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Supply Chain Management: Cracking The "Bullwhip Effect" - Part III -

by R. Michael Donovan

The objective of supply chain management is to provide a high velocity flow of high quality, relevant information that will enable suppliers to provide an uninterrupted and precisely timed flow of materials to customers. However, unplanned demand oscillations, including those caused by stockouts, in the supply chain execution process create distortions which can wreck havoc up and down the supply chain. There are numerous causes, often in combination, that will cause these supply chain distortions to start what has become known as the "Bullwhip Effect". While the devil is usually buried in the details, as is the case here, the most common general drivers of these demand distortions are:

- | | |
|-----------------|-------------|
| ▪ Customers | ▪ Policies |
| ▪ Promotions | ▪ Processes |
| ▪ Sales | ▪ Systems |
| ▪ Manufacturing | ▪ Suppliers |

This unplanned for demand results in a disturbance or "lump of demand", which may be a minor blip for any one customer, oscillates back through the supply chain often resulting in huge and costly disturbances at the supplier end of the chain. Often, these demand oscillations will launch a "mad scramble" in manufacturing with the need to acquire and expedite more raw materials and reschedule production.

The "Bullwhip Effect" has in the past been accepted as normal, and in fact, thought to be an inevitable part of the order-to-delivery cycle. Yet, the negative effect on business performance is often found in excess inventories, quality problems, higher raw material costs, overtime expenses and shipping costs. In the worst-case scenario, customer service goes down, lead times lengthen, sales are lost, costs go up and capacity is adjusted. An important element to operating a smooth flowing supply chain is to mitigate and preferably eliminate the "Bullwhip Effect".

Understand The Causes

It is important for management to understand the causal factors that create supply chain oscillations. Here are some examples:

- *How do sporadic sales promotions impact demand patterns, cost and margins?*
Many companies that conduct sales promotions that effect current inventory and the supply pipeline do not understand the impact, on a quantitative and qualitative basis, of what their sales promotion policies and practices actually do. After gaining a

complete and accurate understanding of what sales promotions do for you vs. what sales promotions do to you, most companies are left with the need to answer the question, “What sales promotion policies and practices should we change?”

A *common* complaint from the manufacturing side of the business, and a common reason for severe demand distortions that cause supply chain oscillations, are unforecasted and “unknown” sales promotions. These unplanned for sales promotion events ripple throughout the supply chain creating excess costs which border on the incalculable.

- *Does your sales incentive plan contribute to demand distortions?* Sales targets, quotas and commission accelerators when applied to an extended quota period, such as three months, will often cause demand distortion. Management needs to examine the rationale for sales incentives to be based on shorter-intervals rather than three months or longer. Typically, shorter measurement periods promote a smoothing of demand resulting in decreased ordering lumps resulting in a dampening of the “Bullwhip Effect”.
- *Are you the victim of false orders and subsequent cancellations?* Two common causes for false orders are:
 1. The customer does not have confidence in your ability to rapidly and reliably supply product. In other words, your customers do not believe you will ship their orders on-time. As a result, customers will hedge by placing higher than projected demand on the manufacturer in the hope they will receive what they need, when they need it and then, when product availability is considered satisfactory, cancel the balance of future orders. These “false” orders often result in excess purchased material in inventory and in the pipeline as well as underutilized capacity.
 2. Sales personnel who will not meet their quota for a time period that would accelerate commissions and qualify them for a bonus, will often have added or change orders placed by a cooperative customer to achieve quota. The customer in turn may later cancel, or return, part or all of the order, as well as expect some concessions and/or special treatment from the salesperson in the future for providing the “service”.
- *Do transportation incentives cause demand lumps?* Transportation discount incentives for volume orders will often cause customers to accumulate orders and then release lumps of demand. After thoroughly examining the impact that this incented distortion has on hampering your own supply chain planning capabilities, and the resultant associated costs, it may be time to examine your freight incentive practices.
- *Have you developed partnerships based on trust with your customers?* With distributors often leery of a manufacturer’s ultimate intentions, especially with the

possibility the distributor will be removed from the sales chain, and, the manufacturer selling directly to end-users, there is no desire to frequently share customer volumes, demand patterns and inventory positions. On the other hand, this mistrust contributes to demand oscillations, stockouts, higher inventories and lost sales for the manufacturer and distributor. Developing a workable and effective solution is essential.

For whatever individual or combination of causes that create demand surges and oscillations, these lumps of demand explode out through your supplier network and their supplier network often extending leadtimes due to unexpected, and often false, increases in demand. Then, the supplier network may not be able to get raw material in a short enough lead time which reverses in the supply chain as it causes theirs and your delivery lead time to lengthen.

Then, the product manufacturer tells their distributors who tell their dealers that leadtimes have increased due to supply problems. The “Bullwhip Effect” is now traveling the other way - - down the supply chain. And, it may get worse with another “Bullwhip Effect” going up the chain again as longer lead times cause customer’s replenishment planning systems to “kick-out” new, and very often, false demand for future supply coverage. This new surge in demand often causes decisions to be made that will increase capacity unnecessarily as the demand ultimately dissipates.

As unnecessary demand variability complicates the supply chain planning and execution processes the following undesirable effects increase in their severity as they negatively impact operating performance.

- Schedule variability increases
- Capacity is overloaded and/or under-loaded
- Cycle times lengthen
- Working and safety stock inventories increase
- Overall costs increase
- Customer service levels decrease
- Sales and profits decrease

Cracking the “Bullwhip Effect”

Essential to minimizing the “Bullwhip Effect” is to first, specifically understand what drives customer demand planning and inventory consumption as they are the triggers for replenishment order quantities at various points in the supply chain. The most effective process for smoothing out the oscillations of the “Bullwhip Effect” will be customers and

suppliers understanding what drives demand and supply patterns and then, collaboratively working to improve information quality and compressing cycle times throughout the entire process.

More than likely, you will find opportunities for improvement by adopting some or all of the following actions, among others, to minimize the “Bullwhip Effect” and increase business performance.

- Minimize the cycle time in receiving projected and actual demand information.
- Establish the monitoring of actual demand for product to as near a real time basis as possible.
- Understand product demand patterns at each stage of the supply chain.
- Increase the frequency and quality of collaboration through shared demand information.
- Minimize or eliminate information queues that create information flow delays.
- Eliminate inventory replenishment methods that launch demand lumps into the supply chain.
- Eliminate incentives for customers that directly cause demand accumulation and order staging prior to a replenishment request, such as volume transportation discounts.
- Minimize incentivized promotions that will cause customers to delay orders and thereby interrupt smoother ordering patterns.
- Offer your products at consistently good prices to minimize buying surges brought on by temporary promotional discounts.
- Identify, and preferably, eliminate the cause of customer order reductions or cancellations.
- Provide vendor-managed inventory (VMI) services by collaboratively planning inventory needs with the customer to projected end-user demand then, monitor actual demand to fine tune the actual VMI levels. (Note: VMI can increase sales and profits especially in industries where buyers can go to alternative sources if you or your distributor stock-out.)

Even the most modern of Supply Chain Management systems, with all the bells and whistles, cannot automatically stop the “Bullwhip Effect”. It’s a demand management process problem with very broad implications because it often encompasses policies, measurements systems, practices and, in some cases, the very core of an organization’s value and belief

system. However, the degree of negative effect it can have on sales, marketshare, cost and profits can be enormous. Certainly, a tough but very necessary problem to solve.

Biography

R. Michael Donovan is a management consultant and partner in Supply Chain Performance Partners in Framingham, Massachusetts. His firm specializes in Supply Chain Management, Cycle Time and Inventory Reduction, ERP Performance Improvement, Manufacturing Strategy, Flow Manufacturing and Strategic Planning.

Mike's 25 plus year consulting career has included over 1000 engagements with manufacturers in the United States, Canada, Mexico, Asia and Europe. In addition to consulting, Mike has experience as Vice President of Operations and Materials Manager for a multi-plant company.

A frequent speaker and seminar leader for business groups, he has been quoted or published in over 200 different publications and is a columnist for Mid Range Enterprise Magazine. His latest book is *Strengthening Manufacturing's Weak Links*. He can be reached at (508)788-1100. Readers may obtain other educational material through the web-site <http://www.rmdonovan.com>