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Synchronization of Stores and Warehouses: Closing the Profit Gap

Successful retailers focus their efforts on the customer and the unique attributes of each store in the chain. Tailoring assortments, promotions and pricing for each store creates environments that foster increased sales and customer loyalty while also enabling profit to be maximized. But this attention to detail makes execution upstream at the corporate headquarters more difficult.

While most retail replenishment systems address the unique needs of each SKU/store, how can orders from the vendor to supplying warehouses reflect the intricate details of store level realities? Can time spent forecasting and ordering into the warehouse be freed up to enable the team to focus on store level opportunities?

What options exist for multi-echelon forecasting and replenishment?

Multi-echelon forecasting and replenishment refers to managing inventory levels for the multiple location levels of a typical retail demand chain. Consider the example of a SKU ordered from a vendor into a warehouse and then from the warehouse into the store. The same item requires demand forecasting and replenishment at two levels – the store and the warehouse that supplies the store. This example is a multi-echelon scenario. If the item were shipped directly from the vendor to the store, bypassing the warehouse entirely, it would be considered a single-echelon example.

There have historically been two ways to manage forecasting and replenishment in a multi-echelon environment: Independent Order Points (IOP) or Distribution Requirements Planning (DRP).

An IOP approach

The order point approach has historically shown strong results in retail forecasting and replenishment. Calculation of unique order points by product/location using key drivers such as a demand forecast, seasonal profile, order cycle, leadtime and safety stock has been a staple of replenishment logic for years. It is a flexible method that enables basic orders to trigger on a regular basis when conditions match the forecast.

When extraordinary conditions such as strong sales or inventory count updates suddenly clear out inventory or a poor performing promotion leaves unexpected residual inventory, the order point method is flexible enough to trigger orders outside of normal cycles to minimize lost sales or delay ordering to avoid unnecessary overstocks.

The challenge to this method becomes evident when applying order point theory to a multi-echelon environment. In many centralized retail buying organizations, it is common to find forecasting and ordering responsibilities for stores and warehouses assigned to two separate teams, each using unique data to calculate order needs. An independent team of allocators may work with software driven by store point-of-sale (POS) history to determine item/store needs and distributions. Promotional events, seasonal selling patterns and store level demand forecasts are managed at the item/store level to insure the unique attributes of the store are recognized.

A separate warehouse inventory management team may use their own warehouse replenishment software and processes to replenish the distribution center (DC) locations that supply the stores. DC to store shipment history and independently created promotional events, seasonal profiles and demand forecasts drive vendor purchase order decisions.

The division of inventory management responsibilities into two teams creates an opportunity for errors in communication and accuracy. Accuracy concerns center on the difference between POS history driving store level decisions while warehouse forecasting and replenishment is driven by warehouse shipment history. The use of POS for store level forecasting and replenishment enables systems to quickly recognize shifts in consumer buying. Adjustments to order points quickly translate into increased or decreased order quantities.

Using warehouse shipment history when forecasting future shipments is not as reliable. Trends in store sales must first be evident in the shipment history before warehouse demand forecasts and orders are impacted. Unfortunately, store sales and warehouse shipments do not always trend in the same way. Pre-season inventory pushes to stores, promotional overstocks or vendor direct shipments can cause strong selling stores to not generate shipment requests for several periods. Once these masking inventory cushions are gone, regular increased store shipments can drive the warehouse out of stock if it is not prepared with additional inventory.

In addition, the two separate replenishment teams likely have no automated or consistent methods to communicate changes in key item components to the other group. This opens the door for each team to be making decisions with different sets of information, driving inventory decisions in different directions for the same item. When communication between the teams does happen, the manual efforts to synchronize the several order point components such as seasonal profiles, promotions or demand forecasts can lead to heavy workloads and potential errors, especially for retailers carrying thousands of items in hundreds of locations.

Potential errors found when users manually synchronize key components include keying errors, errors in summarization and mistakes in time-shifting. The impact of a service level goal change at a single store location on a warehouse that services many stores is not straight-forward or easy to calculate for the average replenishment buyer.

Store events such as promotions not only need to be summarized when calculating the warehouse values for the same promotion, but also need to be time-shifted. This shifting accounts for the fact that a July 4th promotion in the store often must be purchased into the warehouse in late June to enable the product to move through the warehouse and reach the store shelf prior to the promotional start date. The correct application of store leadtimes and order cycles makes time-shifting very difficult to get accurate when not systematically supported.

With these challenges mounting for the replenishment buyer, their focus soon turns to synchronization instead of customer trends. Chances to quickly identify market trends and customer specific opportunities are lost.

DRP provides benefits over IOP

Solution providers recognized the issues with the IOP approach and devised a method to link store and warehouse forecasting and replenishment decisions. By systematically linking stores and warehouses, several areas can benefit. Members of both teams can focus on their products and customers and not on the other team's activities. Data integrity and accuracy are improved by removing keying errors, mistakes in time-shifting and summarization from the process. Sales improvements and inventory productivity gains become apparent when the entire demand chain is addressed as a whole.

One of the most popular methods to accomplish this synchronization is through the use of a model called Distribution Requirements Planning (DRP). In a DRP approach, item/store level order forecasts are summed across store locations to create a warehouse level shipment forecast. This approach provides several benefits compared to the IOP approach. Changes to store level demand forecasts, seasonal profiles, promotional events, order cycles and leadtimes are all captured in the order forecast. When store inventories become out of balance, updated store order forecasts reflect the impact on the warehouse by reducing or increasing the quantities needed.

The DRP method to synchronization is not without its drawbacks. Loss of component detail at the warehouse and the inaccuracy of item/store level order forecasts detract from the manual reconciliation savings realized.

Because the order forecast is a single number, the details of the regular, seasonal, leadtime, promotional and special order needs for the SKU/store are lost. When the component detail is missing at the warehouse, users lose the ability to understand and manage the drivers of the vendor orders. If changes to a single warehouse component are desired, such as pushing out an additional two days of inventory to the stores to cover a future warehouse shutdown for inventory counts, the necessary details are unavailable and flexibility in decision making is lost.

A larger concern is the inaccuracy of the store order forecast that is the basis of the DRP method. For most retailers, over 80% of SKU/stores do not sell a single piece per week. Because of the "hit and miss" nature of sales at the store level, order forecast accuracy suffers. For example, if an item sells 0.3 pieces per week at a specific store, forecasting when the next sale will occur at the location is very difficult. If that store needs to sell 6 pieces before an order for a case pack is triggered, accurately forecasting when the store will place that order becomes almost impossible. Aggregating inaccurate store order forecasts and using the total to drive warehouse ordering leaves some retail executives to question the use of DRP as a method for synchronizing the demand chain.

A better option exists – Synchronized Order Points

It would be nice to allow users to manage the details at the store level and let advanced solutions determine exactly how to translate that activity up to other levels in the demand chain. DRP improves upon the IOP model, but there are still areas on which to improve. A new approach supported by some solution providers – Synchronized Order Points (SOP) – takes the best of both models and combines them into a superior solution to multi-echelon forecasting and replenishment.

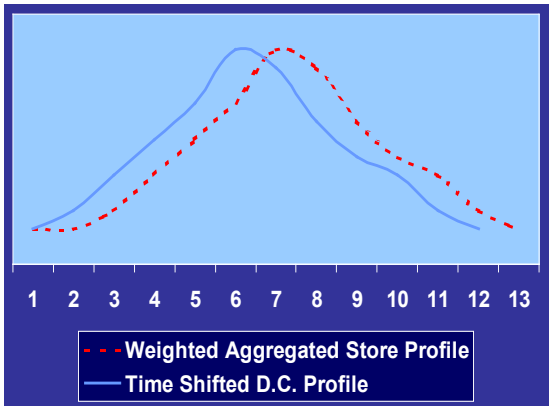
With SOP, instead of taking the answer – a stream of order forecasts over time – and passing it up to other echelons, the base components are summarized to the higher levels. This solution enables the flexibility of the IOP model yet automates the synchronization of major components. It is a much more mathematically complex solution compared to DRP, but the benefits over DRP can be significant.

In the SOP method, store POS history is aggregated across store locations and is used as the basis for warehouse demand forecasting. This approach solves two problems. First, it improves on the IOP model that previously used warehouse shipment history. It often takes several weeks or months for warehouse shipments to reflect changes in consumer buying patterns that are evident much sooner when analyzing the pure consumer driven POS data. Second, using the aggregate POS data improves on the poor forecast accuracy so common at the SKU / store level due to low sales volumes. By summing the history of zeros and ones across several stores, an aggregate demand history emerges that provides a more statistically sound forecast when compared to the summation of individual store level forecasts.

A warehouse demand forecast that is based on aggregate POS history is more reactive to changes in consumer trends compared to a forecast based on shipment history. Because the goal is to forecast future warehouse shipments and not consumer demand, the SOP method must go a few steps further.

There are instances when the team managing store level forecasts has anticipated a demand shift prior to a change in consumer purchases. They can prepare for that change by manually adjusting the store forecast to drive increased orders. To prepare the warehouse for the impact of the store forecast change, the manual store demand forecast change is systematically captured and passed up to the servicing warehouse. In this way, if the store forecasts are suddenly doubled in preparation for a new ad campaign, the warehouse is immediately aware of the anticipated increase in store demand and can more quickly ramp up orders to the vendor to preserve service levels.

The use of store level seasonal profiles is common for categories such as cough medicine, snow shovels and tank tops. Solutions employing the SOP approach apply math to combine the store profiles and create a single aggregate seasonal profile at the supplying warehouse that represents future sales patterns. Time shifting must also be applied to the newly created aggregate profile. For example, a seasonal peak in store sales for bug spray may be early July, but the peak in shipments to the stores would likely be sometime earlier – perhaps mid to late June. Warehouse shipment peaks always occur prior to store sales peaks because the warehouse has to ship the product to the store ahead of time so it is on the shelf when the consumer wants to buy it.



The same approach to aggregation and time shifting used for warehouse seasonal profile creation is also applied to other time sensitive events in the stores such as promotions, new item introductions, exiting items and new store rollouts. The impact of each of these events on the supplying warehouse is calculated, summed across all stores serviced by the warehouse and time shifted to create an adjustment that accurately reflects how the store shifts in demand will impact warehouse shipments.

Because store ordering logic looks at both the supply and demand, the DRP approach of using store order forecasts links both supply and demand in a multi-echelon environment. If store inventories are overstocked due to an ad that did not sell as well as expected, store order forecasts are reduced because the existing inventory can support future sales needs. Because the SOP method does not use store order forecasts, it must take a different approach toward addressing store level inventories and their impact on future warehouse shipments.

A multi-echelon replenishment solution using SOP theory adjusts the warehouse inventory balance to account for inventory imbalances in downstream stores. The warehouse inventory is increased when stores are overstocked and will not order as expected. This will delay and reduce vendor orders.

Just the opposite is true when stores are out of stock and will order more than normal. The warehouse inventory level is decreased to speed up and increase vendor orders. The advanced math required to determine the correct amount of the warehouse inventory adjustment is likely the reason that users in an IOP environment were unable to duplicate this function on their own. Because store overstocks deplete over time and only a portion of a single store's overstock can be, this is an ideal function to be supported by the power of a software solution.

Benefits for those who demand the best

Synchronizing store decisions with the warehouse through intelligent summarization and time shifting enables retailers to apply the focus of their people to the areas where human insight is needed most. Leading retailers have already employed an SOP approach to synchronizing their demand chains. Significant benefits are available if retailers are willing to implement these leading multi-echelon solutions. Synchronizing store and warehouse forecasting and buying decisions closes the profit gap and establishes long term success.

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