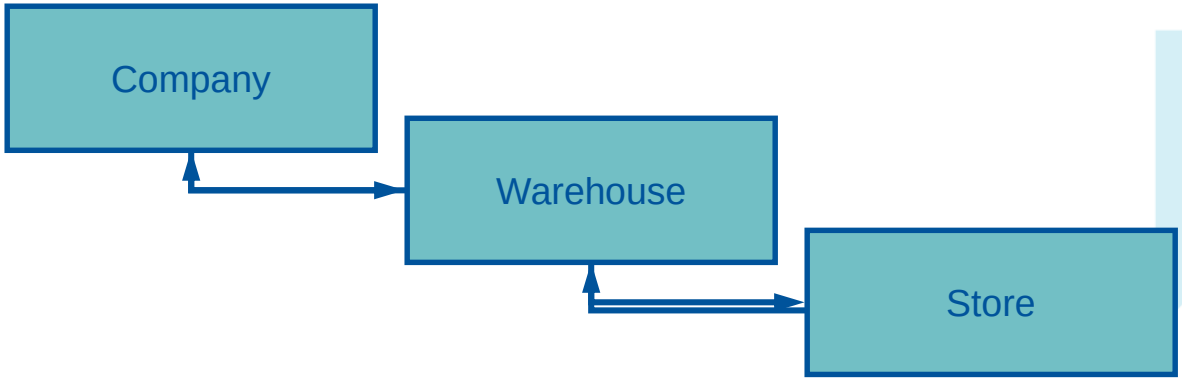
Copyright © 2015, SAS Institute Inc. All right reserved.

THE POWER TO KNOW.

HIERARCHICAL FORECAST

Hierarchies:

- Product dimension
- Customer dimension
- Network dimension

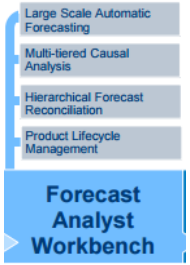


Copyright © 2015, SAS Institute Inc. All right reserved.

Forecasting

EXAMPLE FROM A HIGH-PERFORMANCE FORECASTING (HPF) INSTALLATION

SAS FORUM RUSSIA 2015



- 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 excepted sales

Copyright © 2015, SAS Institute Inc. All right reserved.

Demand-Driven Planning & Optimization

THE PROCESS

SAS FORUM RUSSIA 2015

Copyright © 2015, SAS Institute Inc. All right reserved.

sas THE POWER TO KNOW.

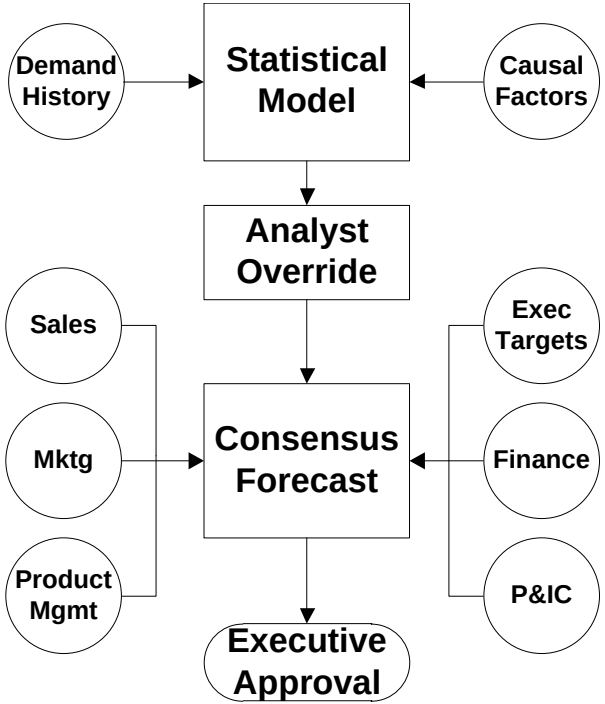
Collaborative Planning

COLLABORATIVE WORKFLOW

SAS FORUM RUSSIA 2015

Gather data on the forecasts of all process steps and participants

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



Copyright © 2015, SAS Institute Inc. All right reserved.

sas THE POWER TO KNOW.

FORECAST VALUE-ADDED (FVA)

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

Copyright © 2015, SAS Institute Inc. All right reserved.

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?

Copyright © 2015, SAS Institute Inc. All right reserved.

FORECAST VALUE-ADDED (FVA)

An example of a FVA Report

Process Step (1)	MAPE (2)	Naïve (3)	Statistical (4)	Override (5)	Consensus (6)
Naïve	50%	-	-	-	-
Statistical Forecast	45%	5%	-	-	-
Analyst Override	40%	10%	5%	-	-
Consensus Forecast	35%	15%	10%	5%	-
Approved Forecast	40%	5%	5%	0%	-5%

Copyright © 2015, SAS Institute Inc. All right reserved.

Forecasting performance evaluation

Who is the best analyst and should have a bonus?

Analyst	Item Type	Item Life Cycle	Seasonal	Promos	New Items	Demand Volatility	MAPE	Naïve MAPE	FVA
A	Basic	Long	No	None	None	Low	20%	10%	-10%
B	Basic	Long	Some	Few	Few	Medium	30%	30%	0%
C	Fashion	Short	Highly	Many	Many	High	40%	50%	10%

Copyright © 2015, SAS Institute Inc. All right reserved.

FORECAST VALUE-ADDED (FVA)

- 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

Copyright © 2015, SAS Institute Inc. All right reserved.

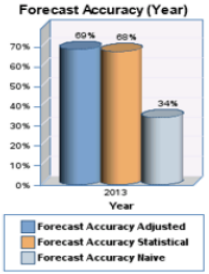
FORECAST VALUE-ADDED (FVA) EXAMPLE

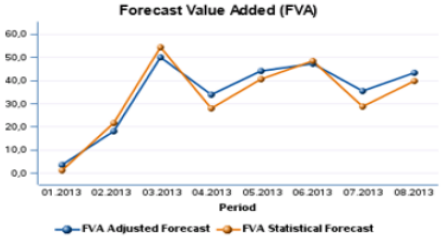
Forecast Value Added

ARCUSGRUPPEN

Måler prestasjonen til hvert steg og hver deltager i prognose prosessen

- Merverdi Statistisk Prognose
- Merverdi Overrides





Copyright © 2015, SAS Institute Inc. All right reserved.

Questions?

SAS FORUM
RUSSIA 2015

Copyright © 2015, SAS Institute Inc. All right reserved.

sas THE POWER TO KNOW.

SAS® FORUM
RUSSIA 2015

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

Copyright © 2015, SAS Institute Inc. All right reserved.

THE POWER TO KNOW.