

LEAN THINKING IN WHOLESALE DISTRIBUTION...



You Know Your Supply Chain Needs To Be Updated When...

The Business Intelligence & Supply Chain Management Challenge: Create Profit, Service Level & Working Capital Improvement

A Thought Leadership White Paper

By

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Introduction

Fashions change, seasons change, and so does your supply chain. So, when was the last time you looked at your entire supply chain process to determine if it is keeping up with the times? Recent supply chain management developments have dramatically changed how your business can compete; *supply chain versus supply chain*. Yes, your supply chain can be a competitive advantage and a source of business value to your company. You know your supply chain management needs to be updated when...well; it actually can be a little bit different for every company. But, if you have not examined your inventory and supply chain “drivers”, in some time, and have not fully recognized the value of new “business intelligence” applications, then maybe it’s time to take a look at how some new innovations can impact profit, service level and working capital improvement. Fortunately, even small companies can look and act big, challenging their thinking about their supply chains and implementing practical and realistic solutions.

Enter “Lean Thinking”

If you happen to be an advocate of “lean thinking”, then this discussion may well be right up your alley. If you are new to “lean thinking” (no, it’s not some new weight loss program, or does LEAN mean “Leave Everything Alone Now”), then this discussion may provide a better perspective on how at least one aspect of this philosophy, with a pragmatic approach, can be

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incorporated into your organization, strategically and tactically, in a new and different way. It may challenge some of the wide-spread beliefs that exist today – even those that you may possess - and by the way, applies not only to your company, but to your customers and suppliers as well - because aren't you all linked?

A Lean Thinking two (2) prong approach...

First; A Business Intelligence Approach

Inventory Optimization (“IO”) is a hot area of supply chain discussion; although at “first thought” some immediately think of it as just another strategy or goal.

If your goal is to have the right inventory - at the right place - at the right time - at some level you are trying to “optimize” your inventory investment. Of course, no one I know intentionally orders too much or too little inventory as a strategy. But sometimes you have to find some other unique, new and different, ways to conserve working capital - and maybe even gain some other benefits too!

You may be familiar with the pricing and gross margin analytical software available today that allows you drill-down into how you price products, customers, etc., develop “what if” scenarios, see the potential results of your pricing policy decisions, and their the impact on the goal of maximizing gross margin.

If so, consider this; *“what margin is to pricing optimization, service levels is to inventory optimization”*. Inventory Optimization is a subset of the broader analytics – business intelligence - which in the process of collecting, storing, and analyzing data enables more intelligent supply chain decisions to unlock working capital while maintaining or improving your desired service levels. **“IO” views inventory as a strategic asset - not as a problem.**

“IO” software, applied to your inventory and supply chain decisions, performs a rigorous analysis to your inventory, then uses this analysis - the business intelligence you obtain - to identify specific changes to inventory stocking and replenishment processes and decisions, changes to the distribution network, and **correlate inventory investments to product revenue and profit generation opportunities.**

I recently heard “IO” defined and then stated in a few different ways that seem to make a lot of sense.

“The minimization of costs and the maximization of revenue and profits, through improved visibility and stocking strategies”.

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“For multi-location distribution networks (known as multi-echelon), the inventory level in one location can affect the ability to achieve inventory and service level goals in another. For instance, if you set inventory levels at location “A” to “X”, what do you need to set inventory levels at location “B” to achieve “Y”, when “B” is the source of inventory for “A”? The only way to correctly answer this question is to determine the total inventory for all locations simultaneously, taking into account all the various dependencies and sources of variability within the distribution network. In other words; identifying smarter inventory replenishment policies and holding rules”.

Simply; “aligning your company’s inventory with your go-to-market strategy”

So, that’s what the Inventory Optimization approach, and the software that is available is purported to address; deliver desired/user specified customer service levels at **minimum total distribution network inventory cost**, and allocate inventory most strategically among the stocking locations.

The word “*simultaneously*” is a key word, considering the impact that inventories have at any given level, or echelon, i.e.; on upstream locations (a distribution center or your supplier) and downstream locations (your stocking branches). Advocates of “IO” say; “look at the total distribution network”, whereas traditional ERP systems often just look at the inventory requirements at each location or echelon separately – in a “transactional based look”.

So, “IO” is an interesting proposition considering that there are so many companies, out there, that don’t even seem to be able to find the time to review and/or update basic safety stock decisions (lots of money tied up there!), review their demand and lead-time supply variability on a regular basis, or are still “ball-parking” their inventory decisions related to paying freight or hedging against commodity price increases - **and what the cost versus inventory trade-offs really are.**

If we accept the premise that the best you can do now is to make these “non-simultaneous” decisions, then maybe a more “scientific” approach does has merit, one that enhances and leverages your ERP investment - but doesn’t have to replace your ERP system.



The Rationale

Now, there are some companies that believe that they may have already “optimized” inventory through their ERP system’s applications capabilities - as far as those capabilities allow. They are now looking for tools that manage safety stocks, lead times, and replenishment/re-order

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frequency decisions; focusing on attaining desired service level objectives, in a more intelligent manner, while recognizing that less inventory does not have to translate into lower service levels.

Additionally, through the “IO” analytics, they are looking to drill-down to specifics and discover a lot of things they didn’t know before. In particular, if you need to provide differing service levels, by product or group or location, or when adding a branch or two changes the game. Or different markets require different approaches, etc. – all this serves to increase the complexity of supply chain management decisions.

In today’s environment, it’s not enough to just monitor inventory control efforts by running reports from your computer system to measure inventory turns. Why? These actions are not directly concerned with transforming inventory management into **a profit and service level enhancer**. This is where the inventory optimization concept enters the picture.

So your stocking strategies become very important, particularly if you relate it to your business objectives, to specific item/product attributes (i.e.: fast movers, slow movers, new products, critical products, etc.), demand expectations, and supply characteristics.

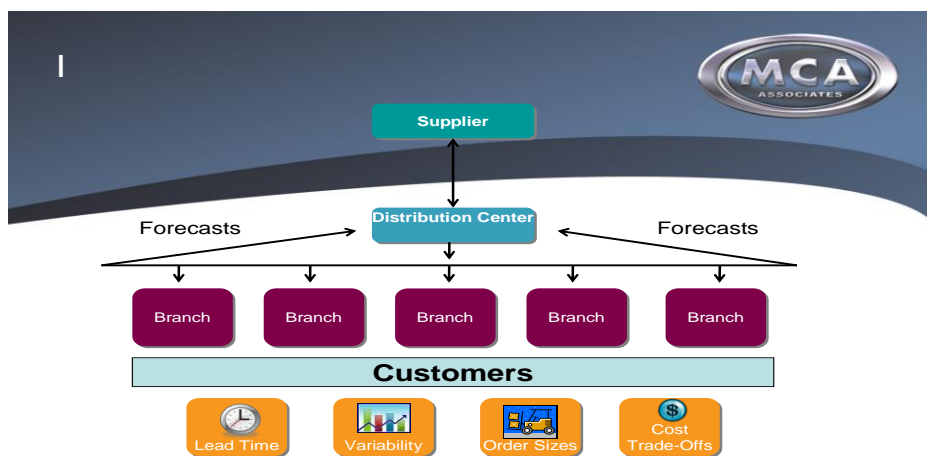


Figure 1

The Inventory Drivers

The challenge of Inventory Optimization can be even more daunting in multi-echelon distribution networks (Figure 1), where you have product stored at a central point (a Distribution Center or Hub) and the DC is the internal supply to your branches (the customer-facing locations). We know this as the “hub and spoke” distribution model.

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The nuts and bolts of inventory optimization involve carefully setting and monitoring the specific “drivers” of inventory management, that are interrelated, and use information gathered from each other. An analysis of these drivers, and visibility into them, can provide answers to “what if” questions; as well as provide the diagnostic tool into inventory rules, metrics and measurements. These “drivers” are:

- Desired Service Levels
- Forecasting – I’ll just call it “Flowcasting” for now (more on this later)
- Replenishment Order Frequency
- Lead Time

Consider **desired service level**. This involves setting and monitoring the desired service level performance of the inventory itself, down to each SKU. Most ERP systems, alone, don’t provide service level analysis and reporting. Rather, you must peer into demand history, demand variation, GMROI and lost sales. So by using “IO” and analyzing these factors, you can positively impact your service levels and gain an edge over your competitors by targeting inventory levels - to meet actual market needs.

Next, **demand forecasting**; this requires that you have an understanding that goes above and beyond simply having knowledge of recent sales history. It requires an understanding of “**demand-pull**” and “**continuous flow**” concepts (“flowcasting”), and their use, to develop appropriate **target inventory levels**, for each and every product. Yes, it is closely related to service level.

Replenishment order frequency is another critical aspect of inventory optimization.

Replenishment is not just reordering. It’s not just about the cost to generate a purchase order, but rather “**how much we order - each time we order**”. **That’s where each order costs your company money**. Supply chain professionals often make the mistake of ordering to sustain perceived service levels or for other perceived benefits, such as free freight. But if service level and continuous flow (flowcasting) can be utilized correctly, there is no need to be in the dark. More accurately pinpointing an optimum or best order frequency can, by itself, account for significant inventory reductions and service level enhancement. Is this the right time to order?

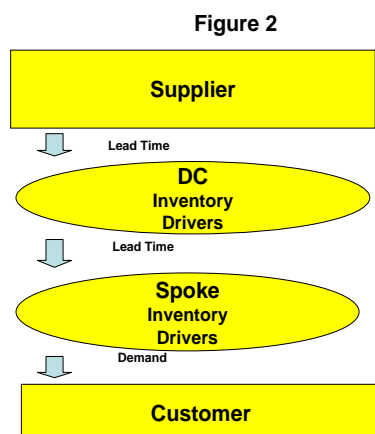
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Do I have all the information I need? By arming themselves with the answers to these questions, supply chain personnel are in a better position to make the most of replenishment order frequency decisions.

Next, is **lead-time**; Anticipating lead-time with accuracy goes beyond simply determining a supplier's lead-time from past averages. It not only requires an in-depth assessment of the supplier's overall performance, but also being able to understand its impact on all locations, within the distribution network, to minimize or eliminate those self-defeating practices such as having to "over order" or "over transfer" - in an attempt to compensate for variations in supplier performance.

The Multi-Echelon Distribution Network and the Need for Inventory Optimization



A "hub & spoke" distribution network can have some major pitfalls; typically a lack of true network optimization, because stocking and replenishment strategies are applied to one echelon without regard to the other(s). Another pitfall is the reliance on demand forecasting and its inherent variability. There are some potential negative consequences:

- Excess inventory in the form of redundant safety stocks (at both Hub and Spoke)

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- Stock-outs occur, at a Spoke, even though adequate inventory exists in the distribution network, while the service between DC and Spoke is believed to be acceptable.
- There may be a minimal relationship between what you order and the actual demand you are experiencing, due to demand variability.

In the typical hub and spoke, replenishment decisions between the DC and its external supplier use order strategies that depend on its internal cost factors such as carrying inventory, but in particular, the supplier's ordering constraints; pricing, discounts, freight, rebates, etc. So order replenishment quantities depend on a combination of internal and external factors.

- **Demand** – the rate of product flow out of the DC
- **Demand Variation** – fluctuation in the rate of product flow out of the DC, from one period to the next
- **Lead Time** – time between ordering product and having it available to fill demand
- **Lead Time Variation** – fluctuation of the lead time, from replenishment order, to replenishment order
- **Replenishment Review Frequency** – the frequency that the DC's inventory position is checked to see if a new replenishment order is needed
- **Replenishment Order Strategy** – the DC's supply objective, a trade-off between carrying inventory, transportation, and purchase cost
- **Service Level Goal** – the DC's service commitment to its internal and its own external end-use customers
- **Inventory Position** – the DC's available stock (on-hand, on-order, backorders, commitments)

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The relationship between the DC and its spokes use order strategies that depend on the spoke's own demand forecast, order frequencies (related to stock-transfer frequency), safety stock protection and other ordering rules that may have a bearing on the spoke's replenishment order quantities.

Some issues emerge here:

- What is the appropriate “measure of demand” signaled to the DC, from the spoke, and how should it be “forecast”?
- How do you account for “demand variation”?
- How does the effect of larger than necessary replenishment orders from the supplier to the DC affect the overall supply chain strategy?
- What is the optimal service level goal between the DC and its “customers” – the spokes?
- How do you factor in the spoke's inventory position into the DC's replenishment decisions?
- How do replenishment review frequency and the service level goals at the DC affect inventory and service levels at the spoke?
- When faced with a limited supply of product, at the DC, how is product allocated to the spoke?
- Should the spoke expect the same service level from the DC, when the DC is servicing its own “end use customers”?
- Does the DC's external supplier's lead time and lead time variation play a role in the spoke's replenishment strategy?

Yes, lots of questions, but there's a reason!

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Going back to Figure 1, there is often a “split” in replenishment approaches, kind of like a sequential approach – one for the DC, and one for the Spoke. This poses problems:

- **Lack of visibility up the demand chain** – When a Spoke seeks to replenish itself, it’s “blind” to suppliers beyond the DC. The Spoke ignores any lead-times other than its own – the lead time from the DC. The Spoke may also assume that the DC will completely fill its replenishment orders each and every time. And depending on your ERP system, the Spoke may not have any visibility into the DC’s inventory balances.
- **Lack of visibility down the demand chain** – Similar to the case above, when the DC seeks to replenish itself, it may be oblivious to customer demands beyond those of individual Spokes and/or have no visibility into the Spoke’s inventory balances.
- **Demand distortion** – Because the DC and Spoke create independent demand forecasts (based on their own immediate “customer’s” demands), distortions in demand and peaks and valleys often result in too much inventory at the DC.
- **Total distribution network costs** – If one or more of the Spoke’s inventory drivers are modified, the cost implications may be readily apparent at the Spoke, but not readily visible to the DC. The impact becomes strictly focused on one single echelon.
- **No linkage between safety stocks** – The DC and each Spoke, protect themselves independently, so any desire to optimally balance inventory is made more problematic.

So overall, this “lack of cohesiveness” is caused by **independent decisions** as to how inventory will be managed, either at the DC - or Spoke.

Second; A Different Multi-Echelon Approach – Push vs. Pull

If you have a hub and spoke arrangement as your primary distribution network, then your primary objective should be to **minimize the total inventory across the distribution network, while meeting your desired service levels to end customers**. So a single optimization exercise

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would seem to be an excellent approach, meaning you may want to investigate “IO” as a solution.

Our White Paper – *“Lean Thinking in Wholesale Distribution Supply Chains – Do You Pull or Push?”* available at www.mcaassociates.com) describes how wholesale-distributors can begin to “pull” inventory through the supply chain, rather than “push”. In conjunction with “IO”, we could then:

- Use as an “inventory driver” - the customer’s “demand signal” (the buy signal) to drive replenishment, rather than the traditional “demand forecasts” - at all echelons
- Synchronize replenishment order strategies by taking into consideration all the other “inventory drivers” we’ve discussed too, i.e.; lead-time, desired service levels, replenishment order frequency. Then you could intelligently examine the alternatives and do some “what-if?” exercises.

Why are these “inventory drivers” so important? Remember this picture in your “mind’s eye”!

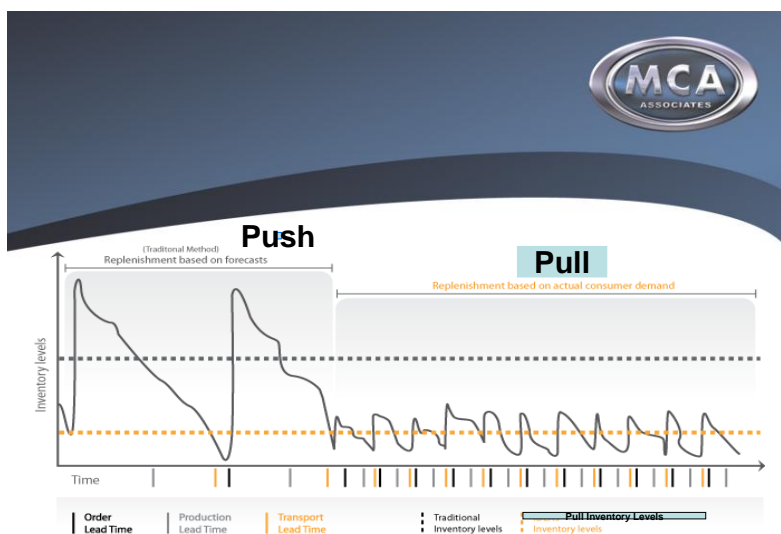


Figure 3

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Immediately, in Figure 3, you probably recognize that on the right side, the **inventory peaks are - lower**, the **inventory lows - are higher**, and the **period between replenishment cycles - is shorter**.

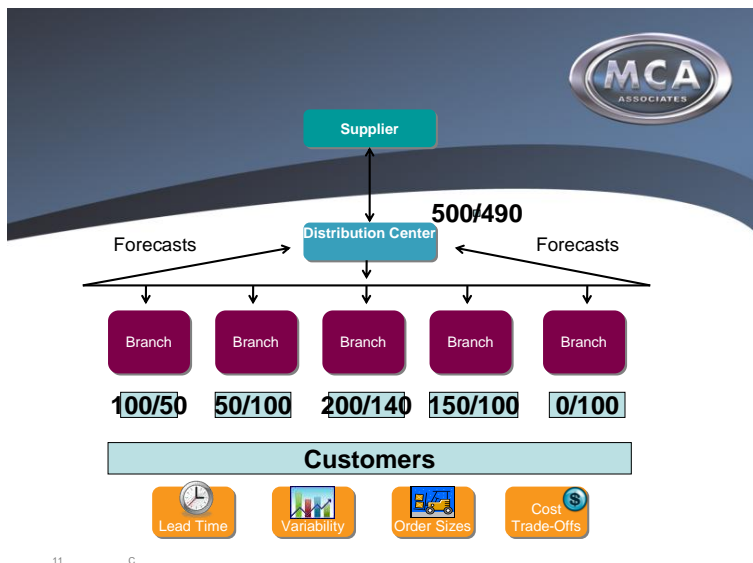


Figure 4

So just maybe there are some “facts of life” to consider - and we should challenge them!

Refer to Figure 4, above. The forecast (the first number) and the actual demand (the second number) shows significant variance at each “spoke”, although at the DC level, the variance is more acceptable. Now, consider this statement; **the narrower the aggregation, the worse the answer becomes**. In other words, the question of how much you will “consume” of a product, for instance from the distribution center, will typically provide a better answer to the question; “how much product will you sell from one of the spokes?” **It’s just a statistical truth!**

So you may tend to address this “truth” by over compensating with inventory, particularly at the spoke - and **just where the forecast variation is highest**. You do this with safety stock, and of course risk, from a service level perspective, the misallocation of inventory (wrong place – wrong time).

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So there is a tendency to “push” inventory through-out the supply chain, based on the specific method of calculating forecast. Demand variability is often not recognized quickly or even communicated to the “source of supply”. So all the “players” in the supply chain are often challenged by a “whip-saw” effect that might look something like this (Figure 5):

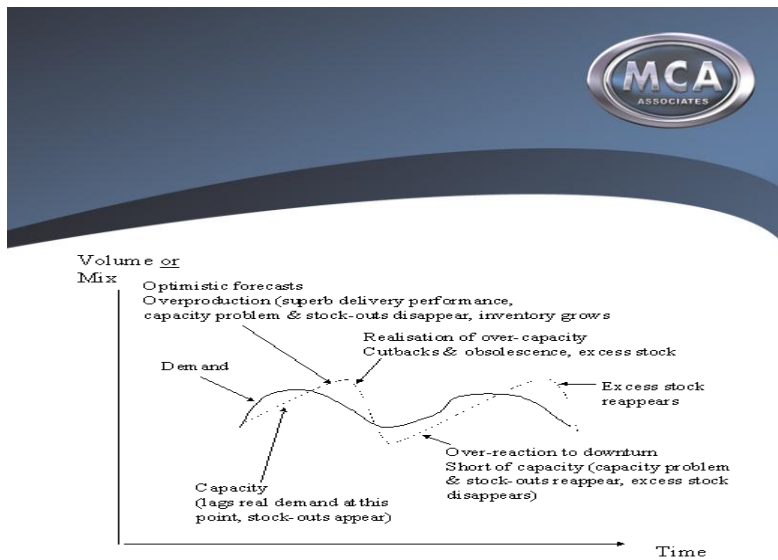


Figure 5

If we just remember that forecasts are not “actual consumption”, then many of the “dilemmas” (Figure 6) we often face could be eliminated.....

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Figure 6

.....having to pay for inventory, moving it, storing it, and counting it. Surely it's not an example of "lean thinking", even if we most simply define lean as "eliminating waste" in your processes.

So, this gets us to a "pull" approach alternative. "Pull" is similar to "Just-In-Time" or maybe you've heard the expression - "Kanban" (no, it's not a new form of martial arts). Simply stated; **as product is sold, a replacement is "pulled" through the supply chain.** Now we are doing it based on real demand – actual consumption – the **"CUSTOMER'S BUY SIGNAL"**.

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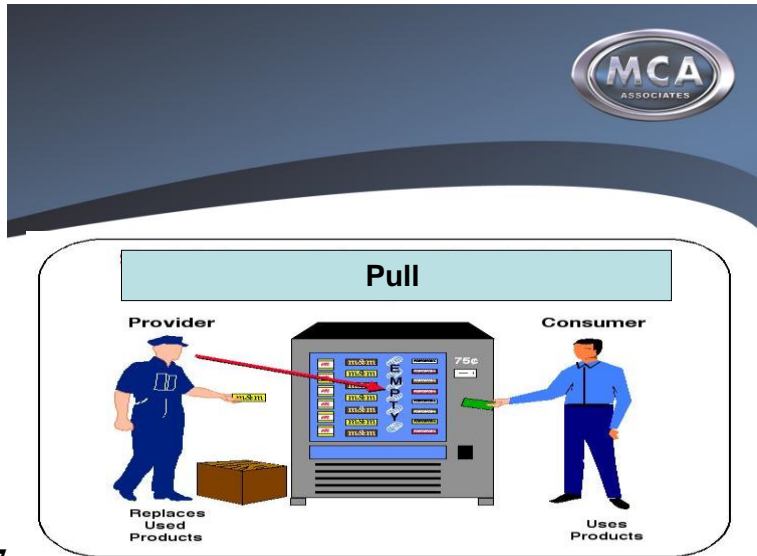


Figure 7

We all use these buy signals in our everyday life (Figure 7). For instance, as an additional example, consider the gas gage in your automobile (Figure 8):

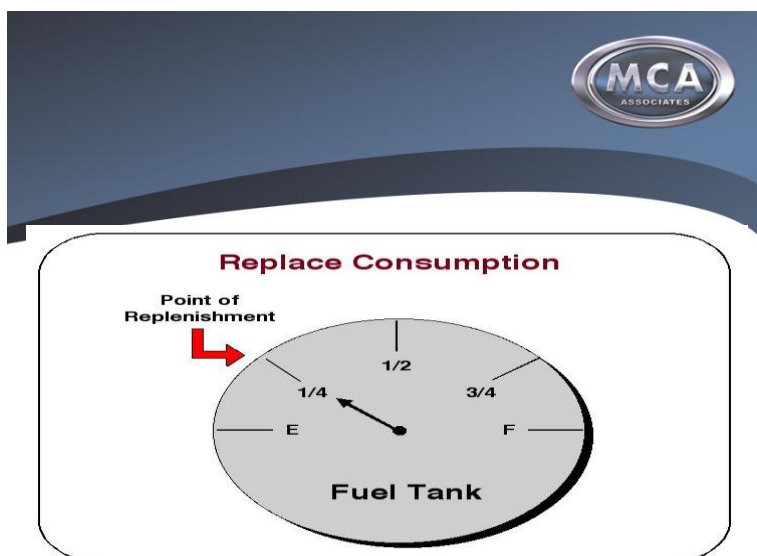


Figure 8

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Without this signal, you would have to guess at your usage of fuel, possibly finding yourself running out of gas, or wasting time filling up the tank too often. The gas gage tells you that although some gas may be left in the tank, what the actual consumption is, and the urgency of replenishment need.

So maybe you already see the difference between “push” and “pull”. But, let me tell you right up front; that what we commonly experience with “PULL” is smaller replenishment order sizes, which means – increased product delivery frequency from the source of supply (remember: replenishment order frequency is one of our “inventory drivers”). I know what you’re thinking! “That’s an anathema in many supply chain relationships”. But, hold your concern for a moment.

The Basic Pull Principles

Consider these basic principles:

1. Aggregate inventory at the DC/Hub

Why? Remember I said that demand is more accurate at this particular level and will improve the timing and the order quantity accuracy of the products you order from your suppliers.

2. “Pull” inventory to the Spokes

Why? Replenish the spokes based on the customer’s “buy signal” as opposed to pushing, based on forecasts and its inherent variability.

3. Replenish inventory as frequently as possible – foster a “continuous flow”


Why? It shortens re-order lead-times, in other words, a shorter time between replenishment orders (one of our “inventory drivers”). This dampens the variability in demand and reduces safety stock needs.

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4. Develop and maintain “target inventory levels”

Target inventory levels can be calculated in a number of ways. The specific calculation methods and its use are covered in our previously noted white paper. Basically, target inventory levels are the quantity of inventory you “shoot for” in the pipeline. Why do you need target inventory levels? They provide the “buffer” inventory to cover demand and the replenishment lead-time as well as protecting against shortages. “Target inventory level penetration” (“TIL”) **can be measured** to provide a means to monitor how well target inventory levels are being managed.

 For instance, you could split the “TIL”, let’s say for a product, into three (3) zones; **green**, **yellow**, and **red** – just like a traffic light - and then set rules as to what constitutes “target inventory level penetration”.

Green – less than 33% “TIL” penetration

Yellow – between 33% and 67% “TIL” penetration

Red – between 67% and 100% “TIL” penetration

How do you use this? Well, too many products in the **green zone** may mean inventories are too high relative to “actual customer consumption”. On the other side, too many products in the **red zone** may mean you have problems with inventory replenishment timing or some very unusual customer consumption.

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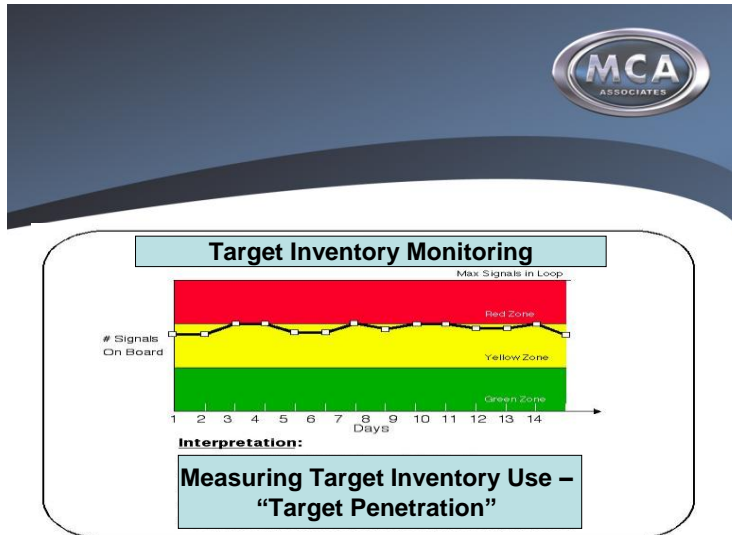


Figure 9

Figure 9, above, illustrates how you can use target inventory level penetration to measure and visually monitor “TIL” use. This could even be used as “signals” to your source of supply (DC or supplier) as to what the priority and urgency of product need is.

Additionally, these graphical representations could be provided at most any level; company wide, location level, A-B-C stratification level, etc. You could even measure the “time in a zone” and/or the “number of products in a zone”. Regardless, it now becomes “actionable”.

5. Develop “new” relationships with suppliers that incorporate a “pull philosophy”

Why? It’s surely not a subject I saved, until last, because it’s the easiest! In fact, I think so many have spoken to this issue of “supply partner collaboration”, that it has reached the point where the term has nearly lost its meaning.

The truth is; that suppliers who have not adopted a “lean thinking philosophy” have a mass production mindset (ask your suppliers if they are “lean”). It’s kind of a “disconnected functional

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“silo”, one that focuses on their own “local optimization”. In other words, they view the key to controlling or reducing costs as a reason to produce in large batches; spreading their fixed costs over a large population of product – reducing unit costs – as well as using this approach to protect themselves from forecast error. This drives an “economy of scale model” and that’s how they get measured; produce large batches, potentially consuming their capacity with product that may not be immediately needed.

So whereas a Supply Chain Manager may get measured by “what’s the purchase cost achieved”, including transportation, your suppliers get measured by their unit cost of manufacturing. What gets forgotten sometimes is the impact; surpluses of inventory beyond the immediate need. Maybe even shortages of product; because everyone is too busy either buying or manufacturing something else. **These are goods reasons to encourage your suppliers to think differently also.**

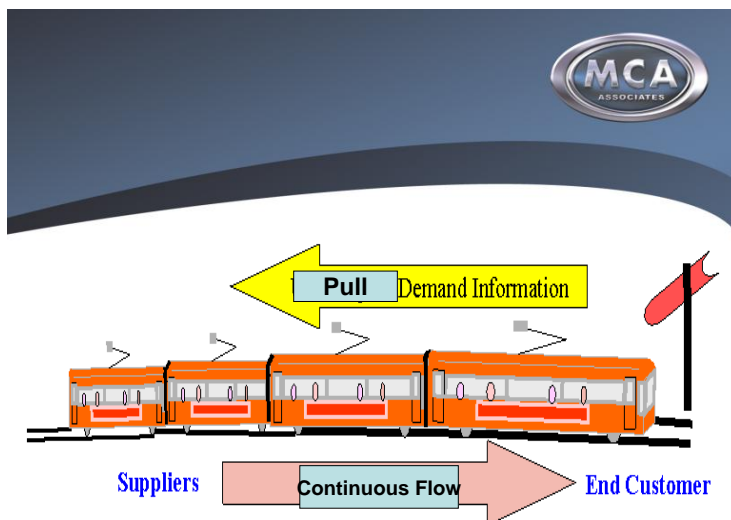


Figure 10

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So what if you could apply these same “pull principles” with your suppliers so that they are producing what their customer (you) need, rather than anticipating (forecasting) what they think you’ll need - and have better control over their production capacity too (Figure 10)?

I think there is a real opportunity to get suppliers to think differently, which might lead to more frequent re-supply to the whole supply chain, **increasing the velocity of product through-out the supply chain**, reducing their forecast variation, and reducing their lead-times.

This “new collaboration” approach should begin around the discussion of “continuous flow” and becoming more synchronous. So what if you shared your “buy signals” with your suppliers; fostering the opportunity to share data?

The possibility of a “direct data connection” with suppliers to communicate these buy signals is intriguing; because there can be aligned interests – and that could be a positive development.

You could even share your target inventory level penetration monitoring with them, or maybe they could even generate their own, based on their inventory position (Figure 11).

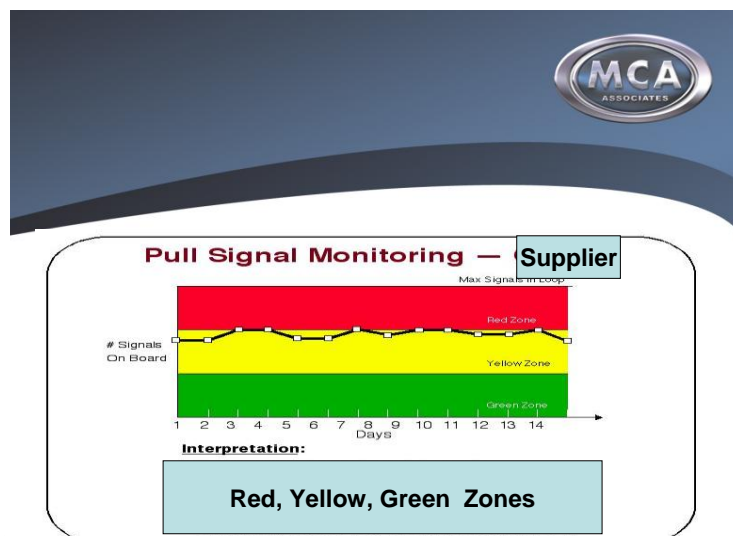


Figure 11

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The Pull Model In A Different Light

So now, look at this “pull model” in a completely different light (Figure 12); more as a supply chain system process, an “engine for supply chain management”, which incorporates not only inventory optimization - optimizing the inventory drivers - **but advancing significant new principles in lean supply chain management** – that exploit the constraints you face.

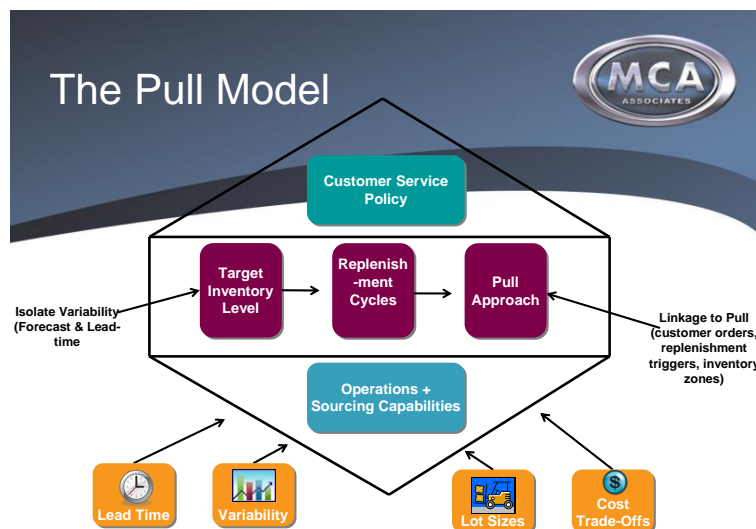


Figure 12



A Change In Thinking & A Call To Action



Finally, committing an organization to realizing the benefits of inventory optimization and “pull-based” lean supply chains will require a change in philosophy; a real change in thinking. It also requires a “solution”, a “tool”, to use, to realize that objective, making “Inventory Optimization” and “Pull Supply Chain Models”, **together**, something that you should be looking at as a source of real supply chain management business value to your company - as well as a competitive advantage – **supply chain vs. supply chain.**

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Distribution focused companies, I believe, must view inventory and supply chain management as an untapped **profit and service level enhancer, as well as a cash saver**. By making these concepts a reality, you can truly reduce your total supply chain costs, generate additional capital, increase service levels, and finally attain that elusive “supplier collaboration” objective - in a meaningful way. **This is your call to action!**

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