

# Replenishment: What is it exactly and why is it important?

Replenishment is an area within operations where retailers can find an edge to beat the competition and delight the customer. Dictionaries define Replenishment as “filling again by supplying what has been used up.” This definition does not adequately address the business conditions in retail inventory management. After all, if an item recently sold several hundred pieces for an ad that has concluded – should several hundred more be brought in to replace what has been sold?

What if an item is going to be discontinued next month or just completed a major season such as candy corn in November – should replenishment blindly fill in again? The complexities of retail dictate that replenishment processes and solutions are more sophisticated than this initial definition. When looking at retail replenishment, a more appropriate definition would be “acquiring product on a recurring basis to support anticipated need.”



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## Replenishment Process

Replenishment is also a process that occurs regularly. If vendors only offer merchandise in a limited number of shipments – common in the fashion industry – merchandise planning and allocation should be used to support ordering. While replenishment can support these situations, the time required for item setup and forecasting often outweighs the savings from the automation of forecasting and ordering. The major benefits of a replenishment model come from situations with on-going availability of merchandise.

Replenishment can be broken into base components for easier definition, description of best practices and discussion of the benefits available.

## Demand Forecasting

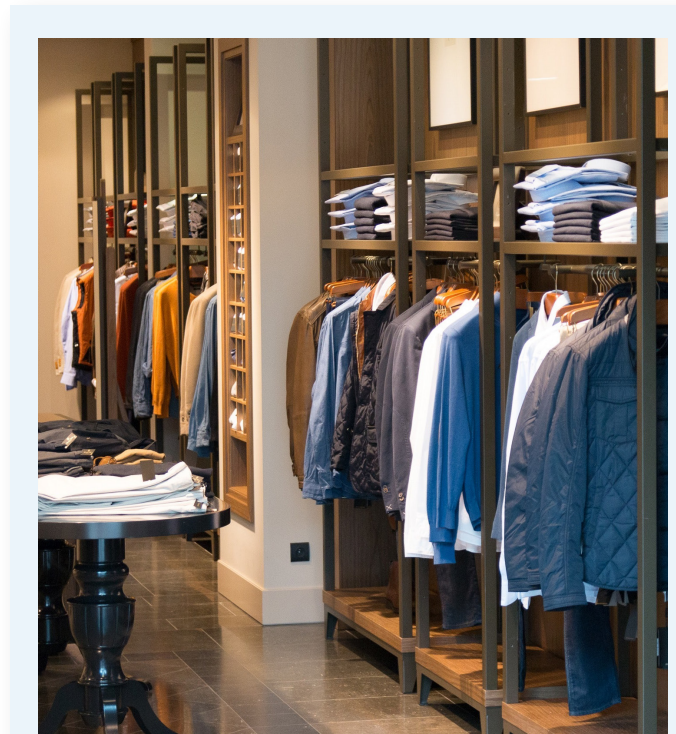
Perhaps the most influential and difficult to master of the replenishment components, demand forecasting is the foundation of replenishment buying. Replenishment focuses on acquiring product to support anticipated need, and the demand forecast is the key to understanding that future need. While some forecasts are calculated manually relying on the experience of the buyer, demand forecasts are almost always calculated using scientific algorithms. Some packages allow for demand forecasting with several algorithms, requiring the user to understand each variation and select the most appropriate method for each product location. Others focus on one or two “best of breed” algorithms, allowing the user to spend their analytical time on other factors of replenishment. The decision which approach to take is an important one, and is largely driven by the types of business scenarios faced by the replenishment team.

Replenishment buyers are typically responsible for tens of thousands of product locations and may not have the time or analytical backgrounds to make these types of decisions. Look for solutions that have a “pick best” approach or a single algorithm that is flexible enough to address the needs of all products. One area where retailers can impact the accuracy of these algorithms is the frequency of demand updates.

Updating forecasts frequently enables retailers to react more quickly to changing consumer buying habits, but this increased reaction speed has a price. Frequently updating forecasts may reveal lower level variance in the demand history and may increase safety stock requirements to compensate for this variance. For example, if an item sells one, nine, one and nine over a four-week period the average sales are five each week but the variance from the forecast is four each week – or 80% of the weekly forecast.

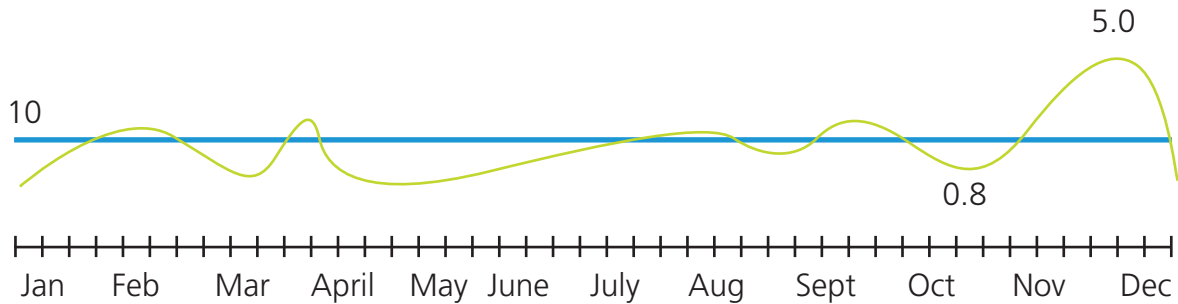
Updating the forecast less frequently has the effect of smoothing the normal random variance but does not allow the system to react as quickly when demand is actually trending up or down.

Updating the forecast every four weeks in the same example would preserve the demand forecast at five each week and would show no variance (20 sales compared to 20 forecasted), reducing safety stock levels. Best practices suggest updating forecasts more frequently for new or trending items and updating the forecast less frequently for more established items or those with very low sales rates. With over 80% of retail item locations selling less than one piece per week, forecasts for the majority of items in retail must be able to handle infrequent sales. Many models will drive the demand forecast to zero with several consecutive weeks lacking a sale. Look for alternate forecasting methods that use an item’s long-term selling history or even those that bypass demand



forecasting and instead simulate ordering practices to minimize inventory investment while preserving sales. Many of the items that have sufficient demand to support demand forecasting also show variance in demand in a predictable pattern over the course of a calendar year. These items are defined as seasonal items. Best practices suggest using a demand forecasting solution that supports the use of seasonal profiles.

A seasonal profile is a series of multipliers – normally weekly – that are applied to the demand forecast. For example, an item may average sales of ten per week over the course of the year but see sales increase to 50 per week in December. This item would justify a seasonal profile with multipliers of 5.0 for each week in December.



Using seasonal profiles where appropriate will enable buyers to systematically apply their product knowledge across more item locations than a human being could accomplish alone. Using a single profile for multiple item locations with similar sales patterns allows the buyers to change many item location's forecasts at the same time by altering a single profile.

Many software solutions offer clustering functionality to group together item locations with similar seasonal selling patterns. This assists buyers in the application of correct profiles. Through maintaining profiles instead of individual item location's sales forecasts, buyers can utilize their market knowledge without bypassing the power and math of demand forecasting.

Promotional management, which in many ways can be seasonal in nature, does have its own flavor. It addresses forecasting the impact on demand when items are promoted. Because of the increased sales volumes, the investment in advertising and the raised customer expectations, accurate promotional forecasts are an important aspect of demand forecasting for successful retailers.



For single week promotions, retailers may use bolt-on promotional forecasting solutions that work in concert with the base demand forecast. Solutions leveraging multi-variant regression analysis using variables such as time of year, ad price, promotional vehicle and competitor activity can yield positive results. Depending on the amount of promotional movement at a company, selecting a separate tool for promotional forecasting and staffing a team of promotional forecasting experts often is an investment that quickly pays for itself. Promotions lasting for several weeks are best supported using an approach that combines the analysis associated with week-long ads and an event profile concept similar to seasonal profiles. Because promotions of extended length can see demand trends and patterns similar to non-promotional sales, the event profile is a preferred solution. Application of an ad multiplier that varies by week enables retailers to forecast the impact of the promotion while also enabling the system to adjust forecasts by location as actual ad sales post higher or lower than originally forecasted.

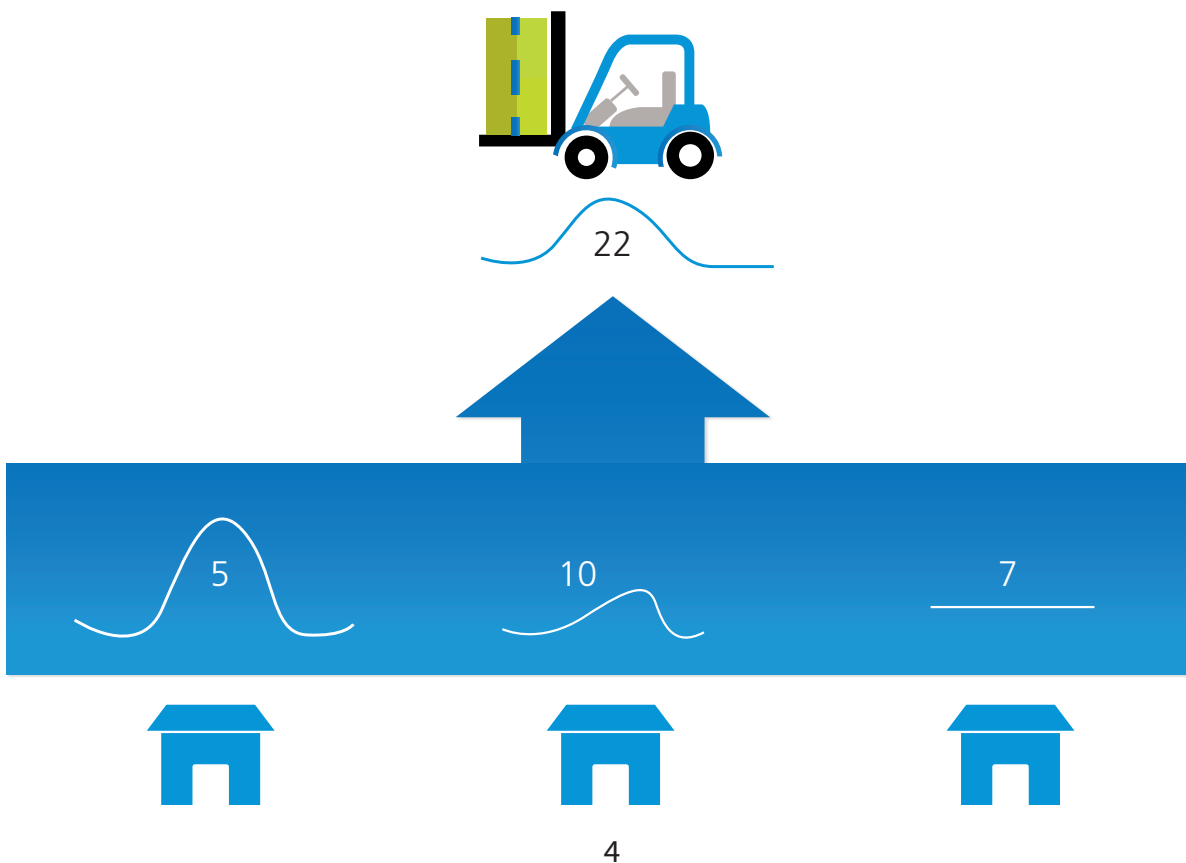
Once a promotion is completed, retailers must ensure that promotional sales history does not impact the non-promotional demand forecast. During the period when the demand history was impacted by a promotion, history needs to be marked as promotional. Then, different solutions can either ignore or adjust history to non-promotional levels when updating the forecast.

One of the most challenging areas for any buyer to manage is new item forecasting. By definition, demand history for new items does not exist. Sometimes history for a similar item can be used to establish the item until demand history for the new item is collected. Other times, treating new items with special care is the best approach. Increasing the system's reaction speed and review frequency are common techniques employed when new items are introduced. Running forecast accuracy reports for items in the first few weeks of selling enables buyers to recognize and react to shifts in demand.

Managing by exception is a key component of successful item location demand forecasting. It enables your staff to be more efficient by directing their energies to items or locations that fall outside pre-established acceptable ranges. Forecast exceptions offer an efficient tool for time-starved analysts, since it requires them to look only at items that had unusual movement.

The best demand forecasting solutions synchronize store and warehouse forecasts. Much of the effort already described focuses on reacting to the unique attributes of item locations. If the detailed forecasting efforts at the item store level do not translate up into the supporting warehouse, out of stocks and overstocks will be the norm. Look for demand forecasting solutions that recognize changes made to store level forecasts, promotional plans and seasonal profiles and roll these changes up to the supporting warehouse. These solutions will enable buyers to focus time and effort at the item store level while still maintaining the warehouse forecast necessary for accurate replenishment ordering. Solutions may be able to handle a multi-tier environment, with one tier of warehouses (hubs) serving as the source of merchandise for the next tier below (spokes).

Some solutions also allow for forecasting at an aggregate level. If the individual skus or stores have demand that is too spotty for traditional forecasting algorithms to parse, an aggregate forecast at another level of the hierarchy (subclass, or class, for example) can provide benefits, particularly when replenishment is often closely linked to merchandise planning which already uses that kind of thinking.



Retailers who have mastered the demand forecasting process have realized inventory reductions of 10% to 15%. At the same time, service levels and sales have increased by up to 30% when best practices and top solutions are in place.

## Lead Time Forecasting

Lead time forecasting has nearly as much impact on the replenishment process as demand forecasting. Lead time refers to the number of days between order placement and receipt, including the time it takes to enter the receipt into the system, place it on the shelf, or otherwise make it available for sale.

As replenishment focuses on acquiring product to support anticipated need, the lead time forecast is the key to understanding how long ahead of that future need orders should be placed.

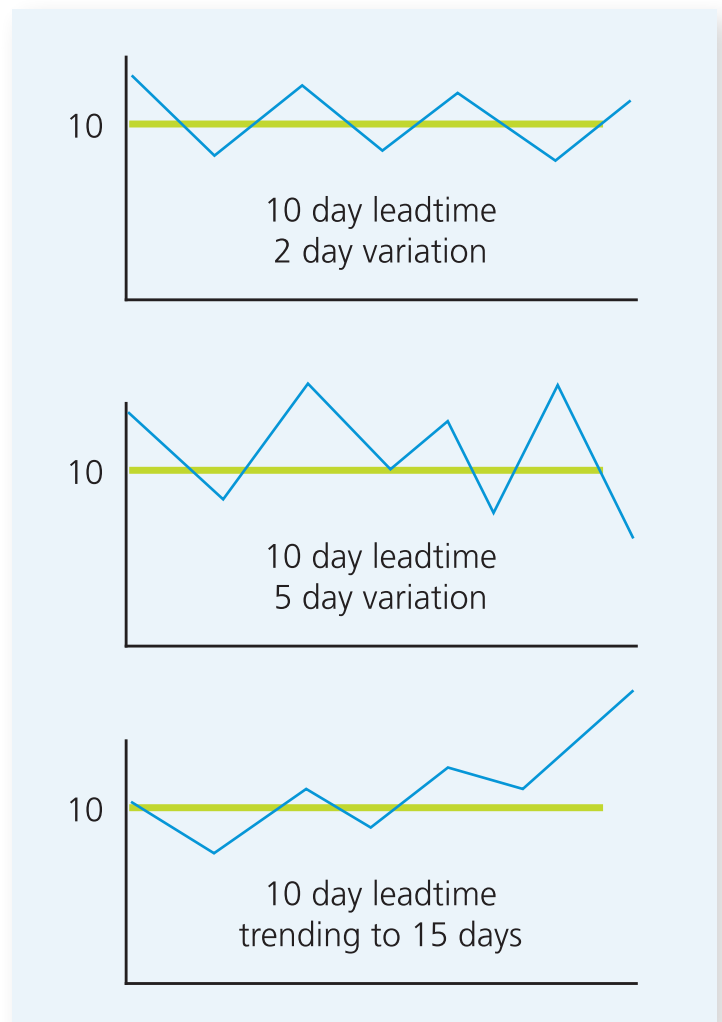
The lead time variance indicates the amount of deviation buyers experience with order delivery. This number represents the reliability of the lead time forecast. The higher the number, the more inconsistent the vendor or warehouse is in their shipping process.

Why is lead time forecasting so important? If weekly demand forecast is 100% accurate, but the lead time forecast is too high by a week, replenishment orders will drive one week of overstock inventory. Under forecasting lead time by a week with a perfect demand forecast leads to inventory levels off by a week of supply and potential out of stocks.

Buyers need accurate statistics concerning supplier lead time to attain their service goals. When time is money, emphasis on lead time forecasting is critical. Reducing the variance of vendor lead time will increase in-stock levels and reduce safety stock levels used to compensate for variation.

Establishing a supplier compliance program – including the detailed lead time and lead time variance reporting required to support the program – is a best practice. Knowledge of each vendor's performance and the impact of poor performance on inventory levels and lost sales help focus buyer and merchant negotiations on this key driver of replenishment success. When searching for a solution to support lead time forecasting needs, look for packages that use the same techniques as demand forecasting. This approach enables buyers to leverage their demand forecasting knowledge for greater gains and enables the same benefits available for demand forecasting including adjustments for lead time trends, calculation of lead time variance and generation of exception reporting.

Without a sound lead time forecasting process and toolset, buyers will tend to add cushion inventory to reduce lost sales. This 'worst case scenario' buying practice adds inventory expense across the board instead of a focused investment in those areas where the statistics indicate additional safety stock is needed. Accurately forecasting lead times and compensating for reduced lead time variance can show a 10% to 15% inventory reduction while preserving current service levels and sales.





## Order Cycle Analysis

The order cycle refers to the amount of time expected between receipts. Knowledge of this variable enables buyers to look forward and determine how much product to buy so inventory levels are preserved until the next expected receipt.

Balance acquisition costs against carrying costs to calculate the most profitable order cycle. Acquisition costs include those related to PO creation such as transmission and payment, and PO handling costs such as receipt, check-in, and put away of the merchandise. Carrying costs include those related to the cost of capital and the physical cost of inventory such as taxes, insurance, shrink, obsolescence, and depreciation.

Analysis of optimal order cycles is a process that calculates the best (i.e. most profitable) order cycle for an item and vendor. This optimal cycle is based on minimizing of carrying cost through increased order frequency balanced with minimizing lost sales and acquisition costs through increased order size. Accomplish this task by evaluating the unique forecasts of each item in combination with established carrying and acquisition costs for inventory. This analysis should take into account all vendor minimums and discount brackets. Using this information, a good order policy analysis function balances the carrying costs with acquisition costs to suggest the most profitable order cycle.

Correct order cycles for vendor orders improve inventory profitability. Using an item-based analysis process, certain items within a vendor line may be purchased less frequently to increase profits while still maintaining overall vendor profit levels.

## Service Level Goal Analysis

How much customer demand should be supported by replenishment inventory and safety stock? Often the emotional reaction to this question is "100%, of course!" However, safety stock is used as a hedge against uncertainty. Customers can always buy more than forecasted. Vendors can always ship late. To ensure 100% coverage of all potential demand would require, theoretically, infinite inventory.

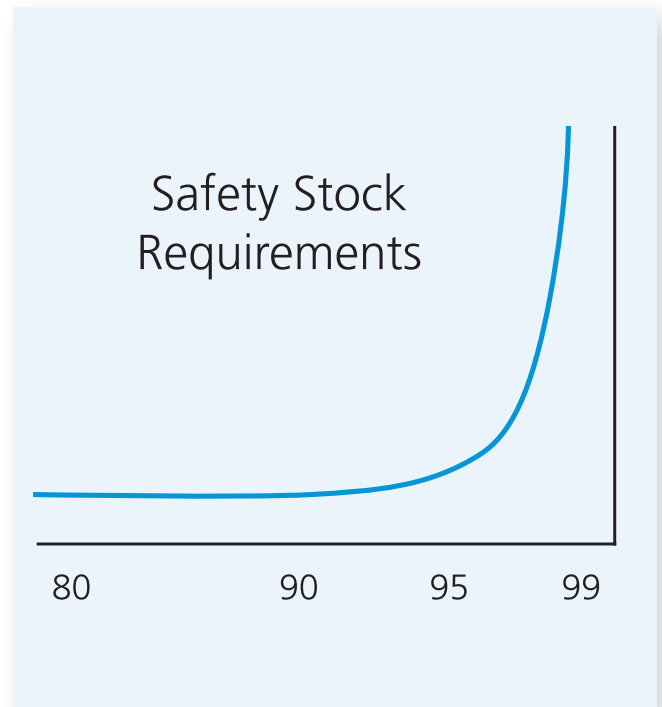
While lead time variance can be minimized through a strong vendor compliance program, accurately forecasting customer purchases will always be an inexact science. Retailers need some way to profitably compensate for the inevitable variance from demand forecasts. Service level goals and the corresponding safety stocks are that compensation.

Higher service level goals result in greater sales opportunities, but they can also result in higher levels of safety stock and expense. Some items have more consistent demand patterns and need less safety stock while other items have less reliable vendors whose lead time variance causes delayed shipments and lost sales. Some items have larger demand forecasts that require additional pieces of hedge stock, while other items receive larger receipts less frequently and have fewer chances to run out of stock.

The best retailers can present an image of near 100% in-stock while minimizing inventory levels for low visibility items that carry a high risk of obsolescence. Selectively choosing times, products or locations with high service levels enables retailers to minimize inventory invested while maximizing perceived in-stock levels.

When determining a service level strategy, carrying enough safety stock inventory to cover all potential sales is not a profitable strategy. Purchasing and carrying the additional inventory required to support every potential sale is very expensive. As service level goals increase, the inventory required to support those goals increases exponentially.

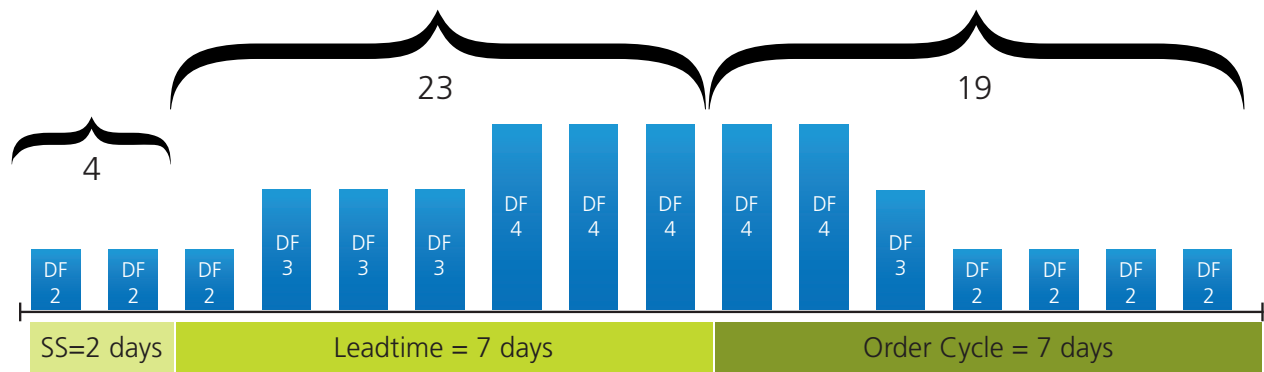
This graphic shows how safety stock requirements increase as service level goals increase. Example: An item sells between three and five pieces each week throughout the year. One week in April saw increased sales of 17 pieces because of a single customer purchase. A 99.9% service level goal for the item would dictate keeping at least 17 pieces of inventory available throughout the year. Often the carrying costs associated with the additional inventory do not offset the gross margin gained with the increased sales. Service level goals drive inventory levels and sales which are two critical components of retail profitability. Setting item service level goals at the appropriate level will improve company profitability. When service levels are increased, lost sales are minimized while carrying costs are raised. When service level goals are brought down, lost sales increase while carrying costs are reduced. Through careful analysis, a service level goal can be found that drives low inventory carrying costs while reducing lost sales. Accurately setting service level goals can result in a 10% to 15% inventory reduction along with a 2% to 10% service level improvement.



## Replenishment

The replenishment step brings together an item location's current inventory position along with the results of the previously mentioned replenishment components. The outcome of this step is a Suggested Order Quantity (SOQ) necessary to support future demand and service level requirements. Demand forecasting estimates future sales for the example item. Lead time forecasting estimates it will be seven days (accounting for sales of 23 pieces) until a purchase order will be received once placed.

Order cycle analysis calculates the most profitable number of days between order receipts is seven days and the forecasted demand is 19 units over those seven days. Finally, service level analysis suggests keeping an additional two days of inventory on hand (four pieces) to address forecasted variance in both lead time and demand.



Replenishment combines these individual calculations and determines that 46 units of inventory ( $4 + 23 + 19$ ) are required to support sales for the item location in question. If current inventory ownership for the item location is 20 units, replenishment will suggest an order of 26 pieces. This example describes the basics of replenishment.

There are several other attributes of the best replenishment solutions and processes. While orders may normally be placed once every seven days in the example, the best solutions will calculate a SOQ for every item location every day. This enables a solution to recognize sales spikes and inventory count updates as soon as possible and react with additional inventory if needed. While the processing time required for this can sometimes be long, the benefits are substantial. Because many slow selling item locations may not register a sale on a particular day, processing times can be minimized by only calculating a SOQ when sales or inventory activity is posted.

Another complexity addressed by the best replenishment solutions and practices is the idea of vendor level ordering. While the examples used up to this point have been at the item location level, buyers place orders to vendors. Vendor level ordering acknowledges that while a single item may need additional product to preserve its service level, the other items carried by the vendor may not.

When the collection of items carried by a vendor will miss a vendor service level goal if an order is not placed, advanced replenishment solutions suggest placing the order. Daily ordering to support a portion of vendor items is often much more expensive in terms of billing and warehouse receiving when compared to waiting several days and placing a single order addressing the needs of all items. Exception reporting indicating individual items in need enables buyers to make the correct business decisions without causing undue expense. Additionally, a well-designed replenishment order will help bring the vendor's items "in line", so that exceptional cases should be less frequent in future.

As these larger vendor orders are placed, emotional buying and over-reaction will be reduced, and the science and math of inventory management take over. Over time, buyers will begin to trust the order quantities and calculations. Time spent reviewing and approving orders is dramatically reduced – often to less than an hour per day. This frees up time for more valuable work, such as fine tuning the previously mentioned replenishment components and focusing on process excellence.

## Special Orders

Special orders refer to additional needs on top of basic replenishment. Adjusting orders to compensate for promotional activity, new store openings, and deal buy opportunities are typical examples of this type of order need. Transferring overstocks from one location to another to maximize service levels without bringing additional inventory into the demand chain or purchasing items from alternate sources are other examples of special orders. On some occasions, opportunities exist to purchase additional quantities of merchandise at a discount. Deals often fall near the end of vendor fiscal quarters when increasing sales volumes can prove beneficial to a vendor's stock price. The best replenishment solutions and processes analyze the deal components such as percent off, additional dating, and cash back offers and recommend the additional quantity, if any, that should be purchased. Because each item location has a unique gross margin, sales rate, carrying cost, and handling cost, avoid solutions that advocate a single "X weeks of supply" approach to all deal opportunities.





Product required to fill new store shelves as well as the additional product needed to support new store sales must be added to orders. The need for additional new store product occurs prior to actual sales history increasing demand forecasts. Effective replenishment teams and solutions forecast this incremental need and build it into the ordering process ahead of time.

Promotional replenishment should consider sending only a portion of the incremental ad product to the stores prior to actual ad sales, assuming lead times allow for this. Often, reading and reacting to the first few days of promotional sales – even just the first day of ad sales – can afford retailers and replenishment solutions the opportunity to adjust forecasts once consumers have cast their initial vote. This increased flexibility helps to compensate for the uncertainty of promotional forecasting, competitor activity or the impact of weather of consumer purchases.

Alternate sourcing – sometimes called diverting in the Health & Beauty industry – can prove to be

a very lucrative process. The best replenishment solutions collect product availability and pricing information from multiple sources for an item and present sourcing options to the buyer. Using this information to improve negotiating leverage with the primary vendor or selecting the “best” vendor for each order can increase gross margins. Buyers should be cautious about the impact on lead times, lead time variance and product quality when dealing with alternate sources.

## Order Validity

Order validity refers to meeting ordering rules established by vendors. Examples of typical order rules include item or order minimums, maximums and multiples such as truckload, case pack, layer or pallet. The best replenishment solutions and processes build profit-driven logic into this step. While rounding a SOQ to a case pack multiple seems straight-forward, when should quantities be rounded up to a layer, pallet or truckload? Deciding how and when to increase orders to meet these larger multiples can improve profits beyond just increasing gross margin. Truckload rounding often reduces lead times and lead time variance, leading to lower safety stocks and increased service levels.

When adding quantity to an entire order to fill a truck, which items should be increased or should items be added to the order? Best practices suggest keeping items tied to a source in a balanced time supply. This will enable the next order placed to fall back into a regular timing cycle and prevent individual items from being over or under stocked. To preserve a balanced time supply, orders should add or subtract days of supply for all items to meet the vendor brackets and other rules.

## Benefits of Successful Replenishment

Excelling at replenishment enables a retailer to implement the promotional, pricing and assortment strategies established. Not only does winning the replenishment game enable execution of these strategies, but additional profit can be gained by minimizing inventory levels and reducing lost sales. Time is made available for analysis and special projects when fighting the fires of overstock and out of stocks is removed from the buyer's day.