

# Optimal Supply Chain Operating Strategies by Replenishment Stream

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Topic Area – Replenishment

**Summary:** In the world of consumer packaged goods (“CPGs”), not all demand is created equal. While Base Demand typically comprises anywhere from 50 – 80% of day-to-day volume, other demand profiles, or replenishment streams, make up the delta. For the purpose of this project, demand patterns for five replenishment streams (Base Demand (“Base”), Incremental Business Activity (“IBA”), Promotional Activity (“Promo”), New Initiative Phase-In (“Phase-In”), and New Initiative Phase-Out (“Phase-Out”)) were analyzed to determine if and how operating strategies from an inventory, planning, and distribution perspective should be adjusted to maximize end customer service level for a newly launched personal care product.



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## Key Insights

1. Segmenting inventory by both product category and SKU into high, medium, and low volume categories is more practical from a strategic inventory management perspective than segmenting by replenishment stream.
2. Initiative Phase-In activity must be executed in a consistent, organized manner to ensure that this demand is properly incorporated into the forward-looking Base Demand forecast after the product launch phase expires.
3. Simple events, such as product being left off the truck in a cube or weigh out event, can disproportionately impact end customer service level for lighter weight CPGs overtime.

**Introduction.** Although consumers in the age 50-plus demographic control ~83% of household wealth in the United States, the Boston Consulting group estimates that <15% of global companies have established business strategies to meet the needs of this older population (Grey Market). The project sponsor, a CPG company, recently launched an incontinence product as part of the Company’s feminine care offering. The Company has identified five replenishment streams (Base, IBA, Promo, Phase-In, and Phase-Out) and wishes to confirm whether there is an operational benefit to differentiate the supply chain by these streams.

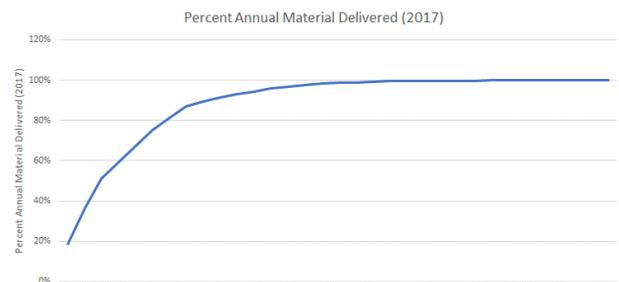
**Data & Methodology.** The Company provided four million records of feminine care data for years 2016 and 2017 for the North American market (United States and Canada). This data contained orders and shipments broken out by SKU, customer, replenishment stream, and day for 2016 and 2017.

The Company monitors case fill rate, or CFR, as a measure of end customer satisfaction (calculated as amount ordered divided by amount shipped). The Company is targeting CFR levels close to 1 for all SKUs for top customers. A CFR ratio of less than 1 represents situations where the Company shipped less than what the customer ordered.

**Results**

**Inventory Strategy.** Adult incontinence is the Company’s fastest growing product segment. The Company offers incontinence products under three main categories: Segment A, Segment B, and Segment C. To properly analyze the Company’s incontinence inventory policy, a Pareto analysis, or SKU segmentation, was performed to identify the Power SKUs for each of the incontinence product lines. This segmentation identified which SKUs contributed the most (Power SKUs) and least (Bottom SKUs) to overall incontinence product volume, serving as a roadmap for further analysis.

From this analysis, three SKUs drive ~70% of sales volume across all incontinence product lines (Segment A, Segment B, and Segment C) in both 2016 and 2017. These SKUs represent Segment A sold to top accounts (Customer A as well as multiple accounts including big box retail, drug stores, and grocers). Interviews with the Company relayed that product sizes in incontinence are trending towards bigger sizes and longer pads given the high incidence of obesity in the US (46 – 67% of obese women are incontinent), providing context for the dominance of Segment A (CDC).

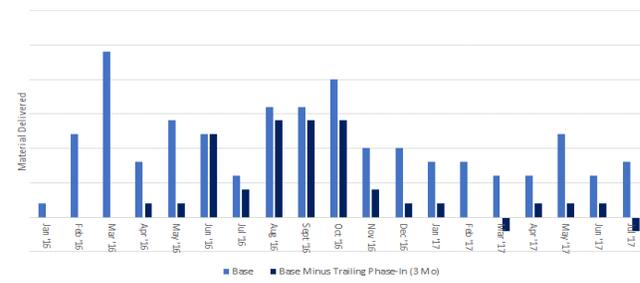


**Fig 1.** Three SKUs drive ~70% of sales volume across all incontinence product lines. These SKUs represent Segment A sold to top accounts.

Interestingly, moving across product lines from heavy to lighter product sizes, there are less Power SKUs driving overall sales volume (4 Power SKUs for Segment C vs. 7 Power SKUs for Segment A). Given that the Segment C product line has 20 SKUs that drive the remaining 20% of product volume, there is opportunity from an inventory management and manufacturing perspective to consolidate low performing SKUs, lowering overall operating costs.

**Planning Strategy.** From on-site Company visits, it was revealed that incontinence has a higher incidence of IBAs than traditional feminine care, likely given that incontinence is a new product that was launched in 2014. IBAs present a challenge from a demand forecasting perspective given that there is very little lead time (typically only 2-4 weeks) for this type of business activity. Unexpected shipments, the result of an IBA, cause supply chain disruptions that result in CFR values <1.

Incontinence also has a high incidence of Phase-In. Given that Phase-In are typically introduced biannually, from a planning perspective, this high incidence of Phase-In likely contributes to low CFR levels for Customer A.



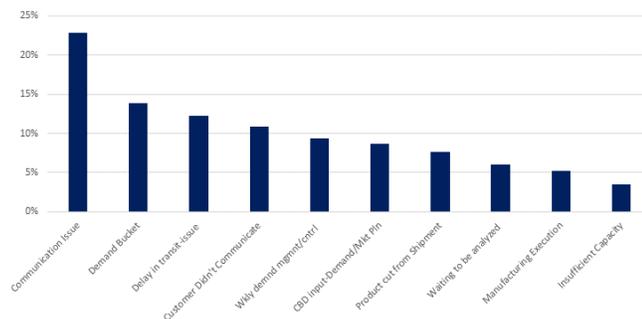
**Fig 2.** Base Demand minus Normalized Base Demand is negative in instances where Phase-In was not properly incorporated. Phase-In becomes Base Demand after three months and must be accounted for in forward-looking Base Demand forecasts.

By normalizing Base Demand to incorporate the Phase-In Demand from three months prior, and subtracting this value from Base Demand, it was clear that Phase-In has not been properly accounted for during the forward-looking planning process for Base Demand.

Specifically, in March 2017 and July 2017, the difference between actual Base Demand and this normalized Base Demand was negative, indicating that the Company was not accurately forecasting Base Demand to reflect the incremental demand from New Initiatives in prior periods, resulting in lower CFR.

**Distribution Strategy.** The Company recently adopted a mixing center strategy to give customers more flexibility when placing orders (i.e. instead of placing orders for a single product type by the truckload that would ship directly from the manufacturing plant, customers now place orders that mix and match commodities to their needs and ship from a centralized mixing center). This novel distribution strategy services 80% of United States demand within 24 hours, translating to increased responsiveness, higher on time reliability, and more friendly freight services.

The Company's incontinence product can ship by pallet, pallet layer, and/or by case. These orders are combined with other orders to make a full customer order; however, certain product lines do not combine with feminine care or incontinence. The Company takes this approach for the purpose of packing the lighter products with heavier soaps and detergents with the aim of weighing the truck out before it is cubed out. For this reason, feminine care and incontinence are typically last on truck for mixed loads because they are the lightest products and, as a result, also the first thing to come off the truck.



**Fig 3.** Root cause analysis for low CFR for the months July 2017 through October 2017.

The Company tracks and diagnoses root causes for low CFR on a month-to-month basis. From Fig. 3 above, it is apparent that ~30% of low CFR incidence can be attributed to a communication related issue either on the part of the Company or the customer. From there, 20% of low CFR incidence is distribution related either from a delay in transit or from the product being cut from shipment.

This is not surprising, given that feminine care and incontinence products are typically last on the truck for mixed loads because they are typically the lightest products and, as a result, the first thing to come off the truck.

## Conclusions.

**Inventory Strategy.** From an inventory management perspective, it does not make sense to segment by replenishment stream given that the determining factors of whether or not a SKU will be a top or bottom SKU (i.e. whether or not a SKU will be high volume) is dependent first and foremost on the nature of the product (Segment A, Segment B, or Segment C), followed by the underlying customer accounts that are buying the product, and, lastly, the replenishment stream

Adopting a policy where Power SKUs across each product category are given priority over SKUs that contribute lower overall sales volume will optimize resource utilization while ensuring that top customer accounts receive high levels of service.

**Planning Strategy.** Primary research revealed that many successful Fortune 500 companies employ differentiated planning processes for replenishment streams based on both their demand profile (i.e. stable versus nonstationary) and lead times. For this reason, it is not uncommon for Base and Promo to be treated similarly from a demand planning perspective whilst demand planning for IBAs is done separately.

For SKUs that have high levels of Phase-In activity, it is critical that all forward-looking demand planning processes incorporate Phase-In Demand into the Base Demand forecast for three months out. To mitigate these types of demand planning shortfalls, the Company should have a targeted, time-constrained Phase-In launch strategy to facilitate more accurate forward-looking demand planning for Base Demand.

**Distribution Strategy.** The Company uses software to pack trucks Tetris style by optimizing the truck load based on axel weight and balance of the overall truck. By being cognizant of the reasons why incontinence and feminine care products are being left off the truck, and by setting certain packing criteria at the mixing center level to ensure that feminine care and incontinence products are not taken off the truck, the Company can lower the overall incidence of low CFR that results from this activity.

## References.

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Neale and Willems: Managing Inventory in Supply Chains with Nonstationary Demand Interfaces 39(5), pp. 388–399, ©2009 INFORMS

“The Grey Market”, The Economist, April 9, 2016.

