SAP IBP - Recent Enhancements in Forecasting

Webinar

SAP Development & Product Management
February, 21st 2019
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Agenda

❖ Introduction to SAP IBP and IBP for Demand
❖ Recent Enhancements in Forecasting
❖ Roadmap in Forecasting
❖ Q&A*

* Q&A chat is open for questions throughout the session with experts online to answer
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SAP Digital Supply Chain Management Strategy

Business Partners

End-to-End Supply Chain Business Processes

Design Plan Respond Produce Deliver Operate

Machines / Sensors / Devices

Real-time Data

Agility & Speed

Flexibility & Scalability

Real-time Collaboration
Plan and Respond with
SAP’s Integrated Business Planning Solution

Supply Chain Control Tower
Exception Handling and Business Network Collaboration

Sales & Operations
Strategic and Tactical Decision Processes

Demand
Statistical Forecasting, Consensus Planning & Demand Sensing

Inventory
Multi-Stage Inventory Optimization & DDMRP

Response & Supply
Allocations & Deployment Planning, Order Rescheduling
Unconstrained & Constrained Supply Planning

SAP HANA
Demand Planning
Full Value – A Streamlined Approach to Demand Planning
Cluster and Organize Your Demand Planning Process

- Segmentation
  - Quarterly/Yearly

- Time Series Analysis
  - Quarterly

- Monitoring & Controlling of the Planning Process
  - Process Step 1
  - Process Step 2
  - …
  - Process Step n

- Consensus Demand Planning
  - Statistical Forecasting
    - Weekly/Monthly
  - Management by Exception
    - Daily/Weekly
  - Manual Input by Planners
  - Forecast Accuracy Calculation
    - Monthly
Full Value – A Streamlined Approach to Demand Planning

Cluster and Organize Your Demand Planning Process

Monitoring & Controlling of the Planning Process

Consensus Demand Planning

Segmentation

Quarterly/Yearly

Time Series Analysis

Quarterly

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Demand Segmentation
Configure & Calculate Your Segments

<table>
<thead>
<tr>
<th>PRODUCT IMPORTANCE / PROFITABILITY</th>
</tr>
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<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRODUCT VOLATILITY / FORECASTIBILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
</tr>
<tr>
<td>Y</td>
</tr>
<tr>
<td>Z</td>
</tr>
</tbody>
</table>

Define ABC and/or XYZ calculation rules
Example: Based on Revenue or QTYs?

Run segmentation jobs regularly
e.g. monthly or quarterly

Define planning strategies based on segmentation results
Full Value – A Streamlined Approach to Demand Planning
Cluster and Organize Your Demand Planning Process

Monitoring & Controlling of the Planning Process

Consensus Demand Planning
- Statistical Forecasting
- Management by Exception
- Manual Input by Planners
- Forecast Accuracy Calculation

Segmentation
- Quarterly/Yearly

Time Series Analysis
- Quarterly
Time Series Analysis

Example

Automated analysis of historical sales data via statistical tests

Demand pattern identified by the analysis

Resulting Demand properties to be stored as attribute values
Full Value – A Streamlined Approach to Demand Planning
Cluster and Organize Your Demand Planning Process

Consensus Demand Planning

- Statistical Forecasting
  - Weekly/Monthly
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  - Daily/Weekly
- Manual Input by Planners
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  - Monthly

Segmentation
- Quarterly/Yearly

Time Series Analysis
- Quarterly

Monitoring & Controlling of the Planning Process

Process Step 1
Process Step 2
Process Step n
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Process Step 1 > Process Step 2 > … > Process Step n

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Statistical Forecasting
Preparation and Execution

Data Cleansing

Data Integration

Statistical Forecasting
Data Cleansing
Create Baseline Sales History as Foundation for a Good Forecast

Cleansed Data
Reliable Data
Better Forecasting Results

Substitute Missing Values
Outlier Correction
Promotion Sales Lift Elimination

Automated Data Cleansing
Define „pre-processing algorithms“ that automatically cleanse the data before the actual forecasting run

Manual Data Cleansing
Via Microsoft Excel, e.g. by calculating standard variations. The data can then be changed directly in the planning view
Statistical Forecasting Models

**Data Cleansing**
- Outlier Correction
- Substitute Missing Values
- Promotion Sales Lift Elimination

**Constant Models**
- Automated Exponential Smoothing
- Single Exponential Smoothing
- Adaptive-Response-Rate Single Exponential Smoothing
- Simple Moving Average
- Simple Average
- Weighted Moving Average
- Weighted Average

**Trend Models**
- Automated Exponential Smoothing
- Double Exponential Smoothing
- Brown’s Linear Exponential Smoothing
  - Auto-ARIMA

**Seasonal Models**
- Automated Exponential Smoothing
- Triple Exponential Smoothing
  - Auto-SARIMA

**Sporadic Demand Models**
- Croston Method

**Regression Models**
- Multiple Linear Regression

**Machine Learning Models**
- Gradient Boosting

**Naïve Models**
- Copy Past Periods
**Time Series Analysis and Forecasting Algorithms**

<table>
<thead>
<tr>
<th>Common Demand Patterns</th>
<th>Demand Properties</th>
<th>Algorithms Used</th>
<th>Forecast Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td></td>
<td>Adaptive Response Rate Single Exponential Smoothing</td>
<td>78%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Automated Exponential Smoothing</td>
<td>80%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auto-ARIMA/SARIMA</td>
<td>78%</td>
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<td></td>
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<td>Brown Exponential Smoothing</td>
<td>75%</td>
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<td>Croston Method</td>
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<td></td>
<td></td>
<td>Double Exponential Smoothing</td>
<td>70%</td>
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<td>Multiple Linear Regression</td>
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<tr>
<td></td>
<td></td>
<td>Simple Average</td>
<td>70%</td>
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<td></td>
<td></td>
<td>Simple Moving Average</td>
<td>65%</td>
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<tr>
<td></td>
<td></td>
<td>Single Exponential Smoothing</td>
<td>85%</td>
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<tr>
<td></td>
<td></td>
<td>Triple Exponential Smoothing</td>
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<tr>
<td></td>
<td></td>
<td>Weighted Average</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Weighted Moving Average</td>
<td>75%</td>
</tr>
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Time Series Analysis identifies which demand pattern fits for which product.

Only algorithms which fit the identified demand pattern are considered by system.*

Best Fit selects the algorithm with the best accuracy based on Model Fit Error.

* Planned feature

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Cluster and Organize Your Demand Planning Process

Monitoring & Controlling of the Planning Process

Process Step 1  Process Step 2  ...  Process Step n

Segmentation
Quarterly/Yearly

Consensus Demand Planning

Statistical Forecasting
Weekly/Monthly

Management by Exception

Manual Input by Planners
Daily/Weekly

Forecast Accuracy Calculation
Monthly

Time Series Analysis
Quarterly
Manual Input & Refinement by Planners, Example
Refine an Automated Process

Example:

- **Statistical Forecast**
- **Manual Sales Input**
- **Manual Marketing Input**
- **Manual Demand Planner Input**
- **Final Consensus Demand Plan**
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Forecast Accuracy Calculation
Monthly

Statistical Forecasting
Weekly/Monthly

Management by Exception
Daily/Weekly

Manual Input by Planners
Forecast Accuracy Calculation
Measure the Quality of the Forecasting Process

What it Does:

- **Accuracy Analysis**: Compares the different forecasts to the actual historical sales data.
- **Bias Analysis**: Compares forecast tendencies to historic sales trend.
- **Value Add Analysis**: Measures quality of different forecasting steps.

What it Means:

- **Identify areas with planning issues**
- **Identify trends over time**
- **Identify areas suitable for automation**

<table>
<thead>
<tr>
<th>Short Term Improvements</th>
<th>Long Term Improvements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify areas with planning issues</td>
<td>Identify trends over time</td>
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</tbody>
</table>
Forecast Accuracy Calculation: Bias Analysis
Example of Same Accuracy, Different Bias

Negative Bias = Under-forecasting

Unbiased

Accuracy: 70%

Historic Sales Data

Forecast

Time

Qty

Historic Sales Data

Forecast

Time

Qty

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... What is the next step to tackle growing market volatility
Demand Sensing
Bridge the Gap between Tactical and Operational Processes

Accurate and granular short term forecast

Focus of classical forecasting:
- Aggregated (e.g. Customer Group)
- Mid to long term
- Weekly or even monthly buckets and planning cycles

Question:
How to come to a detailed daily forecast as input to operational supply planning processes like Deployment?

The Answer:
**Demand Sensing** as an extension to the classical forecasting
Demand Sensing – Next Level of Forecasting
Enhance and disaggregate Forecast based on short term Demand Signals

“Internal” Demand Signals like Deliveries, Sales Orders, Promotions and Open Orders

Demand Sensing
Time Horizon: 4-8 Weeks
Granularity: Days

Consensus Demand Plan

Short Term Forecast

“External” Demand Signals like Point-of-Sale (POS) or Weather* data

Drive operational supply planning processes:
- Deployment
- Transportation planning
- Production and packaging sequences
- Purchasing Decision
- Inventory Optimization

* Future Direction
Further Capabilities in IBP for demand
Further Capabilities in Demand Planning

- **Manage Product Lifecycle**
- **Trade Promotions**
- **Realignment**
- **Customer Collaboration** *
- **Excel Planning Interface**
- **E2E Business Process**
- **Flexible Planning Levels**
- **Machine Learning** *

* Future direction
SAP Integrated Business Planning for demand

Further Information

Link to previous Webinar “Forecasting in SAP IBP“ (May 2018):

- Presentation: https://d.dam.sap.com/a/ydv4xCg
- Recording: http://sapnaevent.adobeconnect.com/p7vd1b0nf1gh/

IBP for demand overview video:

- https://www.youtube.com/watch?v=9J4IdEby3_0

SAP IBP 1902 in SAP Help Portal:

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Recent Enhancements in Forecasting

- New forecasting methods:
  - SARIMA, ARIMA
  - Gradient Boosting
  - Copy Past Periods

- New settings in forecasting:
  - Disregard Leading Nulls
  - Test Phase Periods

- Time Series Analysis

- Usability enhancements in Product Life Cycle Management
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SAP Integrated Business Planning for demand
Product road map overview – key themes and capabilities

**Demand management**
- New forecast algorithm:
  - Naïve algorithms
- Product lifecycle management/like modeling
  - Flexible phase-in/phase-out curves
  - Predecessor chains (non-overlapping periods)
- Time-series analysis
  - Display result details
- Realignment
  - Version specific realignment
  - Transport of realignment projects
- Background forecasting on scenarios
- Forecast Accuracy Calculation:
  - Usage of lag-based snapshots

**Demand management**
- New forecast algorithm:
  - ARIMAX/SARIMAX
- Product lifecycle management/like modeling
  - Predecessor chains (overlapping periods)
- Time Series Analysis:
  - Introduction of new category “Insufficient data”
  - Refined logics for seasonality, trend and lumpy test
- Realignment:
  - Recurring execution of Realignment Projects

**Demand management**
- Product lifecycle management/like modeling
  - Aggregated Lifecycle planning respecting phase-in and phase-out on detailed level
- Forecast automation:
  - Anomaly detection

**Demand sensing**
- No decimals for EA/PC-type Unit of Measure

**Demand management**
- Product lifecycle management/like modeling
  - Aggregated Lifecycle planning respecting reference products from detailed level
- Extensibility of forecasting with custom algorithms from R studio
- Clean Sales History from promotion impact: monthly promotion elimination

**Demand sensing**
- User-specified periods to influence results
  - Periods to be ignored in learning
  - Periods to be ignored in balancing

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1 This is the current state of planning and may be changed by SAP at any time without notice.

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Release 1811
SAP Integrated Business Planning for demand
Direction update

- Forecast automation
- Forecasting enhancement, including new advanced algorithms and forecasting libraries (e.g. APL (Automated Predictive Library), UDF (Unified Demand Forecasting))
- Planning calendar support for demand processes
- Range forecasting
- Market- and customer-driven enhancements, and extended industry support
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Thank you.

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