

## 8.9: Supply Chain Collaboration

### Vendor Managed Inventory (VMI)

Vendor Managed Inventory (VMI) is an advanced supply chain relationship whereby a vendor (often a manufacturer) has access to their customer's inventory information and the vendor takes the responsibility for maintaining an agreed-upon level of product at the customers location. This arrangement can be used with manufacturers, distributors and retailers.

VMI has numerous benefits for both the supplier (vendor) and the customer. The vendor has strong motivation to ensure that shelves are fully stocked, any slow-moving stock is discontinued and that employees have full understanding of the product offerings. The customer benefits from these VMI relationships because less work is involved on the buyers' end. Due to EDI, there are few errors and goods flow quickly. Point-of-sale data updates the inventory and determines what items are needed. Salespeople from the vendor often provide assistance by training sales staff and assisting customers when possible.

### Collaborative Planning, Forecasting and Replenishment (CPFR)

Collaborative Planning, Forecasting and Replenishment (CPFR) is an arrangement where two trading partners in a supply chain collaborate to agree on forecasts and orders between the manufacturer and distributor/retailer. The distributor/retailer will have collected POS data and added any additional information, such as promotion plans, inventory status or forecasts. That information gets shared with manufacturers who will then compare it with their own forecasts and capacity. Both teams can collaborate to solve any discrepancies, eliminate gaps and agree on a final set of numbers. Collaborating in this way will enable both firms to reduce inventory as well as reducing problems such as shortages and capacity problems.

### Measuring Supply Chain Performance



### Inventory Turnover

Key Performance Indicators are measurements used to evaluate supply chain performance. One of the ways to evaluate the supply chain performance is to calculate **inventory turnover** (inventory turns = *cost of goods sold divided by average aggregate inventory value*).:

$$\text{Inventory Turnover} = \frac{\text{Cost of goods sold}}{\text{Average Aggregate Inventory Value}} \quad (8.9.1)$$

“Average aggregate inventory value” is a term used to describe all of the inventory held in stock, which includes raw materials, work in process and finished goods, all valued at cost.

Inventory turnover is an indicator of the policies and practices of an organization. It represents their ability to purchase materials, produce and sell their products in a timely manner. A higher value for the inventory turnover means that the organization has been capable of replenishing and selling its inventory more number of times in any particular amount of time, and as a result, have a better cash flow.

It is important to keep in mind that high or low value of inventory turnover for each company is relative to its own industry. For example, dairy (milk) manufacturing has an annual inventory turnover of around 23, while this number is 14.7 for the grocery

supermarkets, and 4.8 for the automotive industry.<sup>1</sup> Industries with higher volume, but lower margin, usually have the highest inventory turnovers.

#### ✓ Example 8.9.1

NED's Food Supply is a supplier to restaurants and institutions for frozen foods, meats, fish, canned and fresh fruits and vegetables. Here is an analysis from the past two years regarding their inventory management. In which year was their supply chain performance better?

	Last year	Two years ago
Cost of goods sold	17,550,000	16,255,000
Average aggregate inventory value	\$1,650,000	\$1,763,350

#### Solution

Inventory turns for last year =  $17,550,000 / 1,650,000 = 10.64$  turns

Inventory turns for two years ago =  $16,255,000 / 1,763,350 = 9.22$  turns

Last year, their inventory turnover was faster. If customer service was equivalent in both years, then their performance was better last year than it was two years ago. This may have resulted in customers receiving fresher foods as well.

### Days of Supply

Another related performance measure is **days of supply**:

$$\text{Days of Supply} = \frac{\text{Average Aggregate Inventory Value}}{\text{Annual Cost of Goods Sold}} \times 365 \text{ days} \quad (8.9.2)$$

Days of supply formula (average aggregate inventory value divided by annual cost of goods sold, the sum of which is multiplied by 365 [days]).

#### ✓ Example 8.9.1

J's Custom Automotive Finishing has calculated that his annual cost of goods sold at 45,000,000. His average inventory value in 2019 is:

Production components	2,350,000
Production supplies	450,000
Finished goods	225,600
<b>Total aggregate inventory value:</b>	<b>3,025,600</b>

#### Solution

Days of supply =  $(3,025,600 / 45,000,000) \times 365 = 24.54$

This measure can be thought of as how much inventory is sitting in the building at any one time. In terms of measuring the efficiency of the inventory, a lower number is better. It would imply that goods are purchased more frequently and spend less time in the facility before being converted into sales.

There are other ways to measure supply chain performance as well. In a warehouse or distribution setting, **fill rate** is an important measure. It is the percentage of customer orders that are filled from on-hand stock. In a manufacturing setting, a measure such as the **percentage of orders delivered on time** is an important indicator of customer service level.

## References

1. BDC. (2019). Inventory turnover ratio. Retrieved on November 4, 2019, from <https://www.bdc.ca/en/articles-tools...king-tool.aspx> ↵

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