Managing Inventories in a Changing Economy

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Abstract. This paper presents a simple methodology that is particularly useful for managing inventories in a changing economy. The technique uses data from your existing MRP or ERP system and identifies which inventory rules are out of date in your company. It uses demand-driven logic and provides the dollar focus necessary for prioritizing your specific inventory improvement opportunities. This methodology was developed by 35 purchasing and materials managers to make the planner/buyer job easier. It helps them reduce excess inventories and increase turns, while avoiding shortages and improving working capital.

"Inventory continues to be the lifeblood of manufacturing supply chains, especially as the economy tightens." –Aberdeen Group

During our recent economic downturn many manufacturing and distribution companies discovered that a small drop in sales can result in a much larger drop in inventory turns. As planners, buyers and managers whose performance is often measured by inventory turns, we need to understand why this happens and what we can do to avoid it.

Consider a manufacturing company with annual sales of $100 million and cost of sales (COS) of $60 million. If their inventory was $10 million then their inventory turns (COS divided by inventory) would be 6 turns per year. But what happens when sales drop by 20% to $80 million? Several scenarios are shown below.

Figure 1. How a 20% sales drop can result in a 50% drop in inventory turns.

	Normal Condition	20% Sales Drop		
		Wishful	**Hopeful**	**Likely**
Sales	100	80	80	80
COS	60	48	48	48
Inventory	10	8	10	16
Turns	6.0	6.0	4.8	3.0

In our first scenario we would like inventory levels to go down with sales so that inventory turns remains the same at 6 turns per year. I think we all know that this is wishful thinking.

In our second scenario, we hope that we can keep inventories at the same level of $10 million. If we are able to do that, then inventory turns will decrease but only to 4.8 turns per year.

What is much more likely to happen in many companies is that about half of the decrease in COS or $6 million becomes new inventory because it isn't sold. When added to the normal inventory of $10 million, the total inventory climbs to $16 million and turns drop to 3 turns per year or half of what they were before.

Why does this happen and, more importantly, what can we do to avoid it. First, most companies will admit that they had too much inventory to begin with and that they don't react to changes quickly enough. But even when we do react well to a drop in demand our systems are typically using the same replenishment parameters that they were programmed with months or even years before.

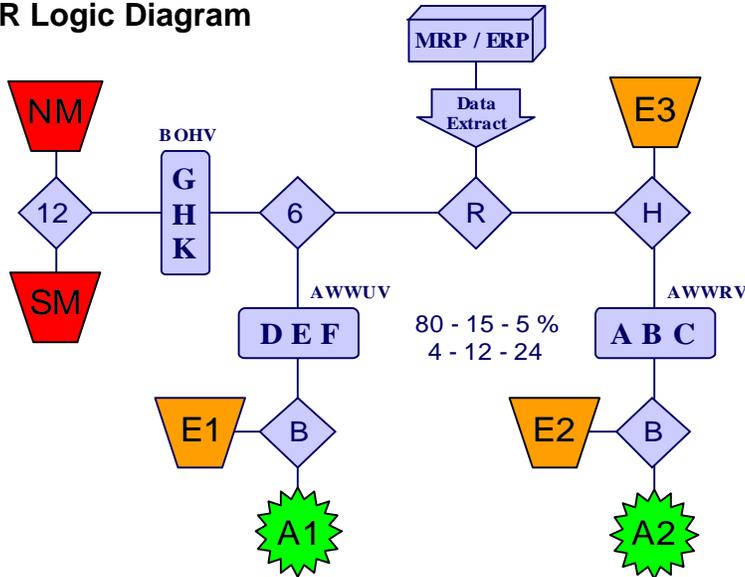The major reasons that inventories go up in a down economy are:
- Our inventory systems and metrics are backward looking.
- Our ABC classifications are out of date.
- Our order quantities and safety stock levels are based on past usage.
- We are still planning part quantities rather than managing inventory dollars.

To manage inventories effectively – in any economy, but particularly with changing demand – we need systems that are dynamically demand driven and that provide a dollar focus. Forward-looking demand-driven ABC classifications are needed to revise our order quantities and safety stock levels, and to keep them current. Yes, ABC classes are not just for cycle counting any more. And we need a dollar focus so that planners and buyers can be more effective in choosing the most important issues to work on first. Since we have limited time to work the problems, let's make it easy to identify the ones with the biggest dollar returns.

The Inventory Quality Ratio. A simple method of measuring inventory performance and managing inventory dollars has been successful in reducing inventories 20% to 40% by giving planners and buyers the information they need to be more effective. This method is called the Inventory Quality Ratio (IQR). The IQR logic was developed collectively by the materials and/or purchasing managers of 35 companies over a two-year period and was used by them to reduce inventories a total of $500 million (average 25% reduction) while improving on-time deliveries to their customers. This demand-driven and dollar-focused logic has since been used successfully by planners and buyers in other manufacturing and distribution companies to reduce inventories and improve working capital.

Using the data from any MRP/ERP/SCM system, the IQR logic divides inventory into three groups: items with future requirements, items with no future requirements but with recent past usage, and items with neither. As shown in Figure 1, the items in these groups are then dynamically stratified into typical ABC-type classifications based on their future dollar requirements (ABC), their past dollar usage (DEF), or their current dollar balances (GHK), respectively. A target inventory level or rule is set for each item based on its classification. The balance on hand of each item is compared to the rule, and the dollars of each item are categorized as either Active (A1 or A2), Excess (E1, E2 or E3), Slow Moving (SM) or No Moving (NM). These are called the inventory quality categories.

Figure 1. IQR Logic Diagram

MRP / ERP

Data Extract

NM   E3

B OHV

G H K

12   6   R   H

SM

AWWUV   AWWRV

D E F   80 - 15 - 5 %   A B C
4 - 12 - 24

E1   B   E2   B

A1   A2

$$IQR = \frac{A1 + A2}{A1 + A2 + E1 + E2 + E3 + SM + NM} = \frac{\text{Active Inventory Dollars}}{\text{Total Inventory Dollars}}$$

The Inventory Quality Ratio is the ratio of the active inventory dollars to total inventory dollars. In a theoretically perfect situation (i.e., with no excess, slow moving or no moving inventories), the IQR would be 100%. Using very generous inventory rules of 4-12-24 weeks of supply for A-B-C items, respectively, the IQR for most of the over 400 companies we have surveyed is in the 30% to 45% range (with the exception of the automotive industry). This means that approximately 60% of the inventory dollars are tied up in excess, slow or no moving items. Further, we found that slow and no moving inventories account for about 10% of the dollars and that one category, Excess 2 (E2), typically accounts for 30% to 50% of the total inventory dollars. (Most companies using the IQR logic today are using rules that are much more aggressive, like 2-6-12 weeks of supply or even 1-4-6 weeks of supply.)

All of the companies surveyed were running MRP or ERP systems, and many were already employing lean manufacturing and pull principles, APICS certified planners and ISM certified buyers. The best-educated practitioners using the latest tools still found it difficult to manage inventory dollars. Their systems were providing lots of data for planning part quantities but they were missing the dollar focus. The IQR logic uses both future requirements and past usage, along with dynamic ABC classifications and a dollar focus to help planner/buyers:
- Quickly identify good, bad and excess inventories
- Measure performance by inventory segment (supplier, commodity, etc.)
- Cleanup data errors and omissions in their host database
- Set realistic reduction objectives and track improvement over time
- Avoid shortages of purchased parts and finished goods
- Drill down on problem areas and prioritize corrective action
- Revise safety stock levels, lot sizes and order quantities
- Enhance the effectiveness of ERP systems with a dollar focus

- Monitor inventory movement as the demands change
- Rebalance inventories among various supply chain locations
- Better manage financial reserves and avoid future write-offs.

Each of these capabilities will be demonstrated during the Conference session.

Strategies and Results. The balance of this paper presents three strategies for reducing excess inventories and improving inventory performance. It also shows the results achieved by three companies using the IQR methodology. The three strategies are as follows:

Identify and Reduce the Excess. The biggest opportunities for inventory reduction in most companies are with the Excess 2 inventories. These are parts for which there are future requirements but the balances on hand exceed the rule. The IQR logic identifies excess inventories according to the inventory rules (expressed in days or weeks of supply) that the planners and buyers have set for their particular manufacturing or distribution environment.

Excess inventories represent not only the biggest but also the best opportunities for inventory reduction. This is true for several reasons:
- Reducing excess inventories reduces inventory dollars on the balance sheet; so turns, return on assets and all of the financial ratios improve. But unlike scrapping obsolete inventories, there is no negative financial impact from inventory write-offs.
- Reducing excess inventories improves cash flow by deferring incoming purchases until the excess inventory is consumed and replenishment is actually needed. Generally, there is a dollar-for-dollar improvement in cash flow from reducing excess inventories.
- Very simply, the less excess inventories we have today, the less likely we are to have slow moving or obsolete inventories in the future, so it reduces future write-offs.
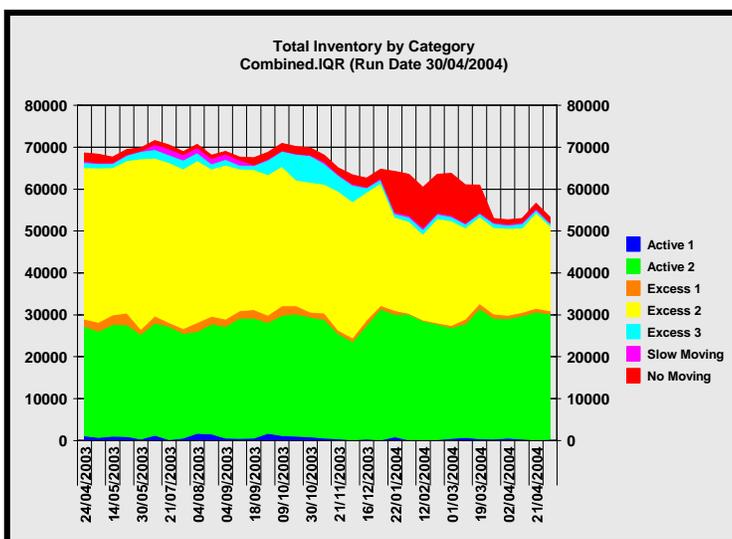

Figure 2. Excess inventory reduction. First year results by an international pharmaceutical company.

Figure 2 shows the results achieved by an international pharmaceutical company. By using the IQR logic to identify their excess inventory dollars they were able to reduce their Excess 2 inventories by €18 million or 46% in the first twelve months. They increased their IQR 17 points from 40% to 57%, increased their active inventories by €2 million, and reduced overall inventory investment by 22%.

Focus on the Dollars. A high-tech manufacturer was grappling with unprecedented technological changes and sales growth. Their inventory investment and obsolescence exposure were increasing while their turns were decreasing. They had recently implemented a new ERP system, were using the latest replenishment techniques, and had experienced planners and buyers. But as their Materials Director said, "The results just weren't there."

After seeing the IQR logic, they realized that they were spending too much time managing their C class items and not enough time on their A items. They were managing part quantities but not inventory dollars. They decided to use the IQR logic along with their new ERP system to manage purchased parts by focusing on the A and B items and developed a three-step plan. First they identified open purchase orders for parts they had too much of and rescheduled deliveries. Second, they disposed of, or found other uses for, their high value obsolete items. Third, they decided to fine tune the safety stock and order quantities in their ERP system with information from IQR so that their replenishment orders were in synch with their overall inventory objectives.
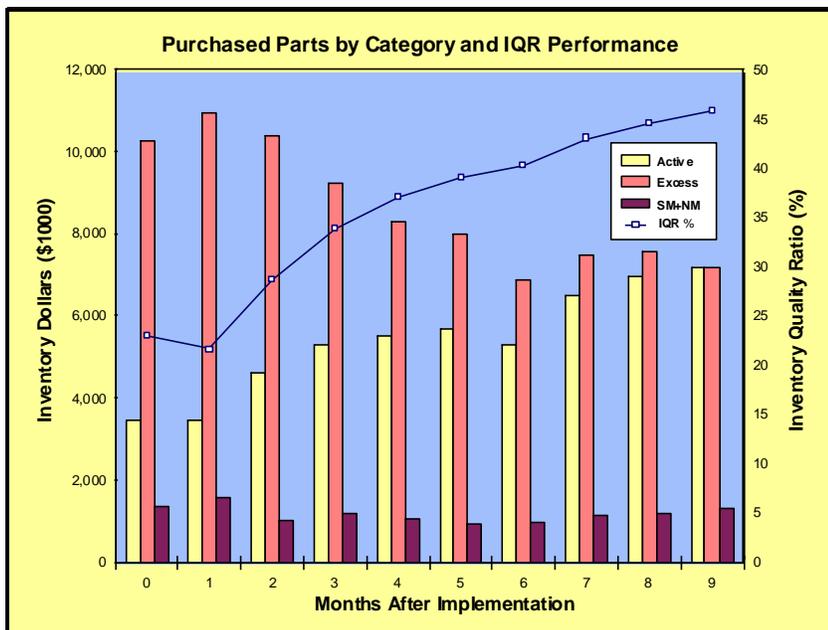

Figure 3. Purchased Parts Inventory Performance and Excess Inventory Reduction.

As shown in Figure 3, a major benefit was a $3.8 million (35%) reduction in excess inventories. This was accomplished while the planners and buyers were grappling with a 25% sales increase and the introduction of new product lines. Under these circumstances buyers are usually consumed by just getting the new parts in the door—their primary objective being to avoid shortages. By each buyer working only their three largest dollar opportunities each week, they were able to double their IQR% in nine months. The dynamic, demand-driven A-B-C classes in IQR helped them to work smarter, not harder.

Use Continuous Improvement. One well-known industrial products company started using IQR when it was already turning raw materials 30 times per year. They changed the performance parameters from 4-12-24 weeks to a much more aggressive 1-2-6 weeks, which lowered their IQR and gave them new targets to pursue. This methodology helped them to increase their raw material turns to 42 times per year.

Whatever a company's current inventory performance may be, there are usually additional gains that can be made by setting new objectives and measuring improvement. Reports and charts have been developed using the basic IQR data to monitor and track inventory performance over time. The IQR methodology lets each planner or company set the performance parameters to match their specific business environment and to change them as the situation warrants.

Conclusions. In any economy we can do a better job of managing inventory levels and working capital by using demand-driven inventory logic and having a dollar focus. This will allow us to respond more quickly and effectively in dealing with the inevitable changes in demand for raw materials, purchased parts and our finished goods.

To be productive, employees need the right tools. And to be effective, they also need the right focus. Planners and buyers have difficult jobs, but we have not given them the tools or the dollar focus they need to be bottom-line oriented. Most of a buyer's time is spent fighting fires and getting the right parts in the door to avoid shortages. Seldom do they have the time or the motivation to reduce inventories.

The Inventory Quality Ratio provides an effective way to manage inventory dollars and improve inventory performance. The technique and tools are available to help identify good and bad inventories, to assess performance by inventory segment, to prioritize reduction opportunities, to set meaningful inventory targets, to revise safety stocks and order quantities consistent with current demand, to measure and track continuous improvement, and to make the planners' and buyers' jobs easier.

The IQR methodology is being used by companies in a wide range of manufacturing environments. These companies have improved their inventory performance, reduced excess and obsolete inventories, increased inventory turns, reduced write-offs, and improved their cash flow and working capital.