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Introduction

If you're in the Supply Chain business, right up there with Newton's Law of Gravity stands Murphy's Other Law stipulating that Demand and Supply, if left to their own tendencies, will always tend to diverge and get you in trouble. In the case of gravity, we have all hopefully learned to predict what it personally means to us (jump out of a tree and down you go!), and so we readily know how to avoid its negative effects (don't jump!). With Demand and Supply (D/S) imbalances, while we all recognize the symptoms (back-orders, extended lead-times, irate customers, etc.), Murphy, unlike Newton, never seems to give us advance warning or enlighten us on how to avoid falling into their trap.

Further adding to the D/S fulfillment dilemma, Sales and Operations do not inherently share a common language upon which to base their discussion of issues and potential resolutions when Murphy strikes. I suppose that "finger-pointing" might be a mutually shared form of sign language, but not a very helpful one! Yet, the ability to succeed grows exponentially when Sales and Operations share common motivations and a clear understanding of how to collectively act together to defeat Murphy. High levels of customer satisfaction and shareholder benefit only result when optimization occurs across the enterprise. Imagine a world where Sales and Operations are actually rowing in the same direction!

Demand and Supply Prediction

Welcome to the world of **Predictive Demand/Supply Planning** whose mission is to predict imbalances as far in advance as possible, in order to provide ample time and opportunity to design and implement corrective Sales & Operations solutions.

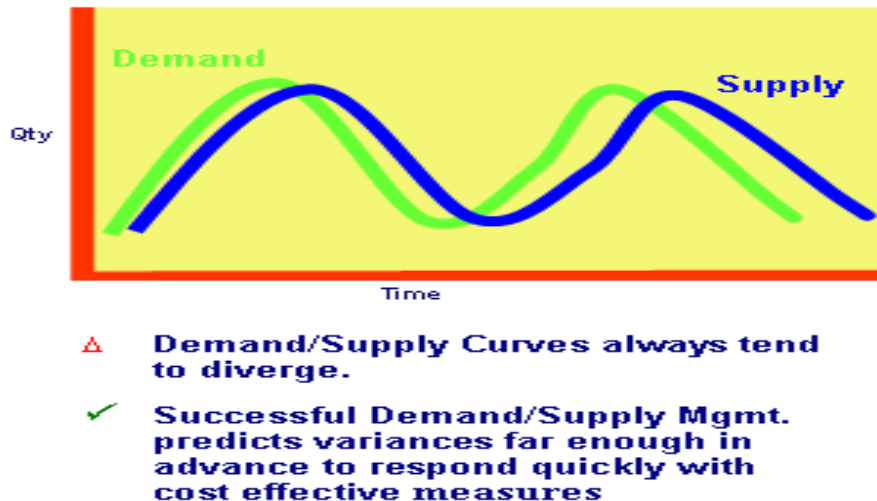


Figure 1: Demand Supply Divergence

The more time we allow for resolving forecasted imbalances, the greater the number of potential cost-effective solutions. So how do we design a system for identifying potential issues and expressing them via a commonly understood key process indicator (KPI) where the cause and effect of our actions can be readily measured?

Step 1. Define the Indicator- When and where will Murphy strike?!

ChainLink's Parallax view focuses on the optimization of inter-enterprise links as a key to success, and further stresses the need for "predictive metrics". One can view this process of Sales and Operations addressing D/S fulfillment as an intra-enterprise microcosm of this same issue- how can two functional links in the chain express their interactions with metrics that are commonly understood, forward looking, and preventive in nature. If we are not successfully integrated within the enterprise, then optimization of external links in the supply chain will fail proportionally. In the Parallax view however, if we can change our orientation to the problem, we can achieve a new view that provides new direction.

Traditional Demand and Supply planning systems serve first as great storehouses for data, and second as rule-based calculators which can make recommendations for action on an exception basis. But they

rarely express issues in a language or format that facilitates meaningful Sales and Operations discussion (come on, is that possible?). I personally learned early in my SCM career that when I said that we have a material shortage, it only begged the question by Sales or the Customer, "So how does that affect my order, and what are my options?" This question was sometimes followed by other less kind words! After multiple occurrences of this dysfunctional conversation, the need to develop a common format to proactively describe the problem and frame the resulting question became evident. The type of production strategy that your business utilizes will determine the KPI that you employ to answer that question.

In a Configure to Order (CTO) or Make to Order (MTO) business, Customer Lead-time (CLT) serves as the primary indicator or unit of measure for defining Customer service levels. The main driver of D/S success, and thus CLT performance, will generally be the availability of raw material components. Using various methods, a business can determine what is an acceptable or, better yet, competitive lead-time for the cycle-time from the time of receiving the order to shipping or delivering it to the Customer. Using a targeted CLT as a benchmark, the business can measure how well it performs in meeting that targeted CLT. Customer Backlog, as the inverse of CLT, becomes a quick reference KPI for understanding on a daily basis how the business stands in terms of meeting targeted CLTs (i.e. as Backlog decreases, CLT decreases). Thus, when Operations talks to Sales, or Sales to Customers, the common language should be the predicted CLT to ship or deliver the order. It may not be good news, but at least you preempt their questions and provide an accurate, intelligent response (which may at least eliminate the unkind words!).

In a Make to Stock (MTS) business, Finished Goods Inventory levels expressed in Day's Supply of Inventory (FG-DSI) and/or its inverse corollary of Backorder Days serve as the KPIs for defining Customer service levels. In this fulfillment strategy, Customers expect to place their order and receive instant gratification in having their order shipped (i.e. < 24 hrs). The performance measure then becomes Fill Rate % while FG-DSI or Backorder Days indicate your general fulfillment health or ability to satisfy Customer order. In this case, the response by Operations to Sales or Sales to the Customer will be either immediate product availability or projected Backorder Days (days before the product will ship). Again, you can beat them to the figurative punch and tell them what they really want to know.

Figure 1. Demand/Supply KPIs by Production Strategy			Performance Measure
CTO	Customer Lead-time	Backlog Days	Ship to Target Lead-time %
MTO	Customer Lead-time	Backlog Days	Ship to Target Lead-time %
MTS	Finished Goods DSI	Back Order	Days Fill Rate %

Figure 2: Planning Measurements

Step 2. Develop a predictive process and tool- *We've got ways of finding you, Murphy!*

The value of good planning systems resides in their capability to predict supply imbalances in the future and make recommendations for supply-side action based on a user managed set of rules. As stated earlier, they fall short, however, in not further translating that picture of the future into a common indicator that facilitates the discussion between Sales and Operations on what consensus corrective actions can be taken, particularly if supply is constrained. Now that we have the common language defined, addressing this short-coming isn't a Herculean task.

Without great technical effort, a reporting tool can be designed as an adjunct to your current planning systems which identifies potential D/S issues based on a pre-configured set of tolerances (example 3 items with actual demand > 20% or < 20% of forecast). After some analysis of these out of tolerance items, the tool can facilitate downloading planning data from the MP and MRP systems into a spreadsheet format (using Excel or another alternate application) which calculates the appropriate KPI for your business (i.e. CLT or FG-DSI and Back Order Days). A spreadsheet format, such as Excel, provides the advantage of allowing for sensitivity analysis of the potential D/S issue by playing with the variables. This exception process for identification of potential D/S issues and the resultant predictive analysis should become a normal output of the standard planning process. Following is an example of the D/S spreadsheet format predicting CLT in a CTO environment.

Purchased Component #1234											
		Wk1	Wk2	Wk3	Wk4	Wk5	Wk6	Wk7	Wk8	Wk9	Wk10
DEMAND											
Backlog =	1600										
Actual		1000	1200	1400	1500						
Forecast		1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
SUPPLY											
On/Hand Inv. =	200										
Deliveries:											
Actual		1000	1000	1000	1200						
Scheduled						1200	1200	1200	1400	1400	1400
Customer LT (days)											
Actual		5	6	7	8						
Projected						9	10	11	12	12	13
Note: Projected based on Run-rate of 1500 per day.											

Target CLT = 5 days, Time to Act!

Figure 3: Spreadsheet to project Customer Lead-time (CLT) in a CTO business

Step 3. Establish a D/S forum- *The Murphy SWAT Team!*

Now that the KPIs, tool, and process exists, a regular D/S meeting must be created to address the items identified as potential issues. The forum should be attended generally by Master Schedulers, Marketing, and Sales representatives, along with the appropriate Managers who can make the necessary decisions involving corrective actions to be taken. Master Schedulers will typically bring the list of issue items displayed in the KPI spreadsheet format along with the details of the potential supply-side actions and/or those already completed.

Generally, D/S imbalances should first be resolved on the supply-side if possible, since meeting customer service objectives takes precedence. However, when that is not possible or if additional supply cost is involved, the regular D/S meeting provides an opportunity for Sales and Operations to collaboratively decide on the action plan, particularly if the resolution requires "demand shaping" (pricing, promotion, etc.) to influence demand and move it to alternative items. The CLT or FG-DSI predictive spreadsheet enables a logical, quantitative, and non-emotional language in which to discuss the issue, and an objective method to assess cause and effect after actions have been implemented. Additionally, the predictive outlook can enhance the customer expectation setting, since it expresses the issue with a Customer-centric KPI.

With a new language of KPIs, a predictive process, and a Sales and Operations forum for resolving D/S issues, you have now enabled a cultural transition to occur where collective, consensual decision-making can rapidly occur. Two links in the intra-enterprise chain (Sales and Operations) can bond together for optimization of business results. Having experienced first hand in a CTO business the use of this predictive D/S process and a resultant cultural shift, I can attest to how organizational behaviors can evolve for the better over time, if you put the right enablers in place and then focus on the desired result (I know, easier said than done!). In my experience, Sales and Operations "finger pointing" became obsolete and unacceptable, and as an SCM executive, I even became intolerant of my team expressing the sentiment that "if the forecast was just right!..."

Conclusion- Murphy goes down in defeat!

In today's competitive world, sound planning processes and systems will keep you in the game, but may not get you the win. Instituting KPIs, processes, and tools that predict D/S issues, and expressing them in a way that facilitates Sales and Operations discussions and customer expectation settings, improves the probability of success. Building a culture where Sales and Operations utilize these capabilities and consistently work together to defeat Murphy and optimize results across intra-enterprise links can create real competitive advantage, and very importantly, enable next steps in optimizing across the inter-enterprise links of your supply chain. The power of fast, collaborative decision-making and aligned D/S actions will leave Murphy frowning and keep a big smile on your Customers' faces!



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