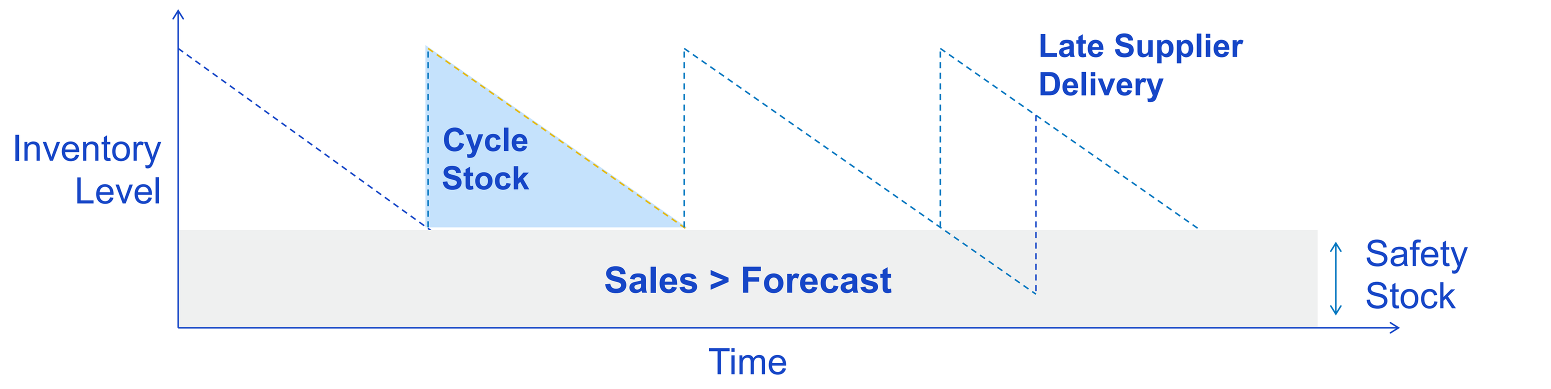
Student: Matias Escuder
Student: Sai Supraja Rao Karanam
Advisor: Jarrod Goentzel
Sponsor: F. Hoffmann - La Roche AG

Integrating Safety Stock Policies into the S&OP Process

MIT GLOBAL SCALE NETWORK

Motivation / Background

One way to mitigate uncertainties in supply chains is by carrying safety stock. Nevertheless, carrying inventory leads to high holding costs and obsolescence. Therefore, companies need to develop safety stock methods that strategically balance the cost of stock out against the holding costs.



The current methodology at our sponsor company is a static once-a-year process that doesn't factor in the legacy practice of positive forecast. This is an opportunity to optimize safety stock and avoid excess inventory.

Key Question / Hypothesis

What methodology should demand planners use for setting safety stock targets more dynamically based on a positive buffer in demand forecasts?

What potential savings could be achieved with a new methodology?

Relevant Literature

Manary, M. P., & Willems, S. P. (2008a). Setting Safety-Stock Targets at Intel in the Presence of Forecast Bias.

Oral, M., & Kettani, O. (1993). The facets of the modeling and validation process in operations research. *European Journal of Operational Research*.

S Suppliers	I Inputs	P Process	O Outputs	C Customers
Step 1: Centralized Database + Forecasting System **Step 1:** Mktg Team, CI Team	**Step 1:** Past Sales **Step 1:** Forecasting Algorithms **Step 1:** Potential Events	1 **Step 1:** Forecasting	**Step 1:** S&OP Forecast (current month + 36 months)	**Step 1:**TM1 **Step 1:**Affiliates
Step 2: Commercial Team **Step 2:** GSC Planners	**Step 2:** Demand Forecast and RMSE **Step 2:** Lead Time and RMSE **Step 2:** k (target service level)	2 **Step 2:** Safety Stock Annual Calculation 3	**Step 2:** Safety stock target proposal in days	**Step 2:** Affiliates
Step 3: Basel Team **Step 3:** Affiliates	**Step 3:** Safety Stock Target Proposal **Step 3:** Frozen Periods **Step 3:** Events	4 **Step 3:** Safety Stock Target Review	**Step 3:**Comments in Excel (TACT Output) **Step 3:**Finalize safety stock levels in days	**Step 3:** Affiliates
Step 4: Affiliates **Step 4:** Commercial Team	**Step 4:** Safety stock value from step 3 **Step 4:** Forecast from Step 1	**Step 4:** Safety Stock Monthly Review	**Step 4:** Replenishment Plan	**Step 4:** Supply Planner
Step 5: Affiliates **Step 5:** Manufacturers	**Step 5:** Demand Forecast and RMSE **Step 5:** Idle Capacity **Step 5:** Urgencies	5 **Step 5:** Order placement	**Step 5:** Production Orders	**Step 5:**Manufacturers

Methodology

Understand the managerial situation and review the existing literature.

Develop a conceptual model by understanding operations of various teams' that impact safety stock.

Develop a formal model to test improvement opportunities in the current process.

Understand › Redesign › Simulate

Results

Product	Average Inventory / month	% of reduction in Inventory due to Buffer	% of Reduction in Total Inventory
SKU 4	21,042	1.7%	16.6%
SKU 6	4,767	4.8%	45.3%
SKU 1	11,891	1.1%	61.3%
SKU 5	1,385	4.3%	44.2%
Total	**39,085**	**2.0%**	**34.7%**

Insights

- **Positive bias in forecast contributes to 2% reduction in Inventory.**
- **Investigating inventory policies beyond safety stock could lead to potential inventory reduction of 35% .**

Conclusions

Establish right communication channels and document reasons for manual changes made to forecast and safety stock targets.

Address forecast bias before calculating safety stock.

Investigate inventory policies beyond safety stock to have significant reduction in inventory.

Sai Supraja Rao Karanam 

Matias Escuder