

# BIA-674 SUPPLY CHAIN ANALYTICS

## Procurement Analysis

### Inventory Analysis

#### 1. Problem Statement

The marketing team has gathered insights regarding the anticipated demand trend for various SKUs based on their product families. Our team, as part of this project, has been requested to:

- Estimate the change in the inventory position to understand the working capital impact in one of the most critical plants in Switzerland, GlasWork.
- Based on the marketing insights gathered, to understand the potential obsolete inventory that they currently have.

#### 2. Methodology

We are given features like SKU, hands-On Inventory, APU, APU Trend, S-OTD and so on. Given the features we are going to do inventory analysis by comparing current month demand to previous month demand, calculate total inventory cost and decision on mitigating impacts on Company, obsoleting SKUs with negative APU trend.

Some of the calculations we have done for this analysis are as follows,

- Calculated Anticipated demand per day(Here we have done this for month of October).

Anticipated Demand Per Day(Oct)=(APU/30)\*(100%\_APU Trend)

- Calculated Standard Deviation(SD) of Demand

Standard Deviation(SD) of Demand= Demand Variability(COV) \* Anticipated Demand Per Day (Oct)

- Standard deviation of Lead Times in Days

SD of Lead Times in Days=SQRT((1-S-OTD)\*Lead Time(Days))

- Calculated Standard Deviation of Demand during Lead variable Time

Standard Deviation of Demand during Lead variable Time =SQRT((Lead Time (days)\* (Anticipated Demand per Day (Oct)^2))+(Standard Deviation of Lead Time in Days^2)))

- Calculate K factor

K Factor= NORMINV(95/100,0,1)

- Calculate Safety Stock

Safety Stock = Standard Deviation of Demand during Lead variable Time \* K Factor

- Calculated Reorder Point

Reorder point= Lead Time (Days) \* Anticipated Demand Per Day (Oct) +Safety Stock

- Calculated inventory Position (End Inventory)

Inventory Position (End Inventory) = Inventory in units on hand- (Anticipated Demand Per Day(Oct)\*30)

- Validated if the reorder is required.

Reorder Required = IF(Inventory Position (End Inventory)< Reorder Point, "Yes","No")

- Calculated Minimum Order Quantity (ct)

Minimum Order Quantity = Lead Time (days) \* Anticipated Demand Per Day (Oct)

- Calculated Order Quantity (Oct)

Order Quantity (Oct)= IF (Reorder required='Yes', IF((Reorder point- Inventory Position (End Inventory))>Minimum Order Quantity, Reorder point- Inventory Position (End Inventory), Minimum Order Quantity), 0)

- Calculated Total Demand

Total Demand = Anticipated Demand Per Day(Oct) \* ((100% + APU Trend )^11-1)/((100%+APU Trend)-1)\*30

- Calculated Obsolete inventory

Obsolete inventory = IF(Inventory in units on Hand -Total Demand >0, Inventory in units on Hand-Total Demand,0)

Anticipated Demand Per (Oct)	SD(Standard Deviation) Demand	SD of Lead Time	SD of Demand Variable Lead Time	K Factor	Safety Stock	Reorder Point	Inventory Position (End Inventory)	Does Reorder required ?	Minimum Order Quantity	Order Quantity	Total Demand	Obsolete Inventory
3.66	5.71	2.30	28.65	1.64	47.12	131.30	63.09	Yes	84.18	84.18	753.44	0.00
7.12	12.82	1.34	45.41	1.64	74.70	160.14	-86.82	Yes	85.44	246.95	6867.33	0.00
6.48	8.94	2.20	43.38	1.64	71.36	207.44	193.68	Yes	136.08	136.08	484.24	0.00
20.70	41.19	2.12	165.47	1.64	272.18	582.68	-111.43	Yes	310.50	694.11	106187.97	0.00
12.47	11.47	1.73	49.39	1.64	81.24	268.24	-262.49	Yes	187.00	530.73	1820813.71	0.00
1.12	1.31	1.43	4.81	1.64	7.92	21.36	-8.59	Yes	13.44	29.94	153.57	0.00
0.20	0.20	2.08	0.90	1.64	1.48	4.68	0.53	Yes	3.20	4.16	14.95	0.00
0.90	1.21	2.30	6.14	1.64	10.10	30.80	-4.28	Yes	20.70	35.08	4616.87	0.00
8.10	7.29	2.20	37.85	1.64	62.26	232.36	-76.87	Yes	170.10	309.23	41551.81	0.00
2.60	2.55	1.55	9.70	1.64	15.96	47.16	7931.14	No	31.20	0.00	194.29	7814.85
0.53	0.76	1.92	3.22	1.64	5.29	13.83	-5.43	Yes	8.53	19.25	4664.58	0.00
1.91	2.44	2.09	12.36	1.64	20.34	64.19	-26.19	Yes	43.85	90.38	278477.39	0.00
1.08	1.43	1.59	5.03	1.64	8.27	20.15	-21.86	Yes	11.88	42.01	25988.21	0.00
4.88	8.78	2.67	50.61	1.64	83.25	234.53	85.19	Yes	151.28	151.28	4706.82	0.00
3.25	5.79	2.67	33.39	1.64	54.93	155.78	132.78	Yes	100.85	100.85	446.08	0.00
2.22	2.44	3.75	20.81	1.64	34.22	169.64	138.74	Yes	135.42	135.42	457.00	0.00
0.73	1.05	1.73	3.99	1.64	6.56	16.09	-14.64	Yes	9.53	30.74	107106.69	0.00
0.30	0.35	2.05	1.70	1.64	2.79	9.09	0.64	Yes	6.30	8.45	61.76	0.00
0.20	0.32	1.66	1.14	1.64	1.88	4.28	1.51	Yes	2.40	2.77	14.95	0.00
0.20	0.31	1.92	1.29	1.64	2.12	5.32	91.26	No	3.20	0.00	14.95	82.31
0.73	0.90	1.66	3.35	1.64	5.52	14.32	-15.73	Yes	8.80	30.05	107106.69	0.00
0.27	0.27	4.32	2.66	1.64	4.38	25.98	25.67	Yes	21.60	21.60	36.56	0.00
0.50	0.77	2.20	3.70	1.64	6.08	16.58	-2.05	Yes	10.50	18.63	2564.93	0.00
0.27	0.66	1.92	2.69	1.64	4.43	8.70	7.57	Yes	4.27	4.27	36.56	0.00
0.73	1.40	1.92	5.78	1.64	9.50	21.23	-9.29	Yes	11.73	30.53	107106.69	0.00
0.84	0.86	3.78	7.45	1.64	12.26	64.34	24.11	Yes	52.08	52.08	2488.23	0.00
0.73	0.98	6.36	13.75	1.64	22.62	151.69	56.96	Yes	129.07	129.07	107106.69	0.00
0.73	1.88	2.67	10.63	1.64	17.49	40.23	9.18	Yes	22.73	31.05	107106.69	0.00
0.83	0.87	4.32	8.59	1.64	14.13	81.63	2.63	Yes	67.50	79.00	397347.63	0.00
0.20	0.45	2.30	2.23	1.64	3.66	8.26	15.58	No	4.60	0.00	14.95	6.64
0.72	0.92	3.75	7.69	1.64	12.64	56.56	47.40	Yes	43.92	43.92	694.45	0.00
0.53	0.47	1.59	1.79	1.64	2.94	8.81	-11.94	Yes	5.87	20.75	4664.58	0.00
0.53	0.49	4.32	4.98	1.64	8.19	51.39	16.19	Yes	43.20	43.20	4664.58	0.00
0.47	0.49	3.78	4.28	1.64	7.03	35.97	12.91	Yes	28.93	28.93	1382.35	0.00

Figure 1: Inventory Analysis

Above is the screenshot of how the data looks after applying all the above stated calculations.

Current month inventory cost = APU unit + Std Price = \$49.66 million. Next month inventory cost = APU Unit from APU trend + Std Price = \$70.71 million. Difference of inventory cost for next month = \$21.05 million

### 3. Conclusion

From our analysis we understand that the expected Inventory depend on the expected APU Trends. Large number of On-Hand Stocks could lead to surplus inventory in contrast some SKUs require new shipments as a result of inventory shortage. By Obsoleting SKU which are >=-40% of APU trend will help reduce the cost by \$3.36 million.