

From Make-To-Stock To Make-To-Demand – A Front Office Transformation

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Abstract

Embracing Lean principles requires many improvements on the shop floor to eliminate waste in setup times, inventories, and handling. However, major stumbling blocks for Lean can be renovating sales, planning and service “front office” processes. We explore the dynamics of customer demand and performance measures in order to show how the front office must be transformed in parallel with the shop floor. The issues in moving from traditional make to stock to pull based production, are used to demonstrate the ‘up front’ process and organization changes required for Lean!

1. Introduction

Lean Manufacturing conjures up images of eliminating waste throughout business processes and production operations. For most executives these images reinforce the perspective that Lean is a manufacturing thing, with little relationship to ‘front office’ processes and activities. If only this could be true! How nice it would be to go after Lean benefits and not worry about or be constrained by customer service or other cross functional process implications. The objective of this paper is to provide a prospective and solutions to the main front office requirements for Lean success.

We start by exploring approaches to meet the critical elements of demand and performance measures for Lean Manufacturing. Demand is the key starting point, because customer service needs and order variability are frequently seen as the limiting factors for pull systems and the elimination of inventory. If we cannot smooth out and stabilize how our customers order, then we cannot implement Lean; or that is the typical thinking. Fortunately, Lean Manufacturing concepts are built on rigorous analysis, break through thinking and changing the rules of the game to eliminate waste. So what we need to do is take the demand and customer service issues and create workable solutions: some maybe short term oriented, while others develop new systematic longer term approaches to the market.

Performance measures are then explored to sustain the changes necessary in the front office. We may hear about many performance measure changes to move away from labor efficiency and standard cost models, but those are just the beginning. Real change in Sales, Marketing, Customer Service and other functions necessitates rewarding the new models for how we service our customer base by leveraging the competitive advantages obtained from Lean. We need to turn the market over and stop attempting to seek better forecasts and order commitments as the approach to manufacturing effectiveness. It is rarely in the customer’s or consumer’s best interest to ‘lock down’ future needs, this is limiting and what we need to do is find ways be more flexible and out maneuver the competition! Now how do we reward for these new behaviors?

Overall, we provide the tools and thought processes to leverage the great work being done on the shop floor into the marketplace. Lean Manufacturing should become the competitive weapon of choice, not just another productivity enhancement program. By working through the tough customer service issues and opportunities, companies can dramatically transform Lean from a ‘Manufacturing thing’ into a pervasive company wide elimination of waste.

2. A Common Front Office View

Sales and customer service professionals focus on sales and profitability of the important customers, products and markets. They are the revenue source and growth engine of the company. With this revenue and growth focus, their objectives typically are measured in dollars sold, collected and gross margins. Depending on how the company is organized, there may be product line, geographical or industry/channel measures as well, but the bottom line tends to be dollars. And if your company is public, then the pressure for quarterly sales numbers can be astronomical.

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Producing sales and growth requires balancing time spent maintaining existing accounts, selling new accounts and introducing new products. Putting more into the pipeline, would be one way to think about it. So when Sales looks at the supply chain, they have a more revenue oriented view of the world, as shown in Figure 1. Sales ‘pushes’ orders into the front end and hopefully, customers are satisfied with what comes out the other end. They should be focused on increasing the customer list, expanding sales to existing customers and introducing new products.

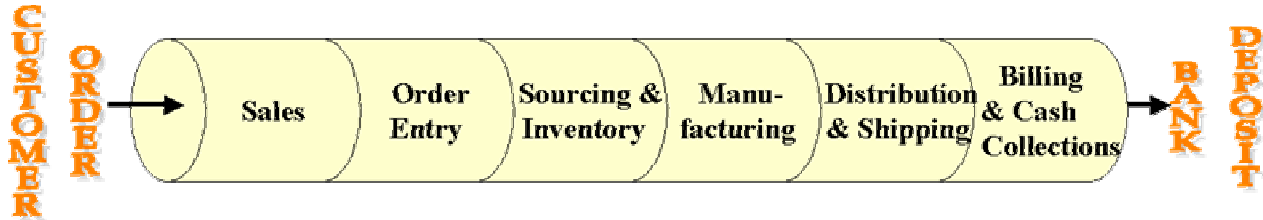


Figure 1. The Revenue Pipeline – Order-To-Cash

The revenue pipeline depicts the series of activities that must come together to form a smooth chain of events. Each step has historically been considered a hand-off to another functional area, which can create an opportunity for delays, mistakes, or disruption. Given our Lean Manufacturing mindset for eliminating waste, we should strive to smooth flows, link demand to use and eliminate buffers. These steps sound simple, but in actuality are very difficult to accomplish due to:

1. Competitive transaction nature of some sales processes. We may only receive orders based on decisions for each order placed, possibly as a request of price negotiations or other competitive forces;
2. Customers decide how much and when to order based on a variety of inputs, but could include ERP based lot sizing logic, full truckload quantities, or even that the customer’s planning systems do not work;
3. Sales introduces new pricing, creates special promotions or incentives to increase orders (possibly at the end of the quarter?); month or quarter
4. Internal processes may create some variation due to how orders are processed (possibly only released once per day, etc.); or
5. The marketplace may have lumpy demand, with consumption driven by unpredictable weather or other related changes.

Since Sales is driven by volume, price and gross margin sold, these disruptions in the pipeline are not a major focus. But the question is, should they be? When our entire focus in Manufacturing is smooth flow and pull production, what do we need from Sales? Or more importantly, how does Lean benefit our customers sufficiently to motivate Sales to support the changes necessary? We are now vying for the time and attention of Sales and any activities taking time away from new revenue streams could be a distraction. Even serving existing accounts may be a low priority on some sales executive’s lists, except when something goes wrong. Due to the heavy emphasis on growth of new accounts and products, it may not ‘pay’ for sales to work hard with customers who order regularly and pay their bills but do not represent large opportunities for increased sales or profits.

So what is the problem with the revenue chain? Quite simply, inventory. Inventory is the shield to protect from these market dynamics and as well as unreliability in the replenishment process, the revenue pipeline is actually more like an old fashion fire bucket brigade than a smooth flowing pipeline. Customer orders and work in process seems to slosh around and back and forth until it finally reaches its destination. Not the way to run a railroad. Or a supply chain.

3. A Supply Chain View

As Lean Manufacturing practices are embraced and instituted, the disjoint activities should pull together into a tight, integrated supply chain. While this may sound like nirvana, it is a transformation from to successively more order and less chaos in the supply chain. The emphasis must be on the direction or trend of change rather than an absolute view of no problems or surprises. This transformation requires a parallel effort in the front office that leverages the results of Lean on the shop floor, but has critical implications to how we manage up front.

3.1 Core Concepts

Many Lean practitioners are familiar with the core lean practices which eliminate waste. While each organization that embraces Lean may develop their own slightly tailored approach, we propose the following core concepts to guide the front office transformation:

- Attain cost leadership
- Focus on value added activities/eliminate non value added work
- Increase customer responsiveness
- Use simplification as a methodology for transformation
- Simplify, automate and integrate customer replenishment

The trick is not so much in understanding the principles, but in successfully implementing them. Working with customers on these principles means creating win-win relationships which meet customer needs. The win externally with customers is greater responsiveness and cost competitiveness. This is achieved internally with Lean reductions in cycle times, because time drives the cost structure and complexity of the supply chain, as seen in Figure 2.

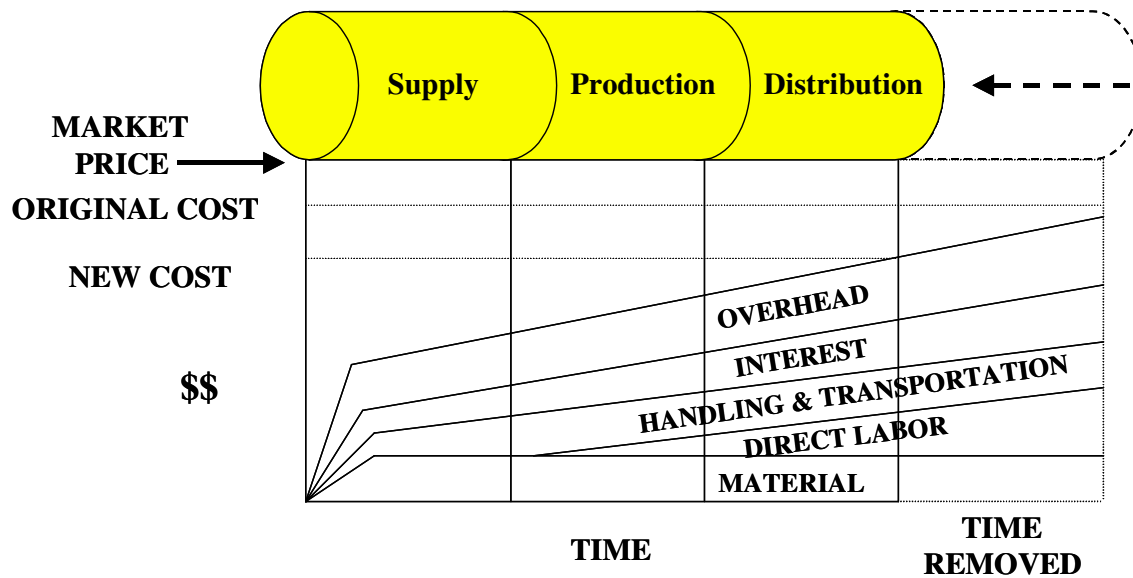


Figure 2. Time Drives Lean Success

This view is in contrast to traditional cost accounting methods, it is also a necessary paradigm shift for the cultural transformation to Lean.

3.2 Supply Chain Implications

Our front office processes must address implications of these core concepts to successfully create internal and external win-wins:

3.2.1 Service Policies

Many companies do not have written policies defining customer service expectations. While a formal, written policy is clearly not the point, a well understood and consistent set of expectations is. The customer may be king, but it is very difficult to plan for every eventuality, so either all of our planning takes the worst case scenario into account (therefore over planning) or we are not sure what to expect. Most customers want to know what they can expect and then demand that you consistently deliver on it, they may not always demand the unreasonable.

An example is lead time, order quantities and delivery dates. Can a relatively small volume customer place an extraordinarily large order with no notice and demand the same short lead-time as for a typical small replenishment quantity? If so, are your inventory levels so bloated you can accommodate this? Or do you rob from Peter to pay Paul? Is either case a reasonable way to operate?

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In other cases, companies may be proud that every customer receives the same excellent level of service. In this case, you may question whether all customers are equally strategic/profitable and whether there really is a priority when push comes to shove. If so, then a more segmented approach to service levels may be appropriate.

3.2.2 Cross Functional Business Processes

The supply chain pipeline crosses virtually every functional organization in a company, but frequently the business processes are structured within each function. Hand-offs and check points between functions for approvals and verification slows down the process and artificially hinders smooth flow. Non aligned metrics further disrupt cross functional processes trace specific transactions from start to finish and are designed to foster sufficient understanding by all to enable problem solving. For example, customer service representatives should understand how inventory levels are set to better identify when customer needs or characteristics warrant changing inventory levels.

3.2.3 Manage The Process, Not The Transactions

Ask one of your planners or customer service representatives how much of their day is spent processing order transactions (entering, reviewing, approving, changing, sorting, etc.). The answer is probably a high percentage. Unfortunately this is primarily non-value added time. The high value part of a planner's day is adjusting inventory levels, changing pull parameters, etc. But most planners are chained to their desk processing transactions. Why? Because the business processes and systems do not work or are in conflict with the Lean practices on the shop floor. There may be too many exceptions. The planning information may be too unstable (forecasts changing faster than you can respond, etc.). The moral is to get the processes aligned with the physical shop floor flow and enable the planners to impact the overall direction, not just the specific order by order transactions.

3.2.4 Shoot Your Competitor, Not Your Foot

The market and customers create variation in demand as consumer and economic trends ripple down through the supply chain. We should not intentionally add to the variability of customer demand by creating incentives to delay or abnormally increase purchases. The core concept is to simplify, automate and integrate replenishment, thereby linking replenishment with actual use. What we frequently do is create incentives for customers to temporarily buy more than they need, which make our order rates more variable. Typical approaches to boost sales include special pricing, delaying price changes (announcing changes, but allowing orders to be accepted at the old rate), and providing logistics incentives. These are temporary increases to sales, which just make long term Lean progress slower or increase inventories.

3.3 Transforming The Supply Chain

Front office processes and systems must change to keep pace with the benefits derived from Lean. In the past our planning and management processes were based on forecasts and everything else was calculated and planned. The assumptions included fixed lead times, push production planning and accurate forecasts. Figure 3 shows how fixed lead times have been utilized in ERP type systems to calculate future needs and then develop detailed production plans. The many inputs to planning create ongoing expedite and de-expedite messages to keep everything in sync.

With demand replenishment (pull production), forecasts are used for longer range planning rather than detail scheduling. As lead times continue to be reduced, some industries have moved to make to order, which enabled further product customization (e.g., personal computers) and much lower inventories. Buffering demand variation may be required depending upon the flexibility in capacity and difference in lead times involved, but we are linking to actual demand and using forecasts for longer range planning.

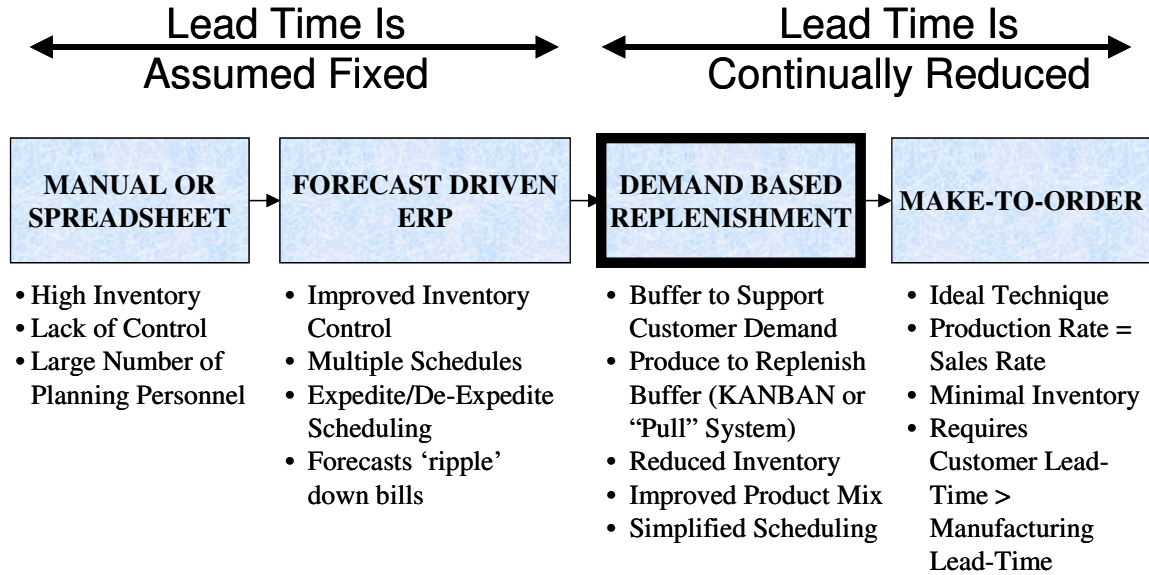


Figure 3. Production Systems Evolution

Ideally, we would reduce lead times sufficiently to make to actual orders. This may be accomplished by assembling to order (computers), packaging to order (consumer goods), etc. You now have other management issues which require some level of inventory buffering, but you are operating closer to actual demand and making the quantity used. Anytime we can make only what is needed we eliminate the lot sizing variation that drives wild swings in demand down through supply chains. Keep in mind the general axiom of supply chain variability in Figure 4:

$$\text{Demand Variability} \approx f(\text{Lead Time} + \text{Lot Size} + \text{Bill Depth})$$

Figure 4. Demand Variability

While this is not a true "equation", it is meant to show how the further down a supply chain you are, the more variation you should experience from relatively small changes in top line demand. This equally applies within an organization. Fabrication and raw material planners see greater swings in demand as assembly planners change schedules to meet changing forecasts. The extent of the swings depend upon and are related to the depth of the product bills of material, planning lead times being used and lot sizes. If the lead times were zero and lot sizes equal one, then there would be the same variability at lower levels as seen at the assembly level. This is the magic of Lean! It reduces lot sizes and lead times, so you can respond faster to changing market conditions and make the planning and scheduling systems/processes simpler at the same time!

4. Meeting Demand

Customer order demand patterns and variability pops up as a key impediment to Lean in many organizations. This is a natural reaction: if our customers do not order in a steady, consistent manner we cannot level our schedules and implement Lean pull techniques. This opinion is based on a few assumptions that very well may be true, but could also be inappropriate assumptions. Let us review some of the key principles necessary to determine what can be accomplished given specific demand patterns.

4.1 Flexibility Assumptions

Concluding that variable demand cannot be supported by Lean is based on assumptions for capacity, service policies, and inventory. If capacity and material availability is a flexible as the customer demand, then we do not have an issue. In most cases, this is not the case, because there are some lead times associated with key materials and capacity has some limiting factors. But the question is how much more does demand vary than our ability to flex capacity? For capital intensive industries we may not be able to flex capacity much at all, whereas, in others 30-40% flex in a given week may be reasonable. So our question boils down to the comparison of flexibility between demand, capacity and inventory.

The starting point is service policies. The questions should be asked about the specific lead time expectations and commitments. These policies may not be the same for all customers, providing some 'slack' to absorb peak order rate days over low rate days. Depending on the degree of variation, this may provide sufficient ability to manage the peak days. For one consumer goods company's package to order line, peak order rate days could be offset by standing orders to a major customer, which were built over a number of weeks and delivered quarterly for special promotions. As long as the peak days were equally offset by trough days, the major customer order could be built.

4.2 Role Of Inventory

The typical approach to managing variable customer demand is to build and hold inventory. Nearly every company does it in some form. But how much of your inventory is devoted to absorbing market variation? Is the inventory required to offset variation in production? Is the inventory too high? Could you meet the market variation in another way? These are key questions for Lean, since inventory is no longer viewed as an asset, but a liability and a form of waste. Figure 5 relates the main inputs to the calculation and setting of inventory levels.

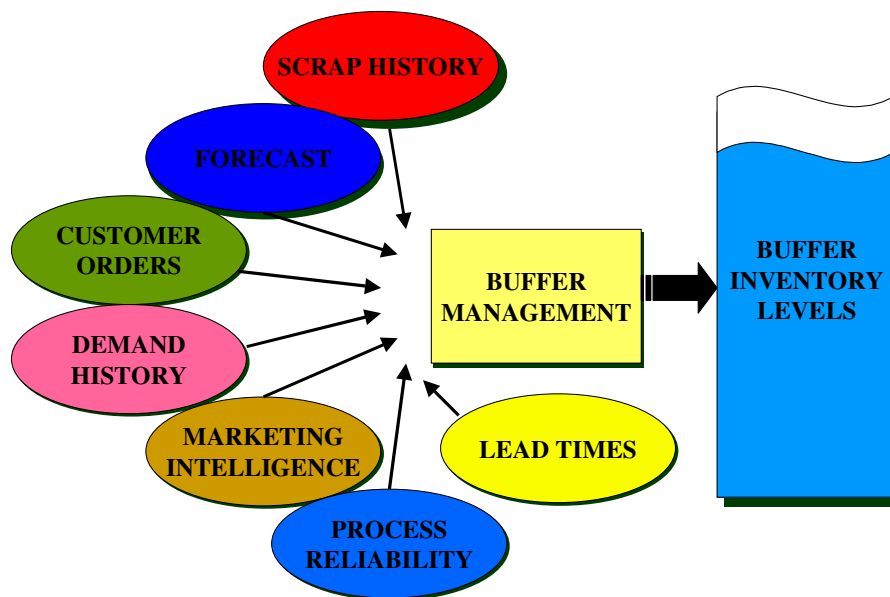


Figure 5. Inventory Drivers

Each factor must be analyzed and used as an input to the calculation of buffer levels. It is important to have some segregation of these drivers to determine whether demand should be managed differently or service policies adjusted to strike the best balance between the cost/risk of inventory and market requirements. Additionally, the drivers should be tracked to identify significant changes that indicate revision of inventory levels, another reason to segregate.

4.3 Managing Demand

Attempting to make any changes to demand is frequently where most companies stop. It is just assumed that orders must be made and due as shown. Making this assumption can be an expensive mistake. If we go back to Figure 5, we see that several aspects of market information goes into the buffer calculation: market intelligence, demand history, customer orders, and forecasts. Depending on which driver is the most critical, there are ways to segregate the more variable parts of one or several. Take the sample order history data in Figure 6. This appears to be highly variable, which would require significant inventory buffer.

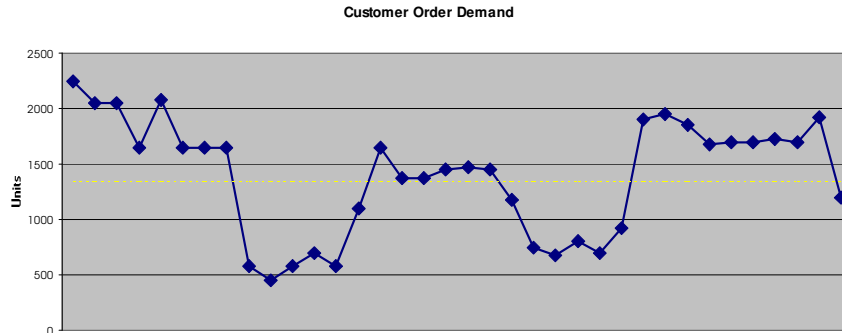


Figure 6. Sample Customer Order Demand By Week

However, if we review the same historical data segregated by customer segment (customer 1 - bottom, customer 2 - middle and all others – top line) we find a very different situation in Figure 7 (stacked line graph).

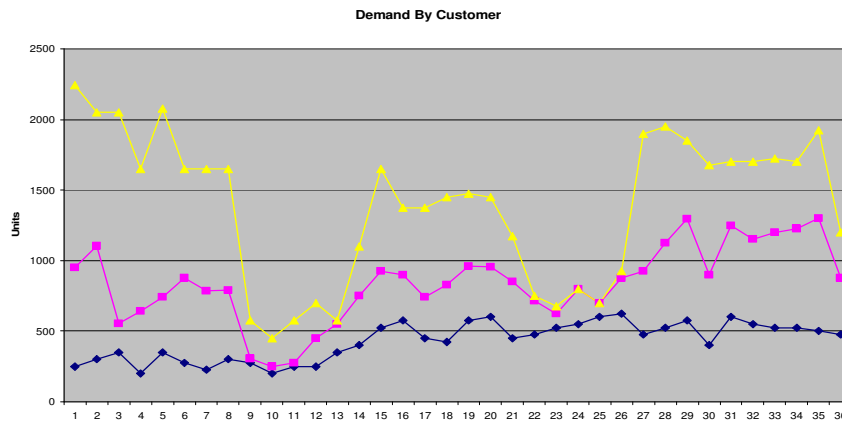


Figure 7. Sample Customer Demand By Customer (stacked lines)

This simple, yet actual example shows how policy can dramatically affect the required inventory levels and thereby carrying costs. Setting an inventory buffer just to support customer 1 (bottom line) would be much smaller than for the total. The policy can state we will make to order for the remaining customers, which dramatically reduces buffer levels. With reduced Lean cycle times, this make to order policy may actually improve service to both categories of customer: inventory will not be borrowed from customer 1 to supply others and the others will have a more predictable lead time and delivery. In another actual example, sales order history shows individual customers weekly demand is very erratic, which would cause very high inventory levels in order to ensure satisfactory service levels. These customers use similar products. By aggregating their demand, there is much less variation, by buffering the demand at a semi finished stage and finishing to order, much less inventory is required.

4.4 Lead Time Inventory Paradox

Finally, when we have the key drivers nailed down the main input becomes lead time. Once again Lean comes to our rescue. As we reduce lead times, buffer inventory levels are reduced. Figure 8 displays how dramatically reductions in lead time can reduce inventory. Inventory must cover the time between replenishments, so the shortest lead time provides the most confidence in the forecast and extent of market variation.

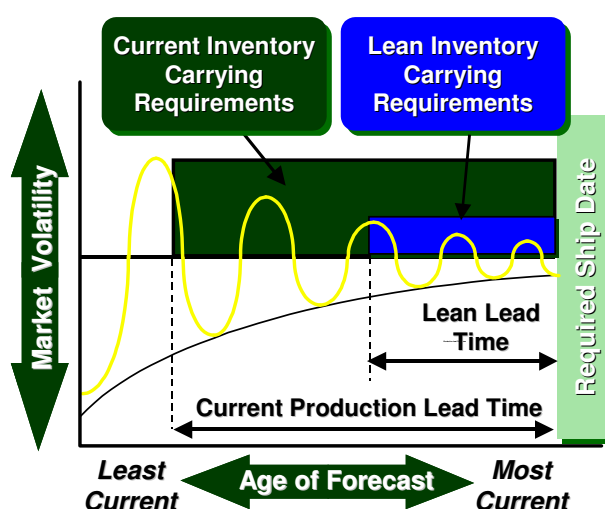


Figure 6. The Lead Time/Inventory Paradox

Are Your Measurements an Obstacle?

We know that how organizations are measured and compensated drives many of the behaviors and decisions across the supply chain. For example, in many companies a planner may be quickly criticized for customer service problems, but only mildly questioned about inventory levels. While this may seem like being “customer driven”, it may unduly raise inventories and other costs. Meanwhile, Manufacturing and Purchasing may be measured primarily on cost per unit, which can be most easily improved with large volumes of a few products. Both cases are counter to the flexibility required for long term customer service.

How costs and performance are measured can be as important as what you measure. Traditional standard costing can cause behavior opposed to lean manufacturing principles. Standard costs are based on assumed production levels and penalize us for producing less than the plan, regardless of current customer needs. The goal of lower cost per unit is generally attained by increasing the denominator in spite of demand - building inventory generates lower cost per unit. The focus in manufacturing needs to shift to time or velocity measures which reduce the numerator in the cost per unit equation.

Similarly, sales measures typically are only volume or revenue oriented. When sales has only dollar revenue targets, the pattern of sales transactions can cause disruptions in the flow of material in the supply chain. Again, we can turn to inventory to help direct our efforts. The main purpose of finished goods inventories is to buffer market variation, therefore the sales organization should accept responsibility for this inventory. With this measure in place, the sales organization should balance the inventory versus service levels and be motivated to smooth supply chain flows.

Conclusions

Lean principles have traditionally been applied to manufacturing. We have shown that to attain the most benefit from these principles they must be applied across the value chain. As customer demand has significant impact on overall inventory levels, effort is needed to manage demand in ways which lead to less variation.

The core principles to better manage demand requires a radical departure from traditional forecast based make to stock planning and manufacturing. We can leverage Lean results in cycle time reduction, flexibility and lot size reduction to more closely make to demand. The steps you must address for this transition includes:

1. Formalize and rationalize customer service policies. If you don't have well described and clear policies, you may not be able to determine what it really takes to meet the service levels. In most cases, companies do not clearly articulate policies leaving expectations to be interpreted, which leads to over planning and excess inventories.

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2. Break away from a forecast driven plan. Yes, you should use forecasts, but in the proper balance with demand driven signals (pull). When forecasts are the starting point to drive the entire process, the plan will always be in flux, since you can seldom stop the target long enough to aim and shoot.
3. Minimize the demand variation introduced. As consumers, we all seem to love the special deal of the week, but as manufacturers we don't. Insure that your organization fully appreciates the implication of variation introducing events and actively manages price changes and other such events.
4. Segment demand into similar demand patterns. In sales, a dollar is usually a dollar, but for operations, we may experience wide fluctuation in demand. Be mindful of how much inventory and cost you want associated with lower priority demand.
5. Manage demand to the plan. No plan can be static, so you must actively compare actual demand to plans and capabilities in order to respond and adjust. Inventory should buffer some variability, but active demand management can minimize inventory requirements and other costs.

We started with the observation that typical demand variation is a common obstacle or limiting factor to Lean Manufacturing success. We showed some of the key customer and front office root causes and drivers for this variation and how you can better manage demand input to take advantage of the Lean success reducing cycle times and lot sizes. Now it is up to you to put these front office principles to work!

Biographical Sketch

Mr. Zylstra is a Deloitte & Touche consulting partner who leverages Lean practices for customer facing, supply chain business processes and manufacturing operations. Kirk's background includes over 20 years of consulting and hands-on manufacturing industry experience. Currently, Kirk's clients are implementing Lean manufacturing concepts across their entire value chain. He works on overall Lean design, business case development, implementation assessments and implementation support. He has a mechanical engineering degree from Purdue and an MBA from Indiana University. He can be reached at (206) 233-7469 or via email at KZYLSTRA@DELOITTE.COM.

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