Optimal Supply Chain Operating Strategies by Replenishment Stream

by

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Bachelor of Science, Chemical Engineering, Tufts University, 2013

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Abstract

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, Incremental Business Activity, Promotional Activity, New Initiative Phase-In, and New Initiative 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. While for certain operating strategies (i.e. inventory) it was found to not be feasible to strategically align processes around replenishment streams, there could be both a financial and operational benefit to align certain processes for planning and distribution with certain replenishment streams.

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1. Introduction

1.1 Why incontinence. In 2011, Unicharm, the largest provider of sanitary products in Japan, reported selling more adult diapers than baby diapers for the first time in history, the CEO reporting that "*the elderly would become the company's target of consumption*" (Alpher, Yamaguchi). Dr. Joseph Coughlin at the MIT AgeLab predicts that by 2026, the same will have taken place in the United States.

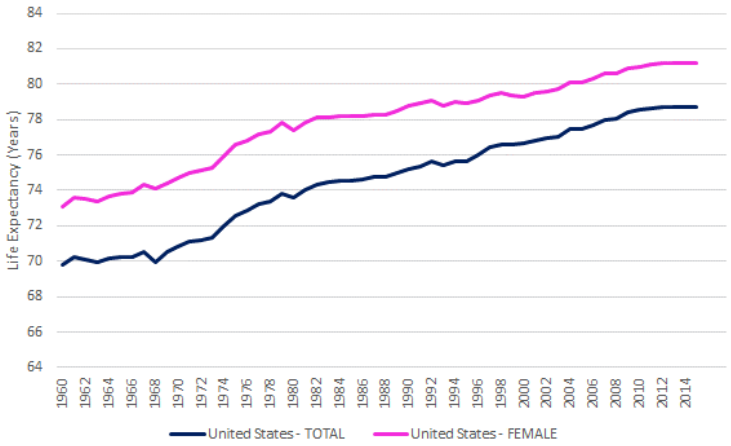

Figure 1.1.1 United States Life Expectancy From Birth (Source: US Census).

Even though consumers in the age 50-plus demographic control ~83% of household wealth in the United States alone, the Boston Consulting group estimates that less than 15% of global companies have established business strategies to meet the needs of this older population (Grey Market). With MIT AgeLab estimates projecting that more than one in every four Americans will be over age 65 by 2030, the elderly demographic represents a market segment that companies must address to remain competitive globally.

More importantly, retailers must recognize that this age demographic is disproportionately female (see Figure 1.1.1 above). In the United States, for those aged 65 – 69, there are 96 men to every 100 women, with this number dropping to 60 men to every 100 women for those aged 85 and over (Coughlin, page 90). With women themselves providing a disproportionate share of elder care (women make up 66% of informal caregivers in the United States), to properly evaluate the purchasing patterns of a sensitive product targeted at treating incontinence, it is necessary to understand the purchasing patterns and consumer behavior of those doing the majority of the purchasing: Women.

1.2 Market Overview. The Centers for Disease Control and Prevention ("CDC") recently reported that more than half of adults aged 65 and older suffer from the disease of incontinence, with nearly 50 percent of women and 25 percent of men suffering from bladder incontinence (Gorina, 2004). Of those identifying as incontinent, it is estimated that roughly one quarter suffer from severe urinary

leakage. While certain surgical procedures can be performed to address structural anatomic deficiencies in the bowel region, doctors recommend the use of adult diapers as a day-to-day solution for related side effects.

The CDC estimates that the average cost for bowel incontinence related personal expenses totals $4,100 annually, valuing the total addressable market in the United States at $19.5 billion. CNBC estimates that, in the United States, the average monthly take home pay for a 65+ year old woman is $3,200, making incontinence spend roughly 11% of total monthly pay. It is estimated that the average elderly person spends 34 percent of their take home pay on medical expenses, making that spent on incontinence roughly one-third of an elderly female's annual medical budget.

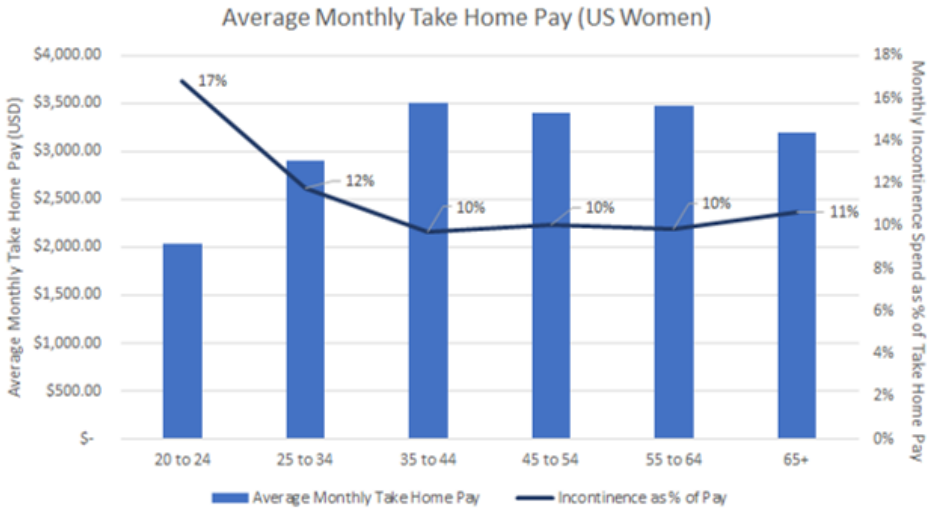

Figure 1.2.1 Average Monthly Take Home Pay – US Women. (Source: CNBC).

1.3 Project Scope. A consumer packaged goods company (the "Company") manufactures and distributes consumer packaged goods including products for feminine care and incontinence. The Company has identified five unique replenishment streams:

1. **Base Demand** – Everyday movement of product, characterized by a very stable demand signal (typically ~80% of product movement is characterized by this profile).

2. **Incremental Business Activities** – Incremental Business Activities ("IBAs") are characterized by unplanned demand spikes and occur with very little notice. These activities are caused by events in the broader market and the actions of competitors. There is typically no early warning signal for this replenishment stream; however, the Company is typically able to respond to this demand signal within two to four weeks.

3. **Promotional Activity** – Planned promotional activities, such as advertisements in retail stores, drive demand spikes in both shipments and sales. The Company coordinates with customers to gather demand planning information four to six weeks in advance.

4. **New Initiatives – Phase in New** – New stock keeping units ("SKUs") brought to market for the first time. The Company defines a new SKU as either an entirely new product or as an iteration of an existing product but with improved features. For a product to be considered "New", the Company must have made a significant change to the product that the product then requires a new SKU, new UPC code, and new brand code. There are very specific demand signals (i.e. the customer launch plan) for this replenishment stream. Phase-In of New Initiatives typically last for three months and then this demand transitions to Base Demand. New Initiatives are typically introduced on a bi-annual basis.

5. **New Initiatives – Phase out Old** – For Phase-Out Old Initiatives, the Company is typically working to replace a historic product (Phase Out demand is characterized by heavy discounting activity of the product being phased out). Phase Out typically occurs two months prior to the end of scheduled ship date in the calendar. Customers for Phase-Out Old are typically second market customers, or discount retailers where the Company can sell products at a discount.

For each of these replenishment streams, the Company would like to identify the optimal supply chain operating strategy to minimize cost, increase cash flow, and maximize service and sales with customers (retailers and distributors). Finally, the Company wishes to confirm whether or not there is an operational benefit and/or financial benefit to differentiate the supply chain by the five replenishment streams identified or by some hybrid.

For this project, the rationale to analyze feminine care data to inform demand patterns for incontinence products is twofold: 1) To understand and analyze the buying patterns of the female consumer (i.e. frequency of purchase and purchase channel preference), the anticipated purchaser, and 2) To augment the incontinence data set with data from an established product (the Company launched incontinence in 2014).

2. Literature Review

2.1 Introduction. A literature review was conducted to determine if other companies had successfully 1) Segmented product demand profiles by replenishment stream and 2) Differentiated operating strategies based on a product's replenishment stream.

2.2 Nonstationary, Stochastic Demand. As products move through the Launch (Phase In – New) , Ramp (Promotional), Peak (Base Demand), and End-of-Life (Phase Out – Old) phases of the product life cycle, both the rate and uncertainty (or coefficient of variation) of demand changes. Even within phases of the product life cycle, non-stationary (Incremental Business Activity), stochastic demand is common. Oftentimes, this non-stationary demand is driven either by seasonality or end-of-quarter "hockey stick" type sales activities. As an example, Microsoft experiences two-thirds of Xbox demand in the time period 13 weeks before Christmas and Kraft's weekly hotdog sales are twice as much during summer months compared to the rest of the year (Neale and Williams). Additionally, competitive marketplace pressures may also give rise to nonstationary demand.

To manage inventory appropriately in the face of nonstationary, stochastic demand, it is common for companies to separate inventory management decisions into both strategic and tactical components. From a strategic viewpoint, inventory related choices influence decisions on where to locate inventories in the supply chain, what customer service levels should be, and whether or not these choices should change over the life cycle of the product (Neale and Williams, 2000). Tactical decisions influence weekly, monthly, and seasonal demand planning (i.e. inventory targets) to reflect the non-stationary demand characteristics of the given product.

Microsoft, conventionally thought of as a software company, introduced a differentiated, four-part sales, inventory, and operations planning ("SI&OP") strategy for the company's hardware products in 2008. The first part of implementing the aforementioned SI&OP process involved collaboration at the business unit level to forecast monthly demand. Secondly, Microsoft implemented a SKU stratification process that segmented and prioritized SKUs based on revenue, margins, and life cycle status, setting customer service level targets based on each SKU's relative classification. The third and fourth processes involved setting safety stock targets to address nonstationary demand and optimizing weekly production plans, respectively (Neale and Williams, 2000).

2.3 Optiant, Inc. Optiant offers a PowerChain suite of supply chain software programs that are utilized by many Fortune 500 companies including Black & Decker, Kraft, Intel, and the Company. This software integrates nonstationary supply chain models to optimize planning processes to support the sales, inventory, and operations planning process across different product lines and replenishment streams. As an example, Microsoft uses Optiant's PowerChain suite for the safety stock planning component for the company's internal SI&OP process. Microsoft added new features to Optiant's software and built interfaces to Microsoft's data warehouse's and internal programs, the resulting program produces weekly safety stock targets for a 52-week horizon, reducing Microsoft's safety stock targets and related inventory management and operating expense.

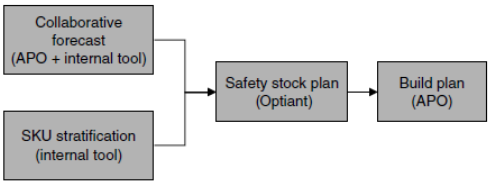

Figure 4: The flowchart shows the four parts of Microsoft's new SI&OP process: monthly forecasting, SKU stratification, safety stock calculation, and production planning.

Figure 2.3.1 Optiant Software Process Flowchart.

2.4 Customer Service Level. In 2006, Intel shifted the company's approach towards customer service level from ad hoc (top tier customers received 95% service level, all others received 90%) to a data-driven, product-specific strategy, striking an optimal trade-off between inventory-driven cost and stock-out cost (Arnow and Willems, 2017). By aligning the business on the costs and benefits of providing specific service levels, Intel was able to bifurcate products into high and low service level categories. By clearly quantifying both inventory related costs and stock out related costs, Intel disassociated emotion-driven customer service level requirements to implement a more pragmatic, sustainable customer service strategy (Arnow and Willems, 2017).

2.5 Conclusion. Several Fortune 500 companies have identified similar demand replenishment streams and have leveraged Optiant PowerChain Software to improve planning processes across these demand profiles. Base Demand, Phase In/Out, and Promotional replenishment streams are similar in nature whilst IBAs are often the result of unrelated, competitive events.

It may not be a cost-effective solution to offer each customer and product the same level of service. SKU and product segmentation are powerful tools that can be leveraged to determine which customers and products should receive which levels of service as a means to increase cash flow and reduce operating costs.

3. Data & Methodology

3.1 Objective. The objective of this project is to optimize the supply chain operating strategies for the Company's incontinence product line by determining whether or not differentiating the Company's supply chain into five replenishment streams (Base Demand, Incremental Business Activity, Promotional Activity, New Initiatives – Phase In New, and New Initiatives – Phase Out Old) would minimize cost, increase cash flow, and maximize end customer service levels and sales. This project leveraged data analysis and optimization tools to analyze how 1) Inventory Strategy, 2) Planning Strategy, and 3) Distribution Strategy could be manipulated to maximize profit and minimize cost per replenishment stream.

3.1.1 Operational Context. The Company is a consumer packaged goods ("CPG") firm headquartered in the United States with a global brand presence. Sales in North America historically have driven more than half of the Company's overall revenue. The Company's brands cover several consumer categories across multiple product categories.

The Company does not manage retail sales but produces finished products for sale and distribution to mass merchandisers, grocery stores, membership club stores, and discount retailers among other distributors and wholesalers. In 2015, the Company implemented a novel distribution strategy to streamline the Company's North American supply chain.

Leveraging this strategy, the Company now services 80% of United States based demand within 24 hours. For the 80% of the United States that is within less than one day transit of a mixing center, this translates to increased responsiveness, higher on time reliability, and more friendly freight services.

3.1.2 Incontinence Competitive Landscape. Kimberly Clark is the market leader in adult incontinence products behind the Poise and Depends brands. Sales for Kimberly Clark's personal care division (under which the aforementioned products sit) have grown ~40% since 2003 with a 6% CAGR over the last 13 years. Huggies, Kimberly Clark's baby diaper brand, contributed 56% of operating profit in 2016 (Kalogeropoulos, 2017).

3.2 Data. 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 is broken up by SKU by

customer, shipment date, ship from location, amount ordered, and amount shipped. Separate, smaller files were also provided that included information for geolocation mapping of the Company's mixing centers and the Company's manufacturing locations.

3.2.1 Data Manipulation. The customer demand data file contained orders and shipments broken out by SKU, customer, replenishment stream, and day for 2016 and 2017. At the Company, all relevant inventory and planning analysis at the execution level is done using internal metrics for ease of comparison across business units. By having a standardized unit of comparison across business units, the Company can compare metrics like profitability across seemingly dissimilar product categories.

All entries where the field "Orders in SU" was zero, indicating that the customer in question had either not placed an order or had placed an empty order, were excluded from analysis (for example 3,975 entries for Segment A 2016 and 2,583 entries for Segment A 2017 were for zero units).

3.2.2 Customer Service level. The Company monitors case fill rate, or CFR, as a measure of end customer satisfaction. The Company is targeting CFR levels close to 1 for all SKUs for the top customers. In the customer data file, a new column on CFR was added by dividing shipments by orders. A CFR ratio of less than 1 represents situations where the Company shipped less than what the customer ordered.

3.3 Data Analysis & Visualization. To analyze trends and patterns in data, this project leveraged Tableau and Excel to visualize data and present findings in elegant, articulate graphics. While the original scope of the project was to focus on the feminine care line as a whole, upon further investigation of the dataset, it was discovered that the greatest incidence of low CFR was concentrated in the incontinence subset of the greater feminine care offering while the more traditional feminine care products (tampons and menstrual pads) were characterized by CFR rates that were performing in line with and, in some cases, well above target CFR.

3.4 SKU Segmentation. 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 products lines (Segment A, Segment B, and Segment C). This segmentation process identified which SKUs contributed most and least to overall incontinence product volume, serving as a roadmap for further analysis.

3.5 Primary Research. To better inform research, interviews with both industry and Company experts were conducted to better understand how both the Company and similar companies have approached the question of whether or not replenishment streams should be treated differently based on their demand characteristics.

In particular, conversations with Dr. Sean Willems of MIT were insightful in understanding how Fortune 500 companies leverage supply chain software provided by Optiant, Inc. to segment demand by replenishment stream and better inform company-wide demand planning procedures. Optiant, Inc. provides a PowerChain suite of supply chain software applications that integrate nonstationary supply chain inventory models to improve demand planning process across replenishment streams that have different lead times and replenishment streams.

4. Results

4.1 Inventory Strategy

4.1.1 Product segmentation. Adult incontinence is the Company's fastest growing product segment. The Company's current growth strategy has been hyper focused on gaining competitive market share and educating the broader population to spread awareness of product availability. The Company's internal operating strategy for adult incontinence products is different than the Company's operating strategy for base feminine care as it applies to inventory management.

While new product technologies in incontinence are growing, the bulk of the Company's feminine care revenues are driven by traditional feminine care products (i.e. tampons and menstrual pads). Incontinence is a rapidly growing business that the Company expects may need different operating strategies than traditional feminine care given the naissance of the product itself (the incontinence product was launched in summer 2014).

The incontinence product is heavily marketed towards women. The Company offers incontinence products under three main categories which, for the purpose of this project, will be identified as Segment A, Segment B, and Segment C with Segment A representing a heavy product similar to a diaper and Segment C representing a light product similar to a liner.

4.1.2 SKU Segmentation. To properly analyze the Company's inventory policy, it is important to begin by segmenting inventory by both product line (Segment A, Segment B, and Segment C) and by SKU. This segmentation distinguishes products by both physical characteristic (i.e. value, size, and density) and demand characteristics (sales volumes and volatility). Segmenting SKUs into high, medium, and low volume categories helps to prioritize strategic inventory processes by identifying the few high impact SKUs that drive the majority of sales volume for each product category, the products that require the most managerial attention and review. Typically, the majority of value (~80%) is driven by very few SKUs (<20%).

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's feminine care team relayed that product sizes in incontinence are

trending towards bigger sizes and longer pads given the high incidence of obesity in the US, providing context for the dominance of Segment A.

From 2016 to 2017, there was significant movement in the SKUs that comprised the next 10% of sales volume, with two of the top SKUs in 2016 dropping in rank towards the bottom of SKUs on a volume contribution basis in 2017 (mostly due to the nature of the replenishment stream of these respective SKUs namely Promo or Initiative Phase-In). What's notable in this analysis is that Customer A and Segment A drive the majority of volume for the incontinence product line.

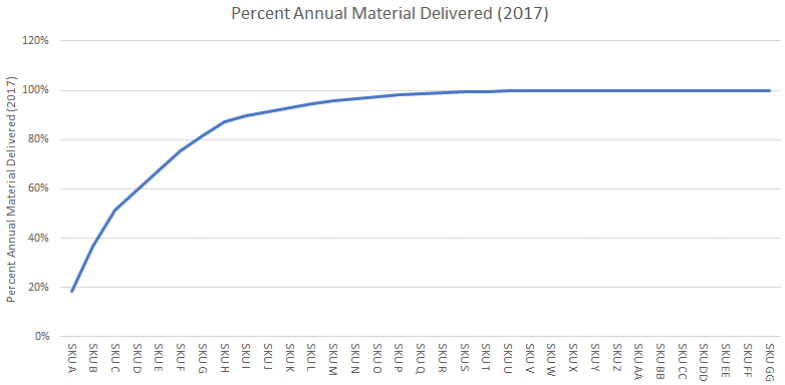

Figure 4.1.1 Segment A – SKU Segmentation

SKU	Brand Segment	Percent 2017 Volume Delivered	Customer	Replenishment Stream
SKU HAI - A	HAI	19%	Customer A, Drug & Grocery, Ecommerce	Base Demand, Promo
SKU HAI - B	HAI	18%	Customer A, Drug & Grocery, Ecommerce	Base Demand, Promo
SKU HAI - C	HAI	15%	Customer A, Drug & Grocery, Ecommerce	Base Demand, Promo, IBA
SKU HAI - D	HAI	8%	Ecommerce	Base Demand
SKU HAI - E	HAI	8%	Customer A, Drug Store	Base Demand, Promo

Figure 4.1.2 Incontinence – Top SKUs – Segment A (2017)

Diving deeper into the Segment A product line, the Power SKUs (or the SKUs that drive the majority of product volume) are the same top SKUs that drive overall volume for incontinence products in the aggregate. Power SKUs for Segment A are characterized by 1) Customer A as well as big box retail customers and grocery stores and 2) Base Demand, Promo, or Initiative Phase-In replenishment streams. Given the dominance of Customer A across the

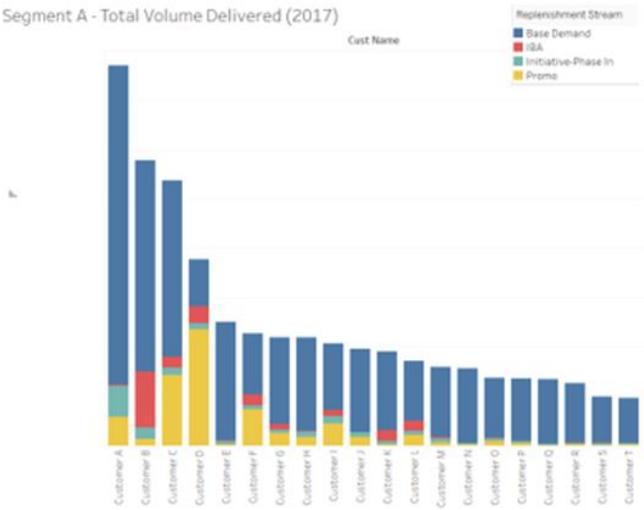

Figure 4.1.3 Segment A – Top 20 Customers

Segment A product line, it would be practical to dedicate unique SKUs to each of Customer A's replenishment streams.

SKU	Brand Segment	Percent 2017 Volume Delivered	Customer	Replenishment Stream
SKU HAI - FF	HAI	<1%	Customer A	Initiative Phase-In
SKU HAI - EE	HAI	<1%	Customer A	Initiative Phase-In
SKU HAI - DD	HAI	<1%	Customer A	Initiative Phase-In
SKU HAI - CC	HAI	<1%	Customer B	Initiative Phase-In

Figure 4.1.4 Incontinence – Bottom SKUs – Segment A (2017)

Analyzing the bottom SKUs (ranked from least contribution to overall volume), these SKUs are characterized by Initiative Phase-In replenishment for Customers A and B. These SKUs likely contribute the least volume as they represent new product launches, new customer expansion activities, and/or new market development. By nature of the replenishment stream, all Initiative Phase-In demand is transitioned to Base Demand after three months in market.

4.1.3 Segment B – SKU Segmentation

While there is no clear dominance in top customer accounts for Segment B Power SKUs, analyzing the bottom SKUs for Segment B gives important information in terms of types of customers the Company is actively pursuing and not pursuing for this product type.

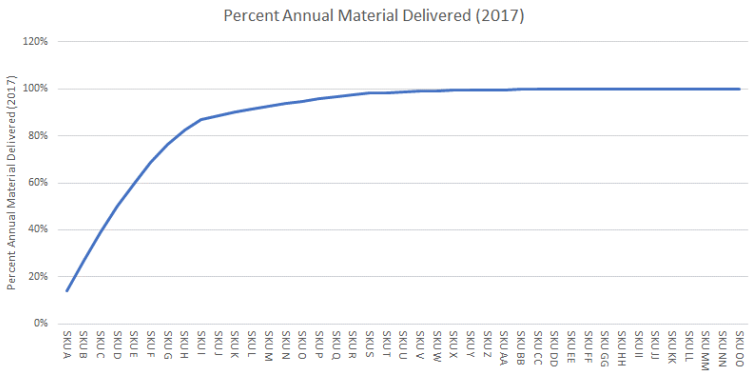

Figure 4.1.5 Segment B – SKU Segmentation

SKU	Brand Segment	Percent 2017 Volume Delivered	Customer	Replenishment Stream
SKU MAI - A	MAI	14%	Customer A, Drug & Grocery, Ecommerce	Base Demand, Promo
SKU MAI - B	MAI	13%	Customer A, Drug & Grocery, Ecommerce	Base Demand, Promo
SKU MAI - C	MAI	12%	Customer A, Drug & Grocery, Ecommerce	Base Demand, Promo, IBA
SKU MAI - D	MAI	11%	Customer A, Drug & Grocery, Dollar Store	Base Demand, Promo, IBA, Export
SKU MAI - E	MAI	10%	Customer A, Drug & Grocery	Base Demand, Promo, IBA, Export

SKU	Brand Segment	Percent 2017 Volume Delivered	Customer	Replenishment Stream
SKU MAI - OO	MAI	<1%	US Grocery & Outlet - All Other	Promo
SKU MAI - NN	MAI	<1%	US Grocery & Outlet - All Other	Promo
SKU MAI - MM	MAI	<1%	US Grocery & Outlet - All Other	Promo
SKU MAI - LL	MAI	<1%	Grocery	Initiative Phase-In

Figure 4.1.6 Incontinence – Bottom SKUs – Segment B (2017)

Customer need for a medium product versus a heavy product is likely to influence whether or not a customer is more likely to buy that product in bulk. For customers that need a medium sized product, it is likely that the incontinence that they are looking to treat is not as debilitating as a customer that would seek a heavy product, and, as a result, said customer may not need to buy incontinence product in bulk. This logic supports why the Initiative Phase-Out replenishment stream is characteristic of the Segment B product for Customer D.

Promotional activity outside of the Company's core Segment B customer base comprises the bulk of bottom SKU activity. Given the naissance of the product, the Company could benefit from a more aggressive expansion strategy, characterized by higher promotional volume to a broader set of customers.

4.1.4 Segment C – SKU Segmentation

Similar to medium adult incontinence, for the light adult incontinence product line there does not seem to be a distinctive customer account driving the bulk of volume. Additionally, from the Segment C bottom SKU analysis Customer D product looks to have been phased out, likely given that this smaller size product is not well suited for big box retail.

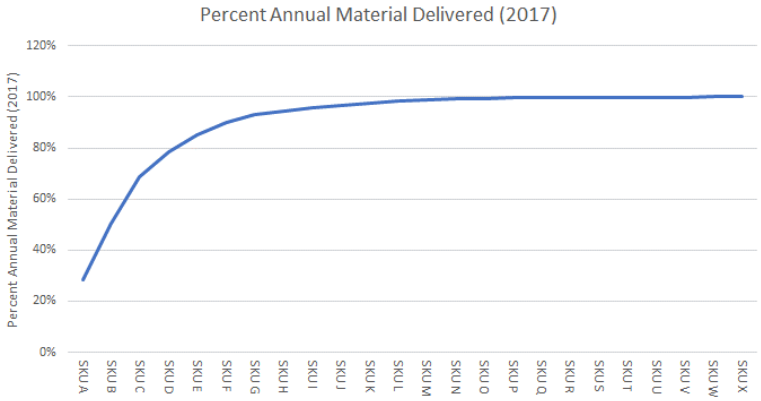

Figure 4.1.7 Segment C – SKU Segmentation

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

Many of the lower volume SKUs for Segment C are characterized by Initiative Phase-In activity for lower tier grocery and pharmacy chains. While this demand will phase into Base Demand in three months, it is unlikely that this volume will eclipse the dominance of Customers A and B.

4.1.5 Customer X. Customer X is the Company's top customer for baby diapers. Given the similar characteristics between incontinence products and baby diapers, it is likely that the incontinence customer profile will shift to look similar to baby diapers in the future (i.e. higher dependence on ecommerce retailers such as Customer X).

Customer X demand is comprised of Base Demand and IBA with the incidence of IBA occurring more frequently in 2017 versus the prior year period. The higher incidence of IBA in 2017 provides an opportunity from a planning perspective to anticipate nonstationary, stochastic demand. Given the personal nature of this product, it is likely that consumers would prefer to place orders via a discrete ecommerce channel. It would behoove the Company to investigate how to grow market share with Customer X for incontinence and to evaluate plans to broaden its heavy customer portfolio to include Customer X.

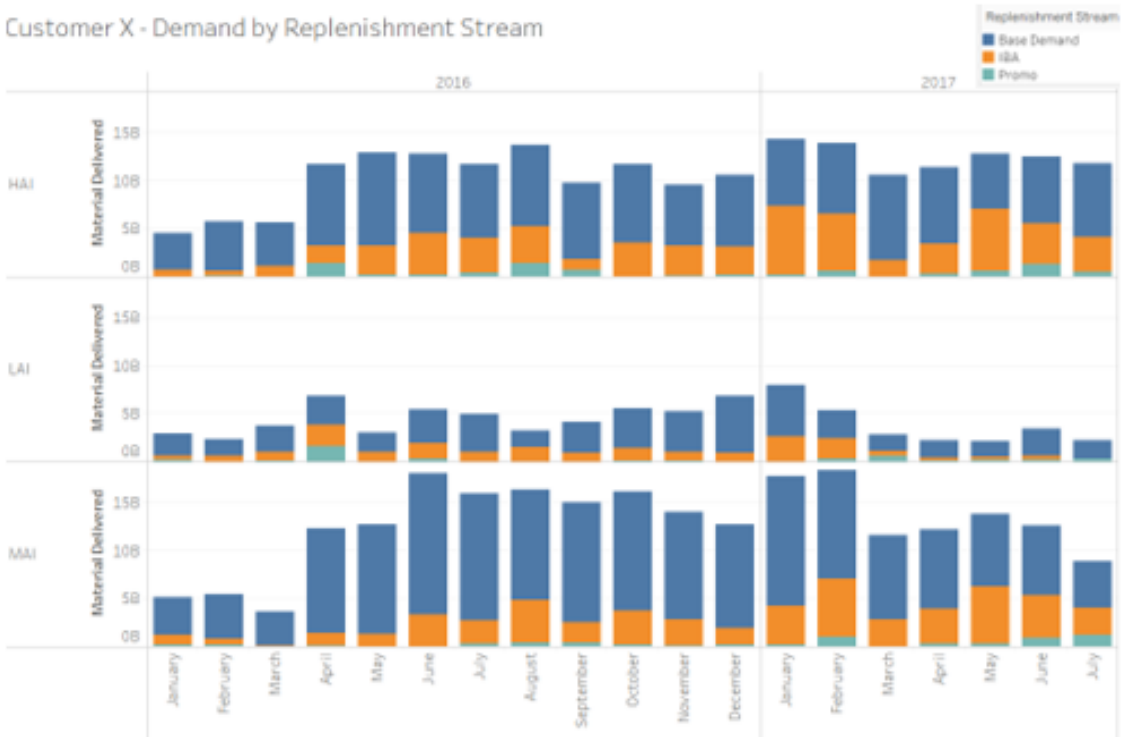

Figure 4.1.8 – Customer X – Demand by Replenishment Stream

4.2 Planning Strategy

4.2.1 How is the Company doing? In 2016, the Company solidified operating strategies for its feminine care business unit Base Demand replenishment stream in detail. From our on-site meetings, it was revealed that levers pulled to achieve these operating strategies were manufacturing cycles, inventory targets, and inventory lead times for certain specific materials (i.e. pulp products used in menstrual pad manufacturing).

Looking forward, the Company's focus is to move beyond the Base Demand replenishment stream. Specifically, for this upcoming fiscal year, the Company is looking to implement strategies to specifically absorb Incremental Business Activities (IBAs) without extra cost or inventory investment. To achieve this goal, the Company must forecast the right inventory targets at the right locations.

From our on-site visit with the feminine care team, it was revealed that incontinence has a higher incidence of IBAs than traditional feminine care. IBA presents 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. The question then arises should we 1) Model IBA demand differently than one would model demand of other replenishment streams and 2) Should there be specific safety stock allocated for IBA to improve customer service levels.

4.2.2 Customer Service level. The Company's FemCare team monitors case fill rate, or CFR, as a measure of end customer satisfaction. The Company is targeting CFR levels close to 1 for all Power SKUs. A CFR ratio of less than 1 represents situations where the Company shipped less product than what the customer ordered. These types of events typically occur when there is some sort of supply chain disruption which may occur for one or many of the reasons below:

- There is not enough manufacturing capacity to produce the requested product,
- The requested product has been shipping heavily for a long period of time and the Company runs out of safety stock before more can be manufactured to meet demand,
- A mistake was made either when taking the customer's order and/or when packing the truck with product,
- The incontinence product is left off the truck in a cube out event given that this product is most likely to get cut off the order and not shipped to the customer, and/or

- There is a failure on the manufacturing line where not as much product as requested by the customer can be manufactured.

Additionally, unexpected shipments, typically the result of an IBA, cause supply chain disruptions that result in CFR values of less than 1.

4.2.3 Replenishment Stream Breakout. Looking only at CFR for the incontinence product replenishment streams, there is more variation that can be attributed to IBA, Promotional activity, and, for certain customers, Base Demand. From conversations with the Company, it is more than likely that low CFR values for the Base Demand replenishment stream servicing Customer A were capacity related and not the result of a forecasting failure.

4.2.4 Customer A. From the product segmentation exercise, it is clear that Customer A is the Company's top account for incontinence. This SKU represents the Segment A product that is sold to Customer A and represents mostly Base Demand and Initiative Phase-In. It is important to note that Initiative Phase-In becomes Based Demand after three months.

Figure 4.2.1 Customer A Power SKU Demand Profile by Replenishment Stream

4.2.5 Initiative Phase-In. Given that New Initiatives are typically introduced biannually, it is notable that New Initiatives represent a considerable portion of material delivered for this incontinence Power SKU throughout the year. From a planning perspective, this high incidence of New Initiatives (combined with a manufacturing capacity shortage) is likely what contributed to low CFR levels for Customer A in 2017 (given that demand for this product was new, Customer A did not have the capacity or planning resources to service customer orders).

By normalizing Base Demand to incorporate the Initiative Phase-In demand from three months prior, it is clear that this demand is not being 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 overall CFRs.

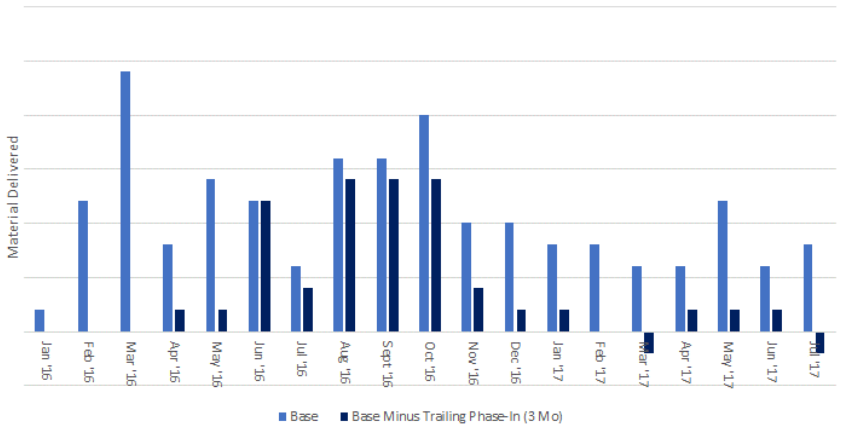

Figure 4.2.2 Customer A Power SKU – Normalized Base Demand

4.2.6 Lead Times. When considering whether or not to implement different planning processes for the Company's incontinence replenishment streams it is important to consider how both lead time and outgoing service time varies across the different streams given that these two inputs drive the planning processes formulated by the Optiant software used by the Company. Base Demand is characterized by stable demand and long (i.e. months) lead time with relatively no outgoing service time (meaning that product is shipped directly to customer). Similarly, merchandising or promotional events are planned 4 – 6 weeks (and, in some cases as long as 8 weeks) out with a similar outgoing service time of zero. From this perspective, it does not make sense to plan for IBAs (which have short, variable lead times and nonstationary demand) using the same process as would be used to plan for Base Demand or Promotional activity.

Successful Fortune 500 companies employ differentiated demand planning processes for replenishment streams based on both their demand profile (i.e. stable versus nonstationary) and lead times. For this reason, Base Demand and Promotional activities are treated similarly while IBAs are thought of as separate entities from a planning perspective. Optiant software allows for planning Base Demand and Promotional activity separately than for IBA.

4.3 Distribution Strategy

4.3.1 Overtime and Materials. There are certain structural inefficiencies that impede the Company's ability to quickly service IBA demand, namely overtime ("OT") and materials requirements. Given that speed to market is critical for fulfilling customer demand in the case of IBAs, any delay from a manufacturing or materials standpoint translates to longer lead times and lower overall levels of customer service. By implementing a policy where OT and materials requests can be fulfilled more rapidly, the Company can provide a higher level of customer service.

4.3.2 Distribution. After product is manufactured, it is immediately shipped to a second location: The supply warehouse where the product is stored until it is needed in the distribution center. From that point, the product is shipped from the supply warehouse to one of the Company's mixing centers depending on the product's final destination.

4.3.3 Shipping. 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. It is important to note that layer and case pick go on different pallets.

4.3.4 Novel 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 based demand within 24 hours, translating to increased responsiveness, higher on time reliability, and more friendly freight services. The Company has observed that the average weekly delivery per customer from these centers has increased for the Company's top twenty customers. More frequent deliveries in smaller quantities ensures that the Company's customer have inventory on hand for what they need (given that a 100% CFR does not necessarily mean that that inventory is on shelf).

These facilities leverage a cross-dock unload strategy where inventory is moved directly to the outbound staged lane and shipped to customers the same day. Through this process, the Company is able to skip the warehouse and transition from inbound truck to outbound truck to main customer, eliminating the picking stage and skipping the warehouse and lost time..

4.3.5 Packaging. To optimize the Company's end-to-end inventory synchronization, an important question to ask is if it is necessary to define different inventory picking strategies by replenishment stream to optimize the network. From our on-site interviews, it was clear that the inventory picking methods varied from replenishment stream to replenishment stream which, in turn, translated to heterogeneous end customer orders that would be packed on the truck differently, ultimately impacting the overall CFR for that customer order.

1. **Base Demand** – Must adhere to Company trade terms.
2. **Incremental Business Activities** – Incremental Business Activity inventory is heavily dependent on the specific situation or customer and is typically shipped in pallet and layer or, for shorter lead times, cases or layers.
3. **Promotional Activity** – Promotion and customized inventory is shipped primarily in bulk case.

4.3.6 Customer X. The Company believes that the world will adapt to become partially Customer X in the future whereby case pick will eventually be phased out in favor of layer and each pick (each picking is picking a single item versus a layer of product).

5. Conclusion & Recommendations

5.1.1 Inventory Strategy - Conclusions. 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 analyze the Company's inventory policy, inventory was segmented both by product line (Segment A, Segment B, and Segment C) and by SKU to distinguish products by both physical characteristics (i.e. value, size, and density) and demand characteristics (sales volume and volatility). Segmenting SKUs into high, medium, and low volume categories helps to prioritize strategic inventory processes by identifying the few high impact SKUs that drive the majority of sales volume for each product category, namely, the Power SKUs.

From this analysis, three SKUs drive the bulk of sales volume across all incontinence product lines. These SKUs represent Segment A sold to top accounts (Customer A as well as Big Box retailers and grocers) and were characterized by Base Demand and Promotional activity. Given the high prevalence of obesity in the US, and the correlation of obesity and the incidence of adult incontinence (with 46-67% of obese women experiencing incontinence), it is unlikely that demand for a smaller sized incontinence product will outpace the heavy product line looking forward.

For Segment B and Segment C, there is no clear dominance in top customer accounts; however, analyzing the bottom SKUs for Segment B and Segment C gives important information in terms of the types of customers that the Company is actively pursuing and not pursuing for these products. For both Segment B and Segment C, bottom SKUs are characterized by the Phase-Out replenishment stream and Customer D. It is likely that smaller sized products are being Phased-Out at large big box retailers given the nature of the product.

Customer need for a medium product versus a heavy product is likely to influence whether or not a customer is more likely to buy said product in bulk or not. For customers that need a medium sized product, it is likely that the incontinence that they are looking to treat is not as debilitating as a customer that would seek a heavy product, and, as a result, said customer may not need to buy Segment B and/or Segment C in bulk.

5.1.2 Inventory Strategy - Recommendations. 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.

For both 2016 and 2017, the same three Power SKUs were for the Segment A product line and represented sales to top customer accounts with sales to Customer A. Given the dominance of the Customer A, Segment A account (or SKU A), an effective inventory management policy may focus on prioritizing SKU A to optimize customer service level (in this case measured by CFR). 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. This policy will translate to lower operational costs and higher incremental revenue.

5.2.1 Planning Strategy – Conclusions. In 2016, the Company solidified operating strategies for the overall feminine care business unit Base Demand replenishment stream by optimizing certain manufacturing cycles, inventory targets, and inventory lead times. Looking forward, the Company will take this same strategic approach to the Incremental Business Activity (IBA) replenishment stream. As a product category, incontinence has a higher incidence of IBAs than traditional feminine care.

The Company monitors case fill rate, or CFR, as a measure of end customer service level. The Company is targeting CFR levels close to 1 for all SKUs. In the aggregate the greatest incidence of low CFR rates occurring in IBA and Promotional replenishment streams. This is because IBAs are typically the result of unexpected shipments, resulting in supply chain disruptions that all contribute to lower CFR rates.

However, focusing on the Company's top incontinence SKU (SKU A), low CFR rates were not the result of IBA, but failure to normalize Base Demand to incorporate Initiative Phase-In activities. For each of the months from January through June 2016 (excluding February), the Company delivered shipments of this SKU to Company A as Initiative Phase-In. While Initiative Phase-In demand should

transition to Base Demand after a three-month period, by normalizing Base Demand, it was evident that this Phase-In Demand was not being properly accounted for during the forward-looking planning process for Base Demand.

5.2.2 Planning Strategy – Recommendations. IBAs present a unique challenge from a demand planning perspective given that there is very little lead time (typically only 2-4 weeks) for this type of business activity. 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 Demand and Promotional activities to be treated similarly from a demand planning perspective whilst demand planning for IBAs is done as a separate process.

Optiant software, the platform that the Company leverages for demand planning, allows for planning Base Demand and Promotional activities separately than for IBAs, which, when properly implemented, has been successful in driving higher levels of customer service. Should the Company implement a demand planning process that segments planning by the demand characteristics and lead times of respective replenishment streams, this strategy would generate higher CFR.

Low CFR rates do not always result from IBAs. For SKUs that have high levels of New Initiative Phase-In activity, it is critical that all forward-looking demand planning processes incorporate this Phase-In demand into the Base Demand forecast for three months out. Failure to normalize this forward looking Base Demand results in a lower overall Base Demand forecast which, in turn, drives low CFR rates. To ensure that Initiative Phase-In Demand is properly incorporated into the Base Demand forecast, it is critical that these products are introduced to the market in strict, time-constrained Phase-In initiatives that are then flowed into forward-looking Base Demand forecast after three months.

It is worth noting that SKU A exhibited Phase-In Demand for each of the months from January through June 2016 (excluding February) and January through July 2017. By not having a targeted, time-constrained product launch, the Company's forward-looking forecast did not accurately reflect demand for this new product, resulting in low CFR. To mitigate these types of demand planning shortfalls, the Company should keep Phase-In New activity within the biannual timeline

characteristic for other product brands within the Company to facilitate more accurate forward-looking demand planning.

5.3.1 Distribution Strategy – Conclusions. The Company recently implemented a novel distribution strategy that gives customers more flexibility when placing orders. An unexpected consequence of this mixing center strategy; however, has been that feminine care and incontinence products are often the first products to be taken off a truck given that they are the lightest weight. As a result, oftentimes, low CFR rates can be attributed to picking at the final distribution center stage, occurring outside the scope of influence of the feminine care team.

To incentivize retailers to order Promotional products (which help the Company win in store by increasing on shelf availability) merchandising displays are considered pallet orders when evaluating whether or not a customer is in compliance with the Company's order mandate (which requires that customers place a certain percentage of orders in pallets each month).

5.3.2 Distribution Strategy – Recommendations. The Company tracks and diagnoses root causes for low CFR on a month-to-month basis. The below figure represents an aggregate root cause analysis for the months July through October 2017. From Figure 5.3.2 below, it is apparent that roughly 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.

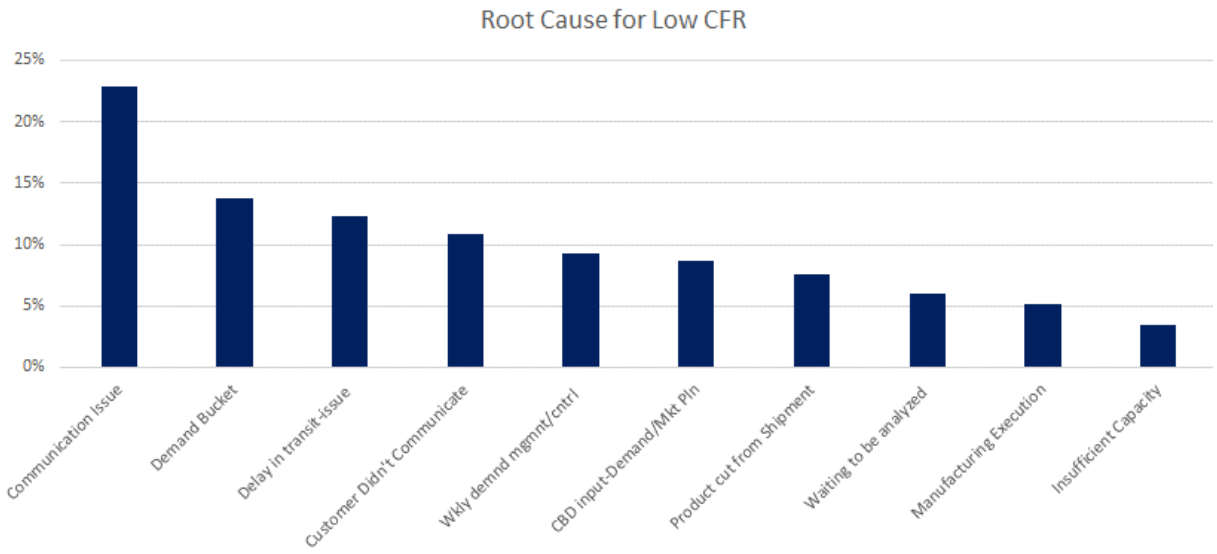

Figure 5.3.2 Root Cause Analysis for Low CFR

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.

From on-site interviews, it was clear that picking methods varied by replenishment steam with Base Demand and Promotional Activity heavily shipped as bulk case or pallet orders. IBA, on the other hand, is heavily dependent on the needs of the individual customer. Limiting IBA to pallet or layer pick; however, would improve overall end customer CFR levels for IBA given the inefficiency of case pick.

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