

SUPPLY CHAIN & LOGISTICS
BEST PRACTICE – ARE YOU KEEPING UP?

Article written by Alan Denton



Supply Chain & Logistics Best Practices

Are you keeping up?

We are told that the constant increase in computer processing power (one version of Moore's Law states that computing power/dollar doubles every 2 years) is changing the way the world, and supply chains, operate. This article looks at some of the ways the Internet and other computer enabled technologies have created 'best practices'.

The question for you is whether or not you are keeping up!

1. Forecasting and Demand Management

Many companies need to forecast customer demand because their lead-time to supply is longer than their customers will typically wait for products. The most common method is to forecast at some aggregate level (product family or geography) and then figure out what to send to each store or regional warehouse by essentially making another forecast; such as demand this year will be in the same proportions as last year. This is done because it is, 'impossible', to generate and review a forecast for potentially millions of item/location combinations.

Best practice is to let a machine make a statistical forecast for each item in each location and then aggregate this demand for management review and adjustment (by product family or geography). The forecast adjustment can be applied automatically to each item / location in the proportions based on the original forecasts. This practice can be enhanced by so called 'tournament' forecasting where the computer program tries out a whole range of possible forecast models and picks the best model on the basis of the lowest, unbiased forecast error. The tournament is re-run every time the underlying demand data is updated (typically weekly or monthly).

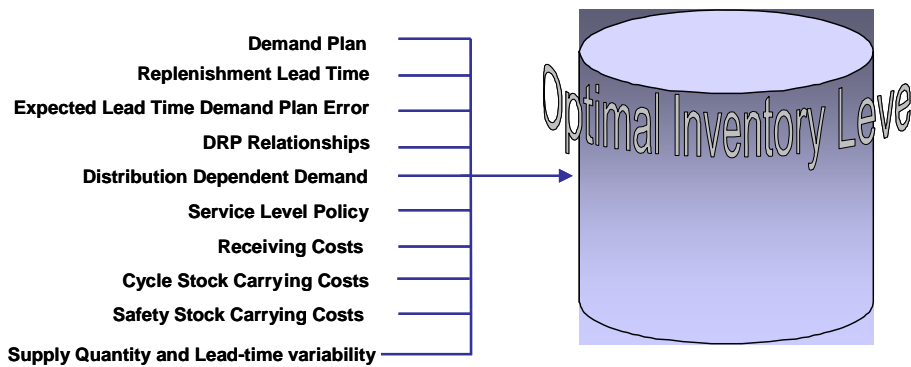
If you are not using item/location tournament forecasting, you are not keeping up.

2. Inventory Optimization

A very common method of managing inventories is to apply a policy or rule, typically based on some segmentation analysis (e.g. ABC), to hold a certain number of weeks of historical average demand – for example, 4 weeks of cycle stock and 2 weeks of safety stock. Unfortunately, rules-based approaches tend to be 'one size fits' all. This means, by definition, that the rule will deliver the right amount of inventory for some items, too much inventory for other items and too little inventory to meet service levels for other items. As a result, we get inventory imbalances that result in excessive inventory costs, impeded cash flow and poor and/or inconsistent service levels all at the same time. In addition, rules-based approaches are only sensitive to changes in demand. So what, you ask? Well, this means they're relatively static and not linked to other important factors, such as service level and forecast accuracy. For example, if you want to increase your service levels, you have to estimate (i.e. best guess) what change in your inventory rules will deliver this. If you invest in a forecasting system and improve your forecast accuracy, a 'weeks supply' approach won't reward you with reduced safety stocks. Here again, you have to figure out what the impact is and change the rule yourself. This gets particularly difficult when you have a significant number of items and stocking locations. Fancy doing this for 10,000 products every week!

But there is a solution.

Best Practice is to have a service level goal for demand satisfaction off the shelf and then calculate the necessary inventory parameters (i.e. order quantities and safety stocks), taking into account all the relevant variables:



Now, if we increase our service levels, our inventory parameters for all items adjust automatically because there is a direct link – and our customers are happy because we’re servicing them consistently to target. If we improve our forecast accuracy, our investment in safety stock will be adjusted accordingly, and we’re rewarded with better inventory turns and case flow. The result is the right mix of inventory for each and every time in every location, and the benefits are achieving ‘best in class’ inventory turn rates and customer service levels at the same time.

If you are using rules based approaches to manage inventory, you are not keeping up.

3. Optimisation - Schedules/ rosters / work assignments

The spreadsheet is the most common tool applied to the problem of resource scheduling, be it school class rooms, warehouse order picking, operating theatres, factories, television studios, airports or delivery trucks. The planner in all these businesses is trying to find an optimal solution, but will generally settle for the first ‘satisficing’ solution they encounter based on some internal heuristic of what constitutes a good roster, schedule, route or assignment.

Best Practice is to apply computer algorithms to solving the problem and generate an optimal or near optimal solution. Recent advances in both computing power and applied mathematics have made extremely large problems amenable to direct computation as well as lowering the threshold where such methods become economically viable for smaller organisations. Computer algorithms can often throw up options a human planner would never consider and produce solutions that fair, unbiased, more profitable and quicker to produce.

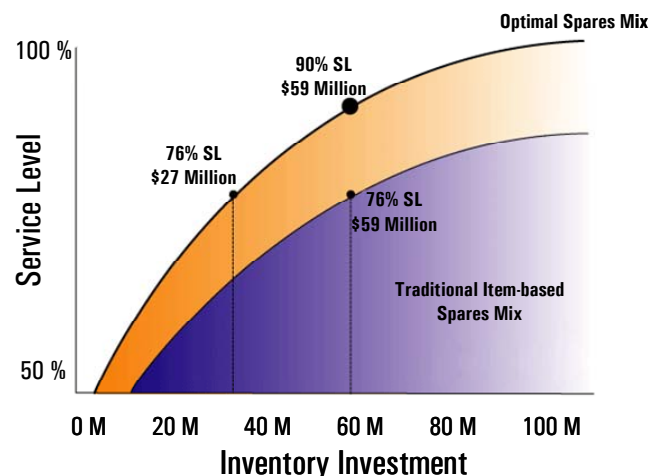
If you employ more than one dedicated planner, who is doing it all ‘by hand’ in a spreadsheet, you are not keeping up.

4. Spare Parts for Capital Intensive Industries

Keeping capital intensive equipment operating is key to delivering profitability in industries such as mining, power generation, electronic networks and commercial airlines. Various maintenance philosophies can be applied to keep the down-time to a minimum involving scheduled pre-emptive replacement, condition monitoring or waiting for a breakdown and then responding rapidly.

Determining the spare parts to be held to support a rapid return to service (assuming an on condition or on break-down methodology where component removal events are randomly distributed) is a ‘black art’ in most industries, and often left to the plant maintenance engineer and advice from the equipment supplier, who may have an interest in selling spares.

Spares Analysis Efficient Frontier



Best practice, as often seen in military aviation or NASA, is data intensive since records must be kept of each component failure or removal to provide the basis of a sparing analysis. This kind of record keeping is mandatory in civil aviation but is increasingly found in modern computer based maintenance management systems applied to production plants or data networks. Other factors, such as Essentiality (related to redundancy and failure modes in the machine design), item cost, cost of down-time, failure rates (often expressed as the mean time between failures) and total repair cycle time (if the component can be repaired and returned to the serviceable spares pool) can be combined in a marginal analysis of each incremental spare part/location combination.

The resulting cumulative inventory investment curve represents an 'efficient frontier' - a line of optimal spare part inventories that deliver maximum service levels (availability) for the system. Such an analysis can tell you the first, best spare component to buy (and where to put it in a network) to improve the 'native' system availability, and then the second, and third spare, until the spares budget is exhausted.

The traditional item by item analytical approach, where only the failure rate, repair time and gut feel are considered, delivers an unrepeatable, biased, sub-optimal spares package for a given budget.

If you operate capital intensive equipment and do not use system based, marginal spares analysis, you are not keeping up.

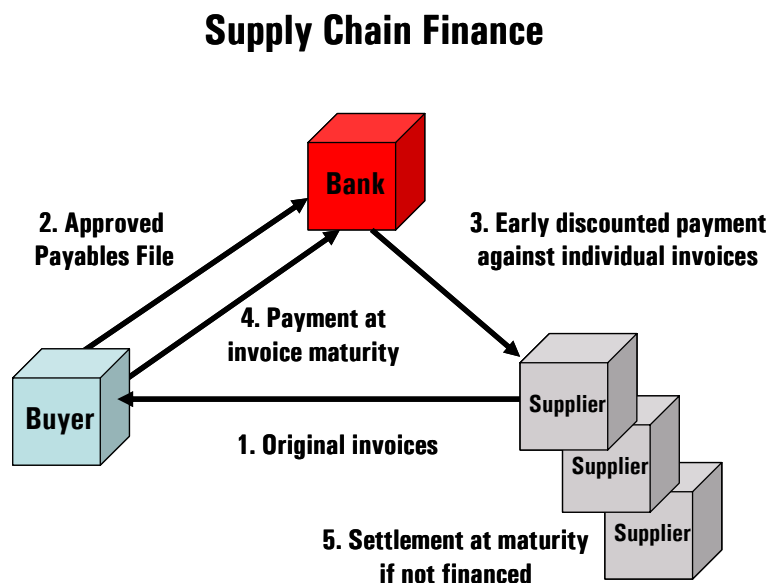
5. Supply Chain Financing

Many companies have optimised their supply chain networks and inventory deployments, adopted lean manufacturing and streamlined their product development cycles. The final frontier for these leading companies is supply chain financial engineering. Buyers and suppliers are traditionally in conflict as each seeks to optimise their payment terms – buyers try to extend terms and suppliers trying to reduce the time between invoice and payment to match their inventory turn.

Best practice lies in a lender, usually with a relationship with the buyer, to leverage the arbitrage between the cost of debt to the buying firm and the cost of debt to (typically) the smaller supplier.

Payables financing removes the conflict by allowing the supplier to extend terms (say 90 days instead of 60), with the buyer company's lender funding the invoice as early as the day of issue.

In common with traditional factoring or invoice discounting arrangements, the supplier receives a percentage of the due payment up front. However, with a supplier finance approach, the process is initiated by the buyer through its own bank and, thanks to the buyer's stronger credit rating, the terms are likely to be more favourable than the terms on offer to the supplier through a local bank. This can be structured as non-recourse funds by banks that are experienced in these reverse factoring solutions.



The lender's exposure is to the buying company, even though the seller receives the advance payment. The lender can achieve a margin which is higher than its normal return achieved on money loaned to the buyer, but below the cost of funds to the seller, since it is lending against the credit profile of the buyer. The seller benefits from a shorter cash to cash cycle and may be able to pass some of this benefit on to the buyer as a lower price. The buyer benefits from the positive cash flow effect and the potentially lower price – improving profitability, key ratios and growth opportunities. The lender increases its volume of business, improves the margin obtainable on the buyer risk and strengthens the relationship with the buyer.

The key to making such a system viable is process automation and real-time visibility of invoice data enabling all parties to track each invoice, its advance payment and final settlement – reducing risk and cost for the three participants.

If you are a large buyer of goods or services, and are not using automated supply chain financing, you are not keeping up.

6. Optimal Supply Chain Network Design

When one company takes over another, everyone talks about ‘synergy benefits’ and ‘economies of scale’, which may be true in terms of market share and product portfolios, but they can be slow and difficult to achieve in the supply chains. The integrator usually starts with at least two of everything – warehouse networks, transport and supply contracts, information systems and organisational cultures. The usual approach is to attempt to ‘cherry pick’ whatever appears best (or cheapest) at the time without necessarily understanding the impact on supply chain risks, inventory levels or customer service. Even without a merger situation, understanding what the growth path should be, at a strategic level for manufacturing and distribution capacity at home and abroad is often painfully reactive. Roughly 80% of the cost of a supply chain is fixed at the design stage – the rest are just rate negotiations.

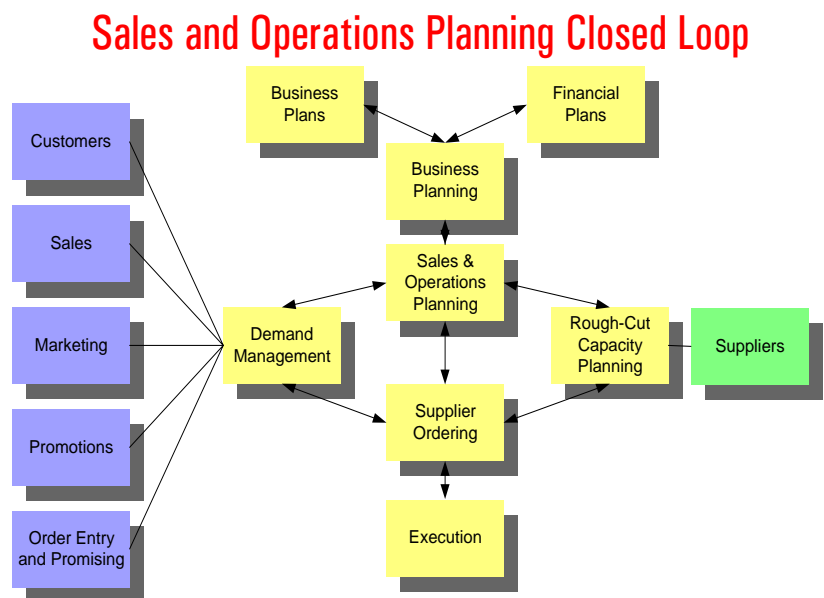
Best Practice is to use integrated graphical and mathematical models to design the supply chain at the strategic level. The graphical network maps, usually linked to geographic data (such as road network time/distance matrices), allow the non-mathematically inclined to visualise the existing or proposed network. The optimisation solvers attached to the model allow billions of combinations of facility locations, transport links, capacities, inventories and customer allocations to be tested and a cost or profit optimal solution defined.

If you are not using mathematical optimisation for strategic network design, you are not keeping up.

7. Sales and Operations Planning

Some businesses behave as if the ‘good old days’ are still with us. They either have plenty of idle capacity that they can flex to meet *any* customer demand or are comfortable holding plenty of inventory somewhere in the supply chain – and their shareholders are probably unhappy. These businesses often pay a bonus to a salesman who can sell above budget, but can't an operations manager who cannot keep the pipeline full.

To these businesses the budget is a once a year guess at the future (last year plus 5%) and tracking is based on hindsight – what happened last month and where we are year to date. Sales has three sets of numbers – budget, actual and what might have been if Operations had delivered. Operations has the budget and what was planned, as well as what needed to be pushed into the schedule to accommodate ‘urgent’ orders, expedited raw materials and the new customer that just popped up. Accounting has the budget, variances to budget and straight line revenue forecasts.



Best Practice is to run the business using Sales and Operations Planning, on one set of numbers, driven from a forecast for every item sold. On a monthly cycle, forecasts of future demand are run for the coming 18 months, adjusted with market intelligence and new product forecasts and locked as the official Demand Plan for all purposes. This Demand drives the Operations plan – sourcing, capacity planning, labour and materials planning, stock levels and deployment at a rough cut level. The approved Supply Plan then feeds a forward view of costs and revenues that is approved by the CEO and measured against the budget. The budget is effectively the S&OP Plan at the start of the financial year. Top down adjustments imposed by 'head office' need to be reflected in the real plans with real actions attached.

Sales is measured and rewarded on the accuracy of the Demand Plan. Operations is held accountable for executing the agreed Supply Plan. The business has an agreed basis for long-term and near term planning and unit costs go down since operations gets a forward view to optimise capacity.

If you're not running your business on one set of numbers, not using integrated Sales and Operations Planning, you are not keeping up.

Article written by Alan Denton, Senior Manager at [GRA supply chain consultants](http://www.gra.net.au) www.gra.net.au .

GRA

4 Erin Street Richmond

Victoria 3121 Australia

Telephone +61 3 9421 4611

Facsimile +61 3 9429 9846

www.gra.net.au • info@gra.net.au

ACN 071 622 136 / ABN 60 614 505 595