

A Note on Forecasting

The Forecasting category examines your ability to forecast demand, **build adequate inventories to satisfy demand, and yet not accumulate excessive inventory.**

Further, if a product's plant is running at maximum utilization (a complete second shift), stock outs are ignored because you could not make any more inventory in that year. Of course, the team should address the problem, but situations arise where a company faces an unexpected industry-wide capacity shortage. For example, a competitor exits a segment, or downsizes a plant. If the company recognized the problem in their forecast, they would run their plant at 200% utilization this year and add sufficient capacity to meet a forecast for next year.

In short, you do not want to stock out, and you do not want to carry too much inventory. Recall the discussion from the Working Capital category. You can think of inventory as crystallized Cash. If you sell the Inventory, it is converted back to Cash. If demand is below expectations, Cash is converted to Inventory. Since you cannot predict what competitors will do, you cannot predict demand perfectly. Therefore, your Cash plus Inventory is a hedge against two risks — the risk of stocking out, and the risk of building too much inventory.

Stock outs are expensive. Carrying excess inventory is expensive. Consider the following situation. You want to forecast sales for Able. As it turns out, demand is 1200. Case 1 underestimates by 200 thousand. Case 2 has only 1 unit left over. Case 3 has 120 days of inventory left over. In all cases unit cost are the same, and the contribution margin is \$10.06 per unit.

Price	\$28.00
Labor Cost/Unit	\$7.56
Material Cost/Unit	\$10.38
Total Unit Cost	\$17.94
Contribution Margin	\$10.06

	Case 1	Case 2	Case 3
	Stock Out	Just In Time	120 Days
Units Demanded	1,200	1,200	1,200
Units Produced	1,000	1,201	1,594
Units Sold	1,000	1,200	1,200
Units In Inventory	0	1	394
Missed Unit Sales	200	0	0

Cash	\$7,068	\$7,066	\$1
Inventory Value	\$0	\$2	\$7,067

<i>REVENUE</i>	Able	Able	Able
Sales	\$28,000	\$33,600	\$33,600
<i>VARIABLE COSTS</i>			
Direct Labor	\$7,556	\$9,068	\$9,068
Direct Material	\$10,378	\$12,454	\$12,454
Inventory Carry	<u>\$0</u>	<u>\$2</u>	<u>\$848</u>
Total Variable Costs	\$17,934	\$21,523	\$22,369
<i>Contribution margin</i>	\$10,066	\$12,077	\$11,231
<i>PERIOD COSTS</i>			
Depreciation	\$2,880	\$2,880	\$2,880
SG&A: R&D	\$0	\$0	\$0
Promotion	\$800	\$800	\$800
Sales	\$800	\$800	\$800
Admin	<u>\$245</u>	<u>\$301</u>	<u>\$319</u>
Total Period Costs	\$4,725	\$4,781	\$4,799
<i>Net Margin</i>	<u>\$5,341</u>	<u>\$7,296</u>	<u>\$6,431</u>

Missed Net Margin	\$2,013
Inventory Carry	\$0
Taxes	\$705
Missed Profits	\$1,308

CASES

In Case 1 you stock out and miss sales of 200 thousand units. Notice that the period costs are already covered by the sales that you did make. Therefore, any missed sales would have gotten a free ride on Depreciation, SG&A expense, even associated interest expenses. The missed sales would only incur taxes. In this example, your missed profits are \$1.3 million. In the proformas that drove this example, total profits were \$5.2 million. A small stock out can make a significant difference in Net Profit.

In Case 2 your hopes come true. You build 1201 and 1200 are sold. Inventory Carry costs are miniscule.

In Case 3 your fears are realized. You build 1594 but only sell 1200, leaving 120 days of

inventory in the warehouse. This incurs an Inventory Carry cost of \$848 thousand.

As inventory days increases, so do the carrying costs. For purposes of the Forecasting category, we make a policy decision that anything beyond 120 days is excessive. You might want to set tighter limits, say 90 days. Consider the rows labeled "Cash" and "Inventory Value". In all three cases your Working Capital requirements are the same. When the Inventory is sold, it is converted to Cash. When it does not sell, Cash is converted to Inventory. The combined position of \$7.1 million represents a policy decision for 120 days of inventory. As discussed in The Working Capital category, that \$7.1 million is not free. If you could invest it at 10% it would earn \$710 thousand. If you set a policy of 90 days, you would only require \$5.3 million (but you expose yourself to more risk of stock outs.)

You can use your Capstone.xls spreadsheet to examine worst and best case scenarios. The technique is discussed in the Operations & Functional Areas > Marketing > Sales Forecasting section of the Online Manager Guide here on the website. To summarize, put your worst case into the Marketing spreadsheet. To produce a 120 day inventory above your worst case, multiply by $(365+120)/365$ or 1.33 or 4/3rds. Put the result into the Production spreadsheet (less any inventory on hand). For example, if your worst case is 1000 units, and you want a 120 day spread, produce enough to give you an inventory of $1000 \times 4/3$ or 1333. (For a 90-day spread, produce 5/4ths or 1.25 your worst case.)

Each product contributes points. If your company has 3 products, each product can contribute 33 points. If it has 8, each product can contribute 12.5 points.

Note: The more products one has, the less likely it becomes that a company will earn 100 forecasting points. If you have 8 products, you need 8 good forecasts. On the other hand, if your company has fewer products, a missed forecast costs more points. If you have three products, a miss costs 33 points.