

The Benefits of Moving from a Push to a Pull System

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Manufacturers, distributors, and retailers are forced to choose the approach they hope will make them the most profit. Is it producing and making goods available

- to forecasts of expected consumer demand, or
- by reacting to what consumers have already bought?

Conventionally, companies use the former approach. In what we term a "Push system", *product availability is based on forecasts*. Companies forecast to feel confident that the goods they buy, sometimes many months in advance, will both find willing buyers and not run out unexpectedly soon. In the Push world, decision points occur at every reorder. How much should be purchased? In other words, how often is it necessary to consider buying each item? In their attempts to prevent stock-outs and protect sales, managers end up with fewer inventory turns than they wish. Pushing inventory downstream through the links of the supply chain is a response to the natural desire to reduce inventory over-investment, as well as to record sales today rather than later.

In contrast, a "Pull system" *controls the flow of products by automatically adjusting inventory levels according to actual consumption*. Pull systems simply respond to what consumers buy. A Pull system manages time buffers of inventory for each item. These buffers act as shock absorbers, which are compressed as inventory is consumed until replenishment can occur. For each consumption, an equivalent order is placed, an approach that lends itself to automatic electronic processing. Replenishments are frequent, in the smallest economical batches. Decision points in Pull systems are triggered only occasionally, to resize buffers, when on-hand inventory levels consistently correspond to too little or too much protection time.

Push

Supply chain problems like high carrying costs, discounting, disposals, missed sales, weak customer loyalty, shortages, high debt loads, inventory disposals, emergency shipments, rescheduled production and attenuated profits all stem from three common root causes.¹

1. Inaccurate forecasts
2. Significant replenishment times and
3. Variability in both demand and replenishment times

Perhaps the nastiest of the three causes of problems in Push environments is that forecasts are almost always wrong. Despite billions spent annually in the US for the best computers and most sophisticated software, actual demand varies from forecasts. Forecasting does not make the end consumer react more rationally or predictably.² When it comes right down to it, no

¹ See Camp, Henry F., *The Negative Consequences of a Conventional Supply Chain*, www.IDEAllc.com for a more thorough discussion of the cause and effect relationships only asserted here.

² Kendall, Gerald I., *Viable Vision: Transforming Total Sales into Net Profits*, J. Ross Publishing, Boca Raton, 2005.

matter how sophisticated its algorithm, a forecast is only a guess. Wrong guesses mean excess investment and lower profits, due to missed sales.

Pull

Applying Pull to a supply chain is analogous to (but more straightforward than) adapting the Toyota Production system (TPS) – the progenitor of Lean – to manufacturing. Toyota's management has used TPS for over 60 years to earn remarkable and consistent profits, amass a cash hoard and drive its market capitalization higher than those of Volkswagen, Daimler, Ford and GM combined. Perhaps such an approach to supply chains should be considered, even though it seems counter-intuitive to behave reactively than proactively by choice.

Each link in a Pull supply chain concentrates on improving speed of replenishment and ordering smaller batches more frequently. Pull systems use demand data to drive both replenishment and production. Only immediate customer requirements are drawn from the protective inventories upstream.

By acting on actual demand, statistical variations are damped rather than magnified, steadying on-hand inventory levels at every stocking location. There is a very nice consequence of less fluctuation in on-hand levels. The lower limits of the on-hand fluctuations are similar to those in a Push system, fixed by the need to hold prudent safety stocks. However, in Pull systems there is less variation on the high side, resulting in significantly lower average inventory. See Figure 1, below.

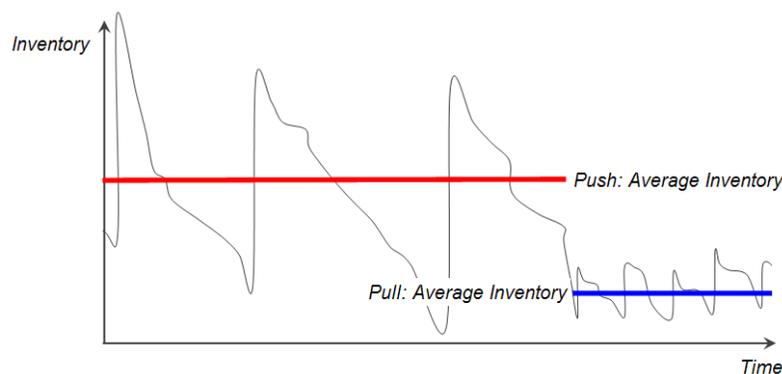


Figure 1

There is another effect on the supply chain as a whole. Since goods only flow downstream to cover immediate need, the preponderance of the inventory remains further up the supply chain, closer to the source. The demand variations of a store are greater than that of a region, because the region's sales are the aggregated sales of all its stores. The same thing is true at a central production location when compared to all the regions it serves. The greater the aggregation, the more statistical highs and lows offset each other. OK, so what? Here's what: variability is proportionally less at the places where demand is aggregated, and safety stocks are sized to protect against that variability. So, safety stocks are proportionally less when they are closer to the source, where Pull supply chains hold most of their inventory. Therefore, there is much less inventory in a Pull supply chain for two reasons: first, less variability naturally results in lower average inventory (again this effect is shown in Figure 1 above) and, second, overall safety stocks are smaller due to where inventories are predominantly held.

In addition, shortages are reduced through Pull. Because there is a constant flow of goods inbound, there is a more rapid response to short term changes in demand, improving service levels. To address longer term changes, buffer management matches stock of each product at

each location to changes in replenishment time and demand, adjusting buffer sizes to keep it matched, even as the situation continually changes.

In summary, one-to-one ordering with frequent replenishment, combined with buffer management liberates companies that adopt Pull from reliance on inaccurate and unreliable forecasts (with the exceptions of new product introductions and only the most dramatic seasonal or promotional effects). Implementing this approach increases a company's revenues without increasing operating expenses and reduces investment in inventory. The results are stunning improvements in financial performance.

Effects of Push and Pull on Retail

Push systems are particularly devastating to the retail industry. They accept the massive inventory push from their suppliers to drive local improvements such as these:

1. They choose long replenishment times in return for lower costs to facilitate the highest possible markups.
2. In many retail environments, they do not expect replenishment within the season, so they accept everything they hope to sell in advance of each season.
3. They broaden their product selection to attract customers to compete with other shops that sell similar products.
4. They fear missing sales, and so, buy to optimistic forecasts.
5. They choose higher quantity discounts or buy large quantities opportunistically.

Consequently, nearly all retailers end up with much more inventory than they need to cover immediate consumption. In fact, as a result of the above choices and the lack of aggregated demand at the retail level, the biggest accumulation of inventory in a Push consumer goods supply chain resides at retail.

Consumer tastes change and more and more manufacturers roll out new products to address consumer demand. Slow moving products sit on the shelves, blocking newer products and those in higher demand. Frequently, a product that is in abundance at one retail location is short in another. Not having the right products on shelves causes customers to walk out of stores when they don't find what they are looking for.

Ultimately, surplus inventory is pushed on consumers. Retailers run promotions and offer discounts in order to move the mountains of inventory. Those lovely markups seldom survive in the form of gross margins after the effects of discounting, shrinkage, disposals and fire sales are subtracted out. The sum of these effects in addition to lost sales exerts enormous negative financial pressures on retailers. When management is unaware of the alternative, this pain is stoically accepted as normal.

In a Pull system, using readily available point-of-sale (POS) data as inputs, shortages can be reduced by an order of magnitude due to the quick response nature of these flow systems. More product is always about to arrive, especially when inventories are low. Customers find what they need, when they need it, where they need it, and complete a purchase more often. Customer loyalty and upbeat word-of-mouth increase. Patrons are less likely to resort to a competitor. New sales are the result – sales that require no additional operating expense.

The indirect impacts of lower inventories on sales are not less important than the reduction of shortages. Lower inventory means less shelf space required per item. The resulting unused shelf space and surplus cash induce the retailer to stock an even wider variety of items. Sales increase significantly from the same physical space. With lower inventories per item, retailers are less exposed to markdowns and require fewer promotions, firming gross margins. Further,

there are many fewer slow-moving items clogging shelves at the expense of better sellers and newly introduced products. In a Pull scenario, there is also less exposure to costly shrinkage and obsolescence. Yes, profits increase due to lower carrying costs, but the real financial improvement is driven by higher sales revenue and margins – dramatic improvements in the retailer's net profit return on their inventory investment.

Effects of Push and Pull on the Distributor

Traditionally, inventory is pushed onto the distributor who is encouraged to purchase large orders from the manufacturer. Incentives for these large orders are quantity discounts offered by the manufacturer and lower transportation rates for bigger shipments. Because cash is tied up due to high levels of inventory, distributors are limited in what products they can afford to hold on hand.

The longer inventory stays in a distributor's warehouse, the higher the risk of declining prices and obsolescence. Both significantly lower profits (although often not until many accounting periods later, when the actions that caused the result are forgotten and the people who took those actions have left, making it difficult to avoid repeat performances). A distributor must turn their inventory to get the most from their investment. So, they use lower pricing and expensive incentives to force products on retailers. Naturally, the need to turn inventory takes priority over being in harmony with end consumer demand and changing trends.

In a proper Pull system, distributors share point of sale data, collected from their retail customers, with their manufacturers, helping the manufacturers smooth the load on their plants, decreasing production response time.³ Distributors may commit to their suppliers to take large quantities over a period of time but in smaller, more frequent shipments. Since they are replenished more often and more quickly, distributors are able to hold less of each SKU.

The distributor concentrates on, and even sells the advantages of, rapidly replenishing its customers. When retail chains can get product quickly and reliably without paying a premium, there is no reason for them not to hold considerably less of each item. Without a glut of inventory clogging the retailers' operations, they adapt to consumer trends quickly. Retail sales and profits increase and cash is freed up – positive results which the distributor shares. With less investment, distributors can grow faster, offering retail points a broader variety of products. In return for their much better service, distributors need not discount as often or as deeply. They earn more attention and retail shelf space away from their Push competition.

Effects of Push and Pull on Manufacturing

Conventionally, manufacturers produce large batches of product in an attempt to increase productivity, save setup time, and cut production costs. This practice creates excess inventory of some products while delaying production of other products in high demand.

Accrual accounting says a manufacturer's profits are driven by shipments. To appear stronger, they force inventory into the distribution channel as quickly as possible, packing the supply chain. In Push supply chains, different links communicate through orders. If a manufacturer has overloaded the downstream supply chain with product, it will be some time before better than expected demand for certain items is communicated to the manufacturer in the form of new orders. Imagine what happens. About the time heavy orders arrive, the manufacturer has a production schedule which includes everything except the new high flying items. The resultant delay for a production slot may temporarily starve both distribution and retail

³ See Firestone, Erin, *Aligning Manufacturing with a Supply Chain*, www.IDEAllc.com for a more thorough discussion of how smoothing demand helps speed manufacturing response time.

channels. There results a feast and famine cycle which may not resolve itself before consumers fall in love with something new.

With a Pull system, communication of demand is in the form of actual daily consumer purchases, which tend to be quite steady at the manufacturer, the point of highest aggregation. Without surges of orders, manufacturing capacity designed to handle peaks is available to produce the consistently higher sales produced by a Pull supply chain.

When production is planned based on current sales, it stops the wasteful practice of buying raw materials and running plants just to produce surplus inventory which clogs up the supply chain. Plants that convert to Pull actually produce smaller, more frequent batches, dramatically enhancing availability. Since each item is produced more often, there are fewer emergencies and faster reaction to changes in consumer demand. The result is fewer stockouts, increased sales, less obsolescence and fewer asset disposals.

Pricing to the next link in the supply chain is based on the (increased) total consumption rate, rather than order size. Pricing in this fashion eliminates the last incentive to surge demand to the plant, leaving protective capacity to produce the higher level of demand that results from switching from Push to Pull. Sales are increased by the win-win nature of the new policy. Throughout the supply chain inventory turns and profits increase.

In Summary

The Pull system described here helps all links in a supply chain overcome the frustrating and damaging side effects of Push systems in wide use today. To fully realize sales, service, and profit potential, companies need to realize how constantly forcing inventory to the next link in the supply chain before it is needed actually limits their results. It can be said that *“unless the end consumer has bought, no one in the supply chain has sold.”*⁴ Making the transition is a challenge. You don’t need to buy special software or hardware, what is required is much more difficult: a new way of thinking and behaving.

IDEA’S WAY OF THINKING	IDEA’S METHOD
<ul style="list-style-type: none">• Neither an accurate forecast nor changing vendors is required for success• There is a way to both increase sales and reduce inventory• Supply chains sell less when clogged with inventory• In the long term, unless the supply chain sells more no link can sell more• We must help clients gain buy-in internally and with supply chain partners• The majority of our fees are based on improved return on inventory	<ul style="list-style-type: none">• Verify the existence of inventory imbalances and the benefits of moving from a “Push” to a “Pull” system• Gain top management buy-in to the assessment and support of the approach• Build knowledge and understanding across the supply chain, at all levels• Utilize systems that deliver actionable information, integrated with existing software• Work with you until expected results are achieved• Share the tools and know-how to continually improve results
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⁴ Goldratt, Eliyahu M., *Goldratt Satellite Program*: Chevalier Media, The Netherlands, 1999.