

# Improving Supply Chain Performance by Implementing Weekly Demand Planning Processes in the Consumer Packaged Goods Industry

by

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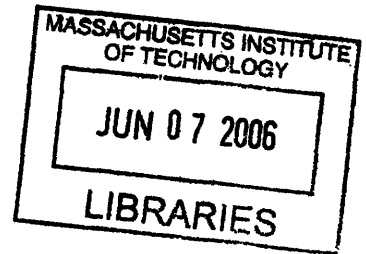
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on 12 May 2006 in Partial Fulfillment of the  
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## Abstract

This thesis examines how simple weekly demand planning process can improve inventory levels and customers service levels at the Gillette Company. The processes designed by the project team has been tested and executed in a real production environment. The weekly forecast volumes generated by the demand planning team were successfully deployed by the manufacturing plant throughout the course of the project. By successfully executing this simple demand planning process, the project was able to shorten factory firm periods, eliminate the supply warehouse, and de-link demand plan to trade-flow commitments to improve overall supply chain performance.

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I would like to extend my thanks to my friends for making sure I always had a well-balanced life in all dimensions (academic, professional, and social!) throughout my stay at MIT. Last but not least, I send my special loving thanks to my family for their unconditional love and support. Without my friends and family's encouragement and support, I would not have been able to get to where I am now.

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# Chapter 1 – Introduction

With a \$150 billion global market size and more than 50% of the global sales generated by a handful of major players, it has become more crucial than ever for companies in the consumer packaged goods (CPG) industry to manage their businesses efficiently. Traditionally, major CPG companies have focused on marketing and brand extensions to gain market share, but the relatively lower profit margin and competitive environment push companies to look elsewhere to strengthen their position in the market place. Today, many CPG companies are focusing on balancing customer service levels, while maintaining supply chain efficiency and asset utilization to serve their customers effectively. As part of this effort to improve supply chain performance, this thesis investigates the value of improving the supply and demand planning processes at a major blade and razor manufacturer. This thesis has proven that a simple weekly demand planning process could potentially provide safety stock inventory improvements, firm period reduction, factory flexibility, and cross-functional collaboration to create a responsive supply chain to meet the changing demand of its customers.

## ***1.1 Research Question***

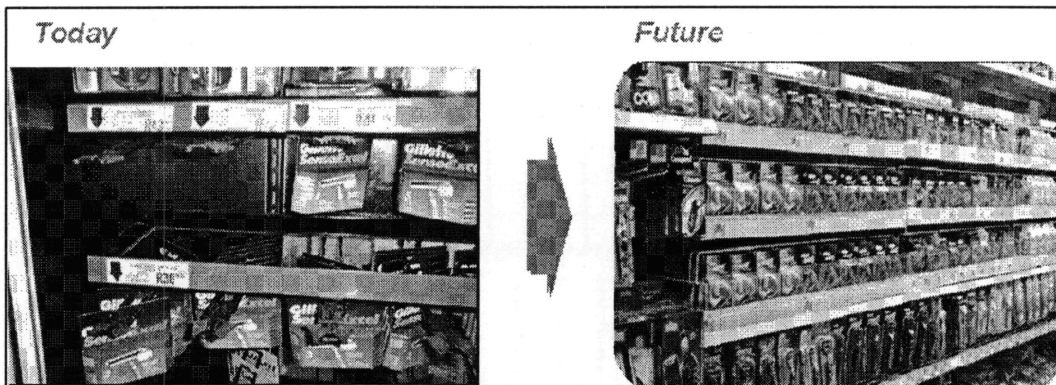
This thesis answers the following research questions:

- Can a simple weekly demand planning process improve inventory levels and customer service levels, while cutting cost?
- How will this new demand planning process affect the entire supply chain when it is implemented in a real production environment?

## 1.2 Project Significance and Motivation

According to the Global Product Supply Chain officer of Procter & Gamble, the new parent company of the Gillette division, the company can create the equivalent for the company of a 'billion dollar brand' via more efficient and responsive supply chain work [1]. From a vendor's stand point, companies' strategic partners and customers are becoming increasingly focused on improving on-shelf availability and reducing inventory at the same time. P&G announced the company's goal is to reduce both inventory and out-of-stocks for consumers by half and lower logistics costs by 20% by 2008 [1]. The company is focusing on having the right products at the right place for its consumers (Figure 1).

**Figure 1: Gillette's focus on on-shelf availability (Source: Gillette)**



Therefore, the pressure to improve its supply chain performance has been increasing for the Gillette Company, despite its market leader position in most of its business categories. In order to help retail partners deliver on their objectives, the importance of developing a demand driven replenishment system has become more significant than ever. By reducing the speed at which Gillette responds to changes in demand signals, the company will be able to differentiate its customer service from its competitors and build an agile supply network. This project intends to test this demand driven planning process in a real manufacturing environment.

### ***1.3 Research Approach and Methodology***

The hypothesis of this thesis has been executed and tested through a pilot project group formed in a major consumer packaged goods company, The Gillette Company. The Quick Response team is a Gillette sponsored project team that was formed with the basis of the findings of Gregory Holt and Atul Agarwal's [2] MIT thesis work. While Holt and Agarwal theoretically analyzed the forecast process at Gillette, the Quick Response project actually implemented the forecasting techniques recommended in their thesis and operationalized the forecast plans. The author generated weekly forecast volumes for twenty pilot SKUs in the Personal Care business unit. These forecasts were actualized by the Supply Planning team at Gillette each week, from June 2005 until April 2006. During this ten month project, a cross-functional Quick Response Project team met on a weekly basis to review the results of the project. Each representative from the team presented his or her functions' performance of the previous week and communicated any sort of watch-outs for the top selling product SKUs, as well as any poor performing product SKUs.

Since the hypothesis was tested in a real service and production environment, there were several unexpected issues, and new processes were designed and executed during the course of the project. When this occurred, the team deviated from the original process on an exception management basis, as the cost of low customer service levels was high. Therefore, the hypothesis was not tested in a strictly controlled testing environment, and test results may contain bias or unexpected outcome.

This thesis also builds upon the author's previous works with the MIT Supply Chain 2020 Research Project (SC2020 Project). The Gillette Company's current supply chain design analysis and other literature review were completed under the supervision of the SC2020 Project

initiative team in 2005 [3]. In order to understand the major concepts of the CPG industry's supply chain, a general literature review about the major concepts and trends of this industry is done. An overview of the industry and Gillette's current supply chain processes is completed through literature review and interviews with industry experts and company contacts from The Gillette Company.

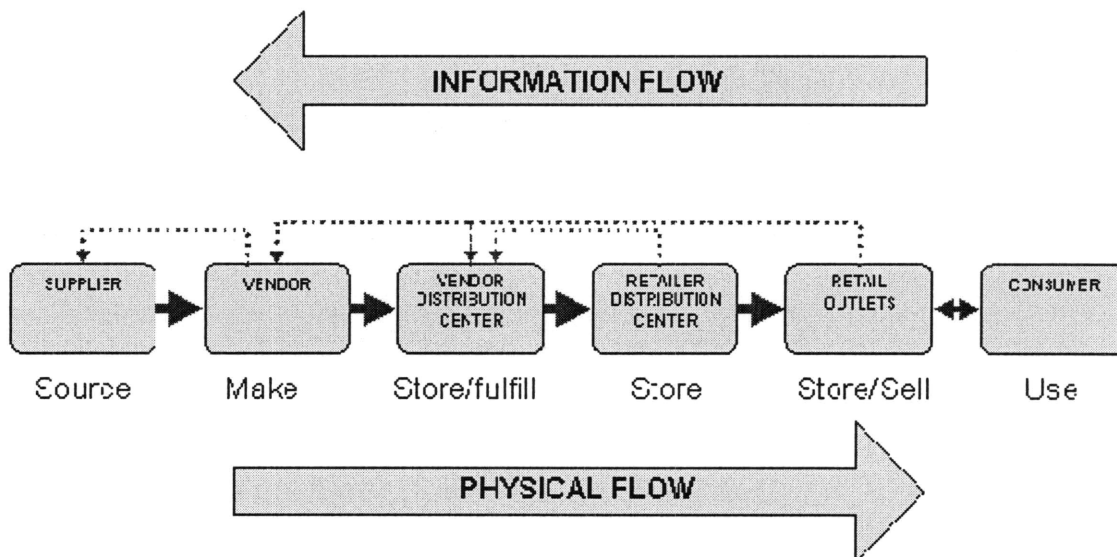
## Chapter 2 - Literature Review

This chapter reviews the typical supply chain structure of the consumer packaged goods industry and other major initiatives that are crucial to the development of this thesis.<sup>1</sup> The chapter also describes some major trends of this industry, as well as how suppliers and customers are working together to improve the overall supply chain performances.

### 2.1 Typical CPG Industry's Supply Chain Structure

A typical consumer packaged goods supply chain (Figure 2) consists of suppliers, vendors, retailers, each player's distribution centers, and the end consumers. Vendors are supplied by their suppliers with raw materials and outsourcing partners with work-in-process (WIP) goods.

Figure 2: Typical CPG Industry Supply Chain Structure



Source: Modified from E Iram, La Londe, and Weber. (1999) and Dau and Chiles (2005).

<sup>1</sup> Chapters 2 and 3 are adapted and modified from the author's previous works with the MIT Center for Transportation and Logistics' Supply Chain 2020 Project group. Further details of this research is documented in her previous paper, Excellent Supply Chains in the Consumer Packaged Goods Industry (2005).

Typically, CPG companies' products are made-to-forecast and held as inventory in the vendor's warehouses or distribution centers until an order is placed. Once the distribution centers receive the order, the products will be shipped to the customers' distribution centers or sometimes, directly to the retailers' stores.

When the inventory reaches a certain threshold at the vendor's distribution centers, production will be triggered, and the products will be made at the manufacturing plants. Suppliers and vendors work closely to supply raw materials just-in-time for production or assembly, and many CPG companies are outsourcing their production of products that are not their core-competencies. Once orders are received at the customer's distribution center, the products are distributed throughout the retail channel ending at the stores, where the consumer will purchase the products. In most cases, products are transported by third-party logistics (3PL) carriers or private fleets, and information technology enables each party in the supply chain to communicate and share information freely and collaborate effectively.

## ***2.2 Choosing the Right Supply Chain for the Right Products***

Despite the wide spread of technology and innovative ideas to improve supply chain performance, companies are having trouble matching the right supply chain for their products. Fisher [4] explains that the first thing a company should do when choosing a supply chain is to consider the nature of the demand for the products, which generally fall under two categories: functional or innovative. Functional products tend to have stable, predictable demand and long life cycles. However, the demand of innovative products tends to be unpredictable and volatile, with short life cycles. Therefore functional products with lower profit margins require an efficient supply chain, whereas innovative products require a responsive supply chain to meet the

rapidly changing demand. Fisher concludes that aligning the right products to the right supply chain will bring “a remarkable competitive advantage that generates high growth in sales and profits – makes the effort worth it.”

### ***2.3 Consumer Packaged Goods Industry Supply Chain Trends***

Having the right product, at the right place, at the right price for the consumers is one of the most important issues consumer packaged goods companies are focusing on these days. The number of stock keeping units (SKUs) in the consumer packaged goods market increased by 20 – 50 percent since 1993, but the time an average consumer spends shopping has decreased by 25 percent [5]. This means consumers have more products to choose from in a shorter time than a decade ago. With so many new products and slightly improved existing products entering the market everyday, the consumers are faced with a challenge every time they visit a retail store and stand in front of the shelves to choose a product. It is almost impossible to select the exact items that meet their exact needs, but the consumer’s desire is becoming more and more specific. The consumers’ demand is becoming less and less predictable, as the number of product lines, competitors, promotions, channels, and geographical networks are becoming more complex.

In order to accommodate the vastly changing consumer needs and consumer goods market environment, it is essential for CPG companies to have an effective supply chain that is driven by consumer demand. “The dynamic and competitive business environment for CPG companies requires a new operations strategy that focuses enterprise investments, initiatives and performance management priorities on meeting consumer demand with a profitable product portfolio [6].”



Therefore, there is a rising trend of CPG companies to put more focus into its demand planning processes. The development of software tools from software companies such as Demand Management, or Manugistics, is one of the key enablers for CPG companies to effectively plan their supply and demand schedules. By using such technology, CPG companies are moving towards a pull from the consumers' demand from the previous push environment, where products were pushed by manufacturing companies to the market. [7]

## ***2.4 Demand Driven Supply Network (DDSN)***

AMR Research [6] defined DDSN as “a system of technologies and processes that senses and reacts to real-time demand across a network of customers, suppliers, and employees.” DDSN is designed to improve operational efficiency, streamline new product development and launch, and maximize profit margins. DDSN is different from the traditional supply chain in a sense that it focuses on the entire network of players and partners in the supply chain, rather than an internally focused linear supply chain. It uses real demand signals and dynamic supply chains built around improving supply chain efficiency, rather than the push oriented or passive pull distorted demand signals, with a static supply chain. DDSN is also designed to focus on value and profit, as well as to optimize opportunity against risk, rather than the traditional cost based view. AMR Research found that companies using DDSN have a 5% higher profit margin, 10% more perfect orders, and 35% lower cash-to-cash cycle times [6].

## **2.5 Supplier-Retailer Collaboration**

As the margins in the consumer packaged goods industry become tighter and higher customer service levels are expected from the customers, the importance of building a strong relationship with the retailers is becoming crucial for suppliers. Simchi-Levi [8] explains that by combining the supplier's knowledge of production capabilities and lead time information with retailer's knowledge of consumer demand CPG companies can make the supply chain more efficient and reduce the overall cost of the entire supply chain. Described below are some supply chain initiatives the suppliers and retailers are jointly working on to improve supply chain efficiencies.

### **2.5.1 Continuous Replenishment and Electronic Data Interchange**

Simchi-Levi [8] defines continuous replenishment, or rapid replenishment, as a strategy that “vendors receive POS data and use these data to prepare shipments at previously agreed upon intervals to maintain specific levels of inventory.” This allows both the retailer and manufacturer to hold minimal inventories and avoid costly stock outs, due to variation in demand. EDI is a set of standards for transactions between retailers and suppliers. This allows trading partners to send electronic transactions rather than paper, and contributed to significant savings in cost and time. In the late 1980's, P&G used EDI to capture its customer's daily sales, and CRP to determine the quantity of products to be shipped to retailer's warehouse. This enabled P&G to provide sufficient safety stock, minimize total logistics cost and eliminate excess inventory in the retailer's warehouse.

## **2.5.2 Collaborative Planning, Forecast, and Replenishment**

Collaborative Planning, Forecast, and Replenishment (CPFR) is a “collection of processes that enhance supply chain efficiency by facilitating buyer/seller interaction through improved information visibility and utilization [9].” The objective of this initiative is to achieve targeted customer service levels, which will ultimately yield increases in profitability for both the retailer and supplier.

CPFR takes advantage of the fact that suppliers often have insights on seasonality and regionality about their products, while the retailers and distributors have insights on planned merchandising activities and supply network changes that will impact future orders. Some of the business processes that are collaborated together may be: DC to store and supplier to retail DC forecasts, supplier truckload brackets, order cycles, on-hand inventories, in-transit inventories, order multiples, lead times, seasonal and promotional pre-builds to maximize store availability, and targeted service levels/safety stock. [10]

## **2.5.3 Vendor Managed Inventory**

Waller [11] describes vendor –managed inventory (VMI) as the inventory replenishment decisions where the “vendor monitors the buyer’s inventory levels and makes periodic re-supply decisions regarding order quantities, shipping, and timing.” Initiated by Wal-Mart and Procter & Gamble in the 1980’s, VMI transfers the transaction responsibility to the supplier rather than the buyer or distributor, who may already be responsible for meeting specific customer service levels. Cost reduction and service level improvement are two of the main benefits seen by implementing VMI. From the supplier’s point of view, it reduces the uncertainty and fluctuation of demand,

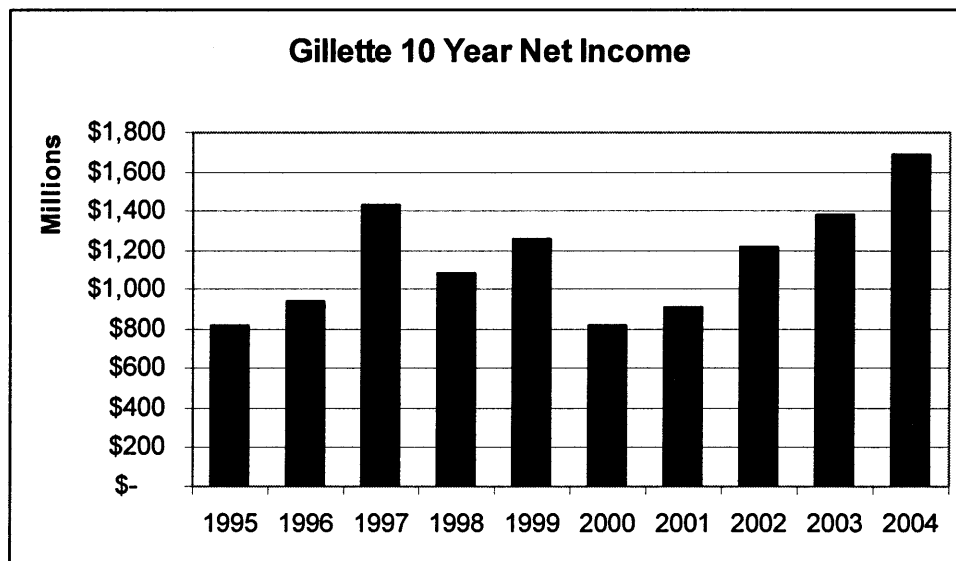
and factories can see much smoother demand, enabling them to increase their service and safety stock levels. From the retailer's point of view, sales increase because of the lower prices enabled by lower costs and service levels increase through greater product availability.

## Chapter 3 – Overview of Gillette’s Current Supply Chain

### 3.1 Company Overview

With annual revenues of \$9.25 billion in 2004, Gillette is the leading manufacturer of a variety of consumer products including razors, blades, oral care, personal care, batteries, and small power appliances, around the world. As seen in Gillette’s ten year net income history (Figure 3), since the major restructuring efforts in 2000, Gillette’s net income has more than tripled. In 2004, the company operated on a 59.3% gross profit margin, and the profit from operations amounted \$2.5 billion, rising 23% from 2003. The profit increase was mainly driven by a shift in mix to higher-margin premium products, manufacturing efficiencies, and overhead cost-savings programs. As the business is heavily driven by technologically advanced product innovation, more than \$209 million was spent on research and development expenditures in 2004, and \$201 million and \$181 million in 2003 and 2002, respectively.

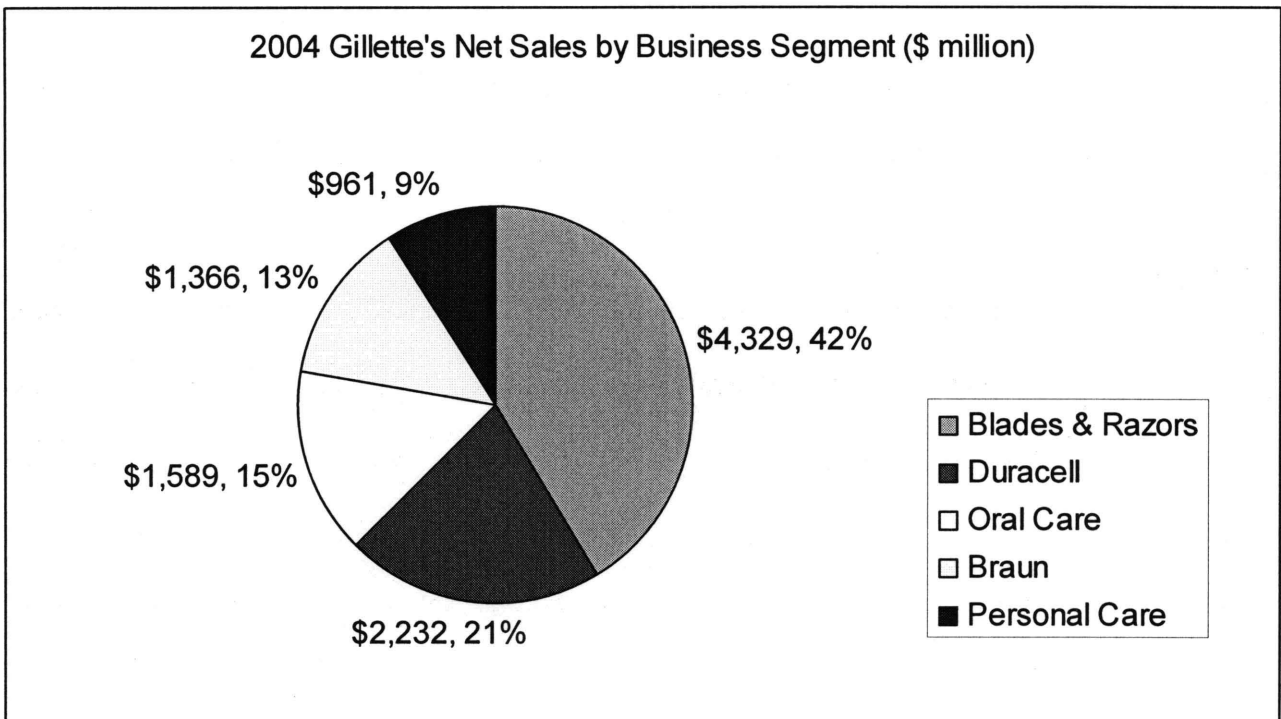
Figure 3: Gillette's 10 Year Net Income (Source: Gillette Annual Reports)



### 3.2 Business Segments

Gillette operates under five business segments: Blades & Razors, Batteries, Oral Care, Braun, and Personal Care. The business segment information shown in Figure 4 is based on Gillette's fiscal year 2004 10K report.

Figure 4: Gillette's Net Sales by Business Segment (Source: Gillette's 2004 10K Report)



#### 3.2.1 Blades & Razors

Holding more than 72% of the market share of sales and profit in the United States, Gillette is the world wide market leader in the blades and razors sector. The blades & razors segment generated about 68% of the operating profit and its \$3.8 billion revenue comprised of 42% of Gillette's total sales in 2003. In 2004, the successful launches of its new products such as M3Power, Venus Divine, and Sensor3 systems contributed to the 10% sales growth. With a number of cutting edge technology driving the profitability, the company enjoys a profit margin

of 37.6%, in this blades and razor group. This business unit is strongly driven by new technology, product performance, price, marketing, and promotion. As the manufacturing technology is highly proprietary, all manufacturing is done in-house, with the exception of outsourced packaging processes.

### **3.2.2 Batteries**

In 1996, Gillette purchased Duracell International, the world's top seller of alkaline batteries at that time. Since then the batteries segment has grown through acquisitions of various battery companies in Korea, India, and, most recently, China. Gillette is now the world market leader in the industry, holding more than 37% of the total US batteries market share. The batteries sector generated 22% and 17% of Gillette's annual revenue and operating profit, respectively, in 2003. While Gillette and its major competitor Energizer Holdings compete in the high end customer segment, the private label market is targeting the low end market. This dynamic market is starting to take over significant market share by capturing consumer demand with its low prices. With the development of cellular phones, PDAs, laptops and other electronic devices, the demand of portable and rechargeable battery packs led to enormous growth in the batteries market. The consumers are demanding smaller and more powerful products for its portable electronics, and this business segment is continuing to see growth.

### **3.2.3 Oral Care**

Gillette's oral care segment dominates both the manual and power toothbrush markets with more than 34% of the US market's dollar share in this category. \$1.3 billion dollars of revenue, 14% of Gillette's total sales, was generated by this segment in 2004. The manual

toothbrush sector showed decline in its market size, which was mainly due to the growth of the power toothbrushes sector. As the health conscious US consumers are willing to spend more on products with greater dental benefits, Oral-B is producing higher margin products with added benefits at a higher price. This segment is highly driven by innovative, premium products with higher price points.

### **3.2.4 Braun**

Braun, an operating segment with Gillette's fourth largest market sales, produces small household products, such as hair care products and a number of personal diagnostic appliances. In 2004, Braun generated 13% of Gillette's revenues, and 2% of its net profits. According to its 2003 10K, Gillette's Braun segment is focusing on the dry shaving market and ensures that its product line will return greater than its cost of capital. Product performance and price are some of the demand driving factors of this segment.

### **3.2.5 Personal Care**

Gillette's personal care may be one of the most dynamic segments among Gillette's five operating segments as the market is highly segmented with numerous competitors. In 2004, the personal care division generated \$961 million in sales, which is 9% of the company's total revenue. Some of the products in this segment includes, shaving preparation products, skin care products, deodorants, and antiperspirants. This market is highly competitive and fragmented with relatively short product life cycles. Frequent introduction of new brands and packaging, innovative marketing concepts and promotions are crucial factors that drive demand and enable Gillette to stay competitive in this market.



In 2004, net sales in personal care increased 11% from the previous year, and the sales growth is primarily due to strong demand of its new products and trade-up in shaving preparations. Gillette Complete Skincare, Right Guard Cool Spray deodorant, and Mach3 Gel are some new products that were introduced during 2004. The profits increased from \$73 million to \$95 during 2004, resulting in a 9.9% operating margin. In 2003, the operating margin of the Personal Care division was about 8.4% compared to the 6.2% in 2002.

Majority of this thesis focuses on this Personal Care business unit. More specifically, twenty SKUs from a single shave preparation gel products production line would be the products of interest. The thesis will mainly focus on improving the supply chain process of these twenty products, including demand, supply, and customer-side planning processes.

### ***3.3 Operating Model and Supply Chain Structure***

Along with the main manufacturing factory in Andover and seven other manufacturing sites across the United States, Gillette owns three distribution centers in the US and one in Toronto, Canada. Gillette's orders are made-to-forecast and products are held as inventory in the supply warehouse to cover volatility and variability in demand and supply. As the demand signal comes in, they replenish from the supply warehouse to the distribution centers, where the products will be shipped to the customers' distribution centers. Once the inventory reaches a certain threshold at the supply warehouse, a trigger is sent to the factory for manufacturing more products. The system consolidates the distribution demand up to the supply warehouse and sends a trigger to the factory.

Within Gillette's control, for a deodorant to become a sellable product from raw materials takes about seven days for manufacturing. With an average distribution time of seven days to

the Gillette's distribution centers, it takes about three weeks for all raw materials to be manufactured as a deodorant and stowed away in the distribution center. Typically, they already have inventory (safety stock) in the distribution centers, and they are constantly replenishing to reach target inventory, to keep them in stock.

### **3.3.1 Supply-Side Business Processes**

According to a Gillette manager, about 80~90% of the personal care products are made at Gillette's production facilities in Andover, MA and Redding, England, and the rest is outsourced to various subcontractors. The sourcing department collects data on manufacturing, procurement, cost savings, and sourcing requirements, and compares this with the volume and annual production requirements of the products. In general, Gillette will outsource production of products when the volume is low, and the competitive activity of the specific product is uncertain. Personal care is a highly competitive industry with very low margins, so they take a "wait-and-see" approach for new products. This means they will purposely outsource the production and have it earn its way into the factory, to avoid re-capitalization for every new product launches. For example, if the product shows a sustainable amount of volume and potential growth after a couple of years, then they will bring it in-house and put it on highly automated equipment.

Gillette always had very good visibility of its suppliers, one level up, but only recently after the strategic sourcing initiative started, is when they were able to look into two or three tiers up the supply chain from Gillette. This was all driven by cost savings opportunities. For example, if the supplier of the supplier is buying the same material as its suppliers, Gillette would develop a global contract to bring cost benefits to all suppliers up the supply chain, by leveraging its buying power.

The five business units in five geographies together purchase about \$4 billion in raw material each year. Gillette takes a global category management approach in purchasing in order to consolidate its purchasing processes. The company may consolidate purchasing of packaging materials, marketing services, or plastic resins. They are also looking into product standardization opportunities.

### **3.3.2 Inside Business Processes**

Gillette plans and manufactures to a forecast and looks at orders as they come in. According to a Gillette manager, approximately 80 to 85% of their orders are made-to-forecast and satisfied with inventory at the distribution centers, while the remaining small percentage of the orders is pack-to-order. The average customer order fulfillment time of its products is approximately six days. Since the system cannot see orders that extend outside of those six days, its eighteen-month forecast horizon drives replenishment in the distribution centers. However, within those six days, they will compare actual demand and forecast data, and take the greater of the two to plan to the higher level. The forecast horizon is eighteen months, but the planning departments will still receive a forecast every month and do continuous review of the forecast.

The small portion of the orders that are pack-to-order are special display and packages that are done for specific customers, rather than building special SKUs or products that are engineered-to-order. These are the products one would usually see at the cash registers, and other display products. The personal care division has about 150 foot prints of different display packs, which is available for order and can be turned around in less than fifteen days. An order that comes in for a display pack draws from open stock inventory that is forecasted. If a

customer requests any configuration outside of the pre-defined template, the lead time may be longer. The display cost is embedded as part of the product order cost, and is only made once the order is received by a specific customer.

Gillette's master production schedule covers around eighteen months, on a rolling basis. Together with the factories and other planning teams under the Global Value Chain organization, the supply planning team will generate the production plans. Gillette divides its production plan into three periods: firm period, slush period, and liquid period. The firm period is the last three weeks of production, in which the production plans cannot be changed unless the planning team negotiates with the factory. During the slush period, the planner spends time adjusting the schedule to variability in demand and supply. During the liquid period, the system plans freely. The factory has a general idea of the orders expected to come in, based on the eighteen-month forecast, but they do not commit to vendors and suppliers yet. The factory continues to actively plan, move products around by grouping, batching sequencing depending on capacity constraints onto a tighter time frame. Visibility of this long horizon is available for suppliers to view, so the suppliers can plan long term raw material requirements.

Currently with the monthly planning process, supply planning looks at the customers' orders that comes in each week. As customer orders actually materialize, the supply team is able to see the signal to see how the customer orders come in against forecast and make an adjustment as necessary for the supply plan to align with the forecast. The greater of the order or forecast is chosen to be the supply signal for the production plans, over a seven day period. The factory will react to potential oversells, as well as undersells, so they can free up the capacity for other flavors they do need at that time. However, ultimately, supply planning would prefer to see a demand signal that would see the change at that forecast level. At a monthly level, the Supply

Planning team will not see the materialized customer orders as quickly as a weekly demand plan would. Under a monthly demand planning process, the only changes made during the month are related to undersells and oversells.

The planning system will take in a forecast, which is an estimate, and then take the customer orders, which are the actual demand, that come in through SAP, and another customer order system for international orders. The system will see the customer order activity updates on a daily basis. For example, if the forecast was 100 units for a specific product, and a major customer such as Wal-Mart ordered 500 units of the SKU during the first week of the month, the demand signal will adjust to 500. Basically, the system takes the greater of the demand and orders. When the Supply Planner goes into deploy the plan, the system may be shocked with the sudden increase in orders. This will trigger the system to ramp up production in the first place holder they can, outside of the firm, to make the adjustment for the oversell, if the supply was not plentiful. She will have to review the plan and decide whether she needs to go into the firm period and negotiate a change in the production plans. The system will see the activity everyday, based on actual customer orders. The Personal Care division reviews pacing daily and weekly, and the ad-hoc functionality allows them to pass a revised forecast. (Personal Care does the most ad-hoc activity within the Gillette Company.)

Gillette's transportation of raw materials and products is outsourced and contracted out to third-party logistics (3PL) providers. Gillette used to own private fleets, but since transportation was not one of their core competencies, they handed this over to third-party logistics carriers. Yellow Freight, DHL, Excel, and JB Hunt are only some of the 3PL providers that serve Gillette. Unlike the highly consolidated Gillette's retailers and suppliers, the 3PL market place hasn't consolidated as quickly, on a global level, so Gillette has many different contracts for different

partners and companies, depending on the region. This is mainly due to the regionally strong players, who are not quite global yet. About 80% of the products are shipped inter-modal and around 20% are transported via trucks, says a Gillette planning manager.

Cross-docking is done for fast moving items at two of Gillette's production sites, Andover, Mass., and Iowa City, Iowa. Once the products move from the manufacturing line, they are labeled with a bar code license and sent to the cross-dock area. At the cross-dock area, the products are scanned and assigned to a put away location in the shipping dock. These products will only stay in this area until the truck is full, and will be shipped to the customers' distribution center or other delivery points, without being stored in the supply warehouse.

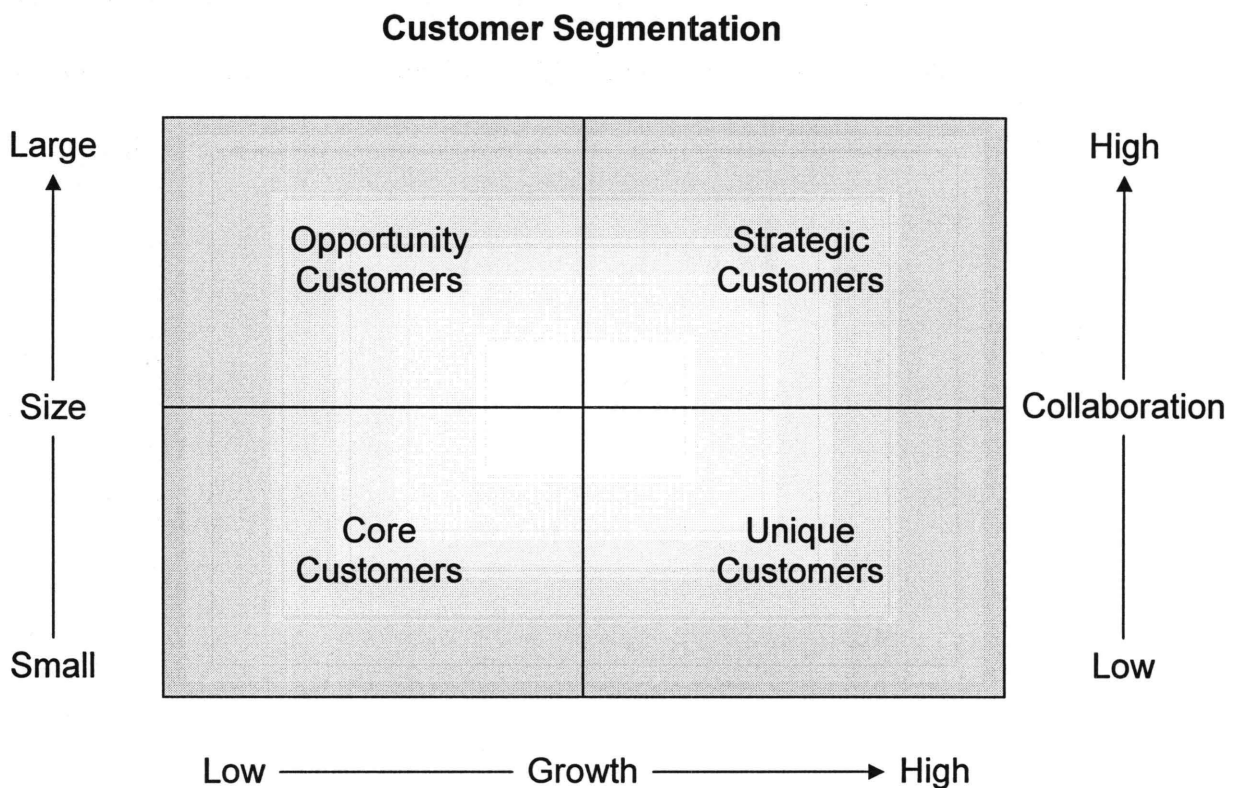
Gillette manages its warehouses and transportation processes with a highly integrated transportation and warehouse management system from Provia Software. It standardizes technology and order fulfillment processes across the distribution centers and production/package sites across North America. This allows them to have accurate inventory information at all times and gives them good control over finished goods inventory in the distribution centers. [12]

### **3.3.3 Customer-Side Business Processes**

For its biggest customers and strategic customers, the value chain organization works with the customers to obtain POS data, share data, and communicate back and forth to receive information on inventory. With some key customers, Gillette does vendor managed inventory, where they look into the customer's inventories to use their intelligence to ensure Gillette has the right inventory, at the right place, at the right time. Entire teams of Gillette employees are located at its key customers' sites, (such as Wal-Mart, Target, K-Mart) to work as strategic partners by writing orders for them, and interfacing directly into the customers' systems.

The demand planning team divides its customers into four segments depending on the size, collaboration level, growth potential of its demand (Figure 5). Retailers such as Wal-Mart or Target are some customers in the strategic customers segment, where Gillette may place value chain team leaders at the customer sites to work with them as strategic partners. Although customers like Home Depot may not be one of Gillette’s biggest customers, they are considered a “unique customer” because of the amount of sales in Duracell batteries. By segmenting the customers, Gillette is able to keep sight of customers that may not necessarily be its biggest across all of Gillette’s products, as it could negatively impact the market share in all five of its business units. This chart assists them throughout the resource planning decisions to support its business with the customers.

**Figure 5: Customer Segmentation (Source: Gillette)**



During its 18-month demand planning process, demand planners develop unconstrained demand plan by business units. They focus on supporting operations through detailed planning in the short run, while aggregated planning allows them to be flexible in the capacity planning over a longer period. Throughout the planning process, the demand planning group gathers market and business information, evaluate history, and review performance metrics and forecasting models to come up with an accurate demand forecast. Once an overall demand plan is established, supply and financial teams contribute to their intelligence to the forecasting model. Figure 6 is a detailed process map of the current Demand Planning process at the Gillette Company.

The Demand Planning group for Personal Care follows a top-down forecast approach where they do not forecast each flavor individually. They try to get the top right and the planners set up models that would break it down to the individual flavors. For example, Satin Care 7 ounce products would be under one model by customer. Below this product level, there exists another model for flavors by customer, and Manugistics reconciles and aggregates the forecast volume based on a pre-determined proportion.

Some major inputs for the current monthly demand plan include weekly demand planning meetings, Core Team meetings, and promotional grids from major customers. Core Team meetings are held with representatives from marketing, sales, demand planning and finance. Promotional grids from major customers may be updated throughout the month, and different information passed on by the sales planning group. This information is passed whenever such information is available, on a weekly, even daily basis. Demand Planning will consolidate this business intelligence into the monthly demand plan and pass it to Supply Planning on the fifth day of each month. However, depending on the nature of the change, if the impact is large



Figure 6: Current Demand Planning Process (source: Gillette)

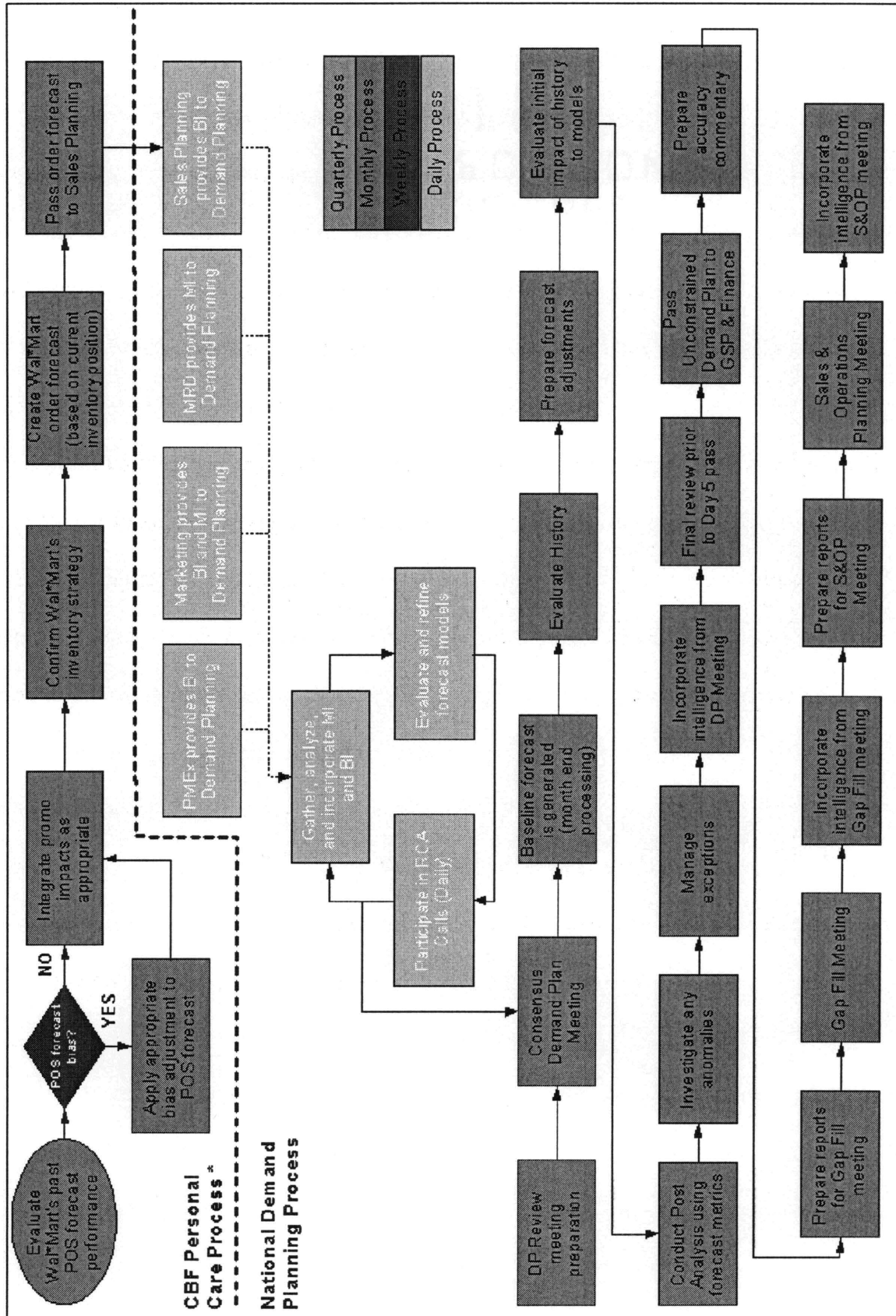
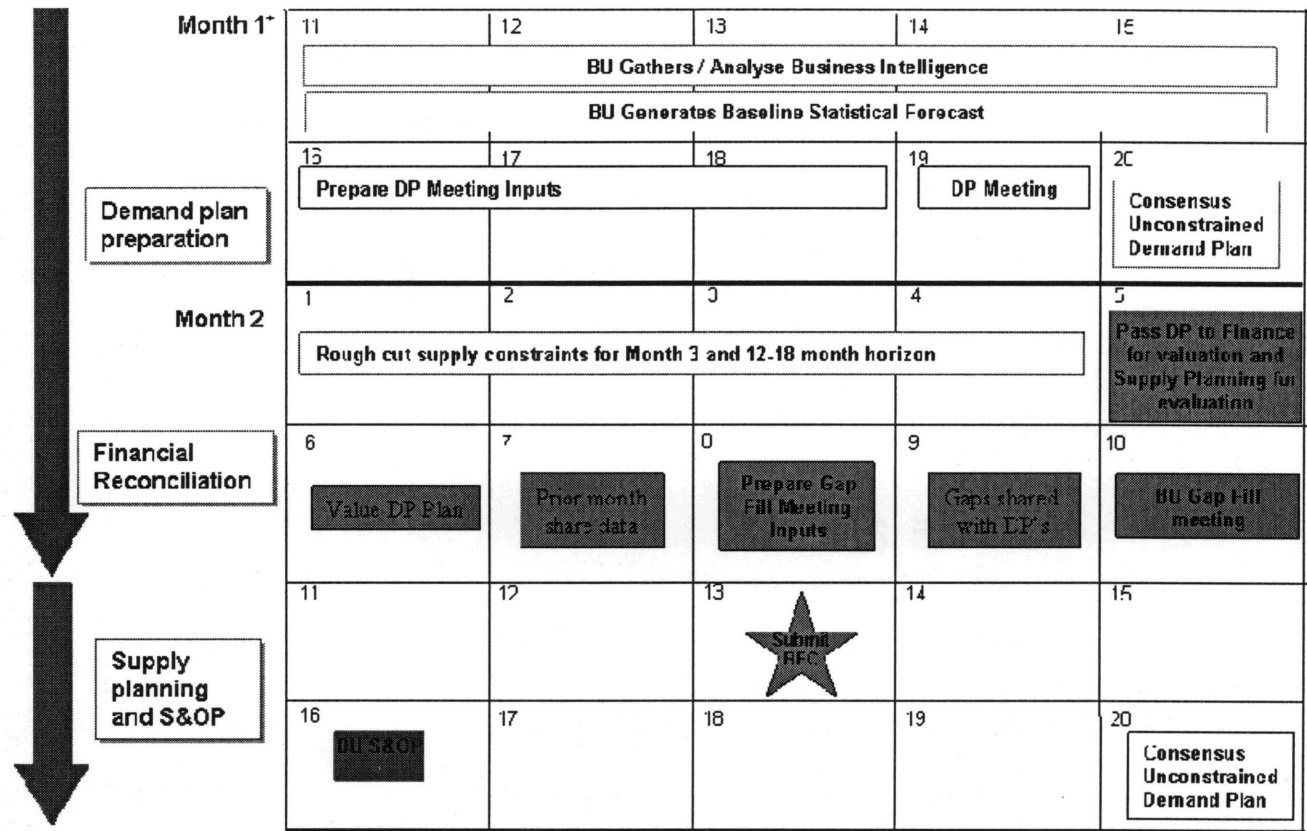


Figure 7: Current Global DP, Gap Fill, S&OP Process Timeline



enough the planners will submit an ad-hoc pass during the month. Figure 7 describes the monthly timeline of the current Demand Planning, Gap Fill, and Sales & Operations Planning Process.

In order to improve the focus of the demand planners and build flexibility in the production process, Gillette consolidates SKUs by evaluating individual products and its performances, using its information technology resources, and eliminating those products that do not meet the standards of the company aggregating the forecast allows Gillette to improve its demand forecasting and production planning process. Inventory turns improved by 25 percent in less than 3 years, and the production process became much more flexible as the consolidation of SKUs allowed them to have fewer changeovers.

The majority of the orders are received through electronic data interchange (EDI), and it takes about six days for them to turn around an order and ship to the customers within the United

States. As long as there is inventory at the right distribution center, the orders could be turned around within 24 hours. However, the average lead time is about six days depending on the material availability date and other factors. Often times, customers may specify an arrival date when they want the products to arrive at their distribution center or where they are shipped to, so Gillette's distribution department will assess, based on that arrival date, inventory, and other customer requirements, when the products should be shipped. In this case, an order might not be sent to the distribution center until three days later to be picked, packed, and shipped. The transportation system will generate freight plans, and the warehouse management system will generate optimal order-filling plans.

## **Chapter 4 - Quick Response Project Overview**

While the previous chapter reviewed Gillette's As-Is process, this chapter documents a detailed demand planning process for the twenty selected shave-preparation SKUs, designed by the Quick Response project group at The Gillette Company. This Quick Response group tested and executed a more responsive demand planning process to improve the company's supply chain performances. Details of the key performance measures used to measure the group's performance is included in this chapter, as well.

### ***4.1 Project Objectives***

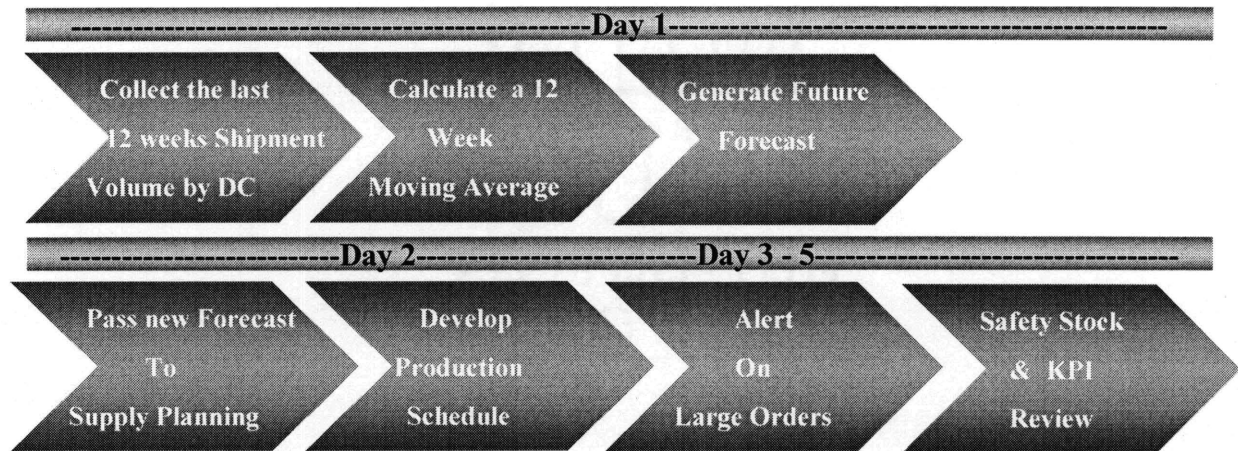
The main objective of the Quick Response project was to prove that the Gillette Company can become a demand driven supply organization with greater view to the shelf. This would in turn result in increased system-wide on-shelf availability, lower inventory, and reduced costs. In order to deliver these objectives, the project team was designed to focus on several main processes throughout the supply chain processes. The Quick Response project would:

- 1) increase focus on consumer demand signals throughout the organization by using real time order and shipment history
- 2) better connect multiple data streams into planning and replenishment processes
- 3) reduce the current 5 week cycle customer order cycle to 1-2 weeks
- 4) establish foundation for future RFID benefit capture studies.

### ***4.2 Quick Response Project Weekly Processes***

The author, who served as one of the Demand Planning group's representative on the project, produced forecast volumes of twenty shave-preparation gel flavors, which were all

**Figure 8: Quick Response Weekly Process**



produced on a single manufacturing line in Gillette's Andover manufacturing facility. This allows the project team to deal with producing the right product mixes under a manufacturing environment with capacity constraints, which truly reflects the reality of manufacturing. The volume forecasted by the demand planner was manufactured at the Personal Care manufacturing plant or contracted out to strategic partners. The Quick Response team also held weekly meetings to closely follow the performance of the products and project itself. The project team followed a weekly process where each member of the team was responsible for the tasks outlined below and illustrated in Figure 8.

#### **4.2.1 Weekly Processes - Day 1**

On every first day of the week, (either Monday or Tuesday, depending on the company's work schedule) the demand planner retrieves the most up-to-date order and shipment history volume for all twenty SKUs. The data is available on the company's data warehouse server, where the order and shipment volume are consolidated through overnight batch jobs automatically scheduled to run over the weekend. The volume history file contains each SKU's daily order and shipment volume history from January 1, 2005 to the Friday before the first day

of the week. The file also divides the volume history into all three of the distribution centers in the United States, as well as the one distribution center in Canada. This allows the planner to generate forecasts at the distribution center level for each SKU.

**Table 1: Sample Order Shipment History Data**

SuppNum	DC	OMADWE	Desc	Country	OMAD	AdjOrdRU	ShipRU
G07614	US30	1/1/05	SCare Gel ShvP 7 oz SknT	US	12/29/04	36	36
G08804	US04	1/1/05	TGS Gel ShvP 7 oz UCmft	US	12/30/04	756	756
G08804	US04	1/1/05	TGS Gel ShvP 7 oz UCmft	US	12/30/04	2100	2100
G04150	US30	1/1/05	SCare Gel ShvP 7 oz DryS	US	12/30/04	240	240
G08749	US20	1/1/05	SCare Gel ShvP 7 oz FlrPs	US	12/31/04	144	144

This raw data (see Table 1 for a sample data table) is loaded into a Microsoft Access database that consolidates the daily volume history into weekly buckets for each SKU, each location. By downloading an entire year of history every week, the team reduces the risk of using bad history, as the company's database is refreshed daily to reflect the most accurate history. Once the history is loaded into the Access database, the planner will generate a twelve-week moving average. The twelve-week average was chosen based on Agarwal and Holt's (2005) work. In order to avoid using incomplete week's history when the complete order or shipment hasn't been confirmed in the system, the week prior to the current forecast week was excluded from the twelve-week moving average calculation.

The weekly forecast numbers were then multiplied by 4 or 5 weeks, depending on Gillette's fiscal calendar, to produce a monthly number for the Supply Planning team. Even though the weekly forecast was aggregated to monthly buckets, the weekly forecast numbers were still used to measure performance. In order to account for the two week firm period, where no change in the production plan is allowed, the team was measured against the forecast that was

generated two weeks prior to the current week, and the current week's order history at the SKU - distribution center level.

During the first day of the week, the planner reviews the previous week's performance and calculates the key performance metric numbers. Forecast Accuracy, Bias, Attainment, and COV are the metrics calculated by the Demand Planning group, which are reviewed during the weekly team meetings. The demand planner also creates a root-cause analysis report for the customer services team. This process involves collecting top three undersells and oversells information and major changes in the forecast volume from the three weeks prior to the current week. Since the forecast was generated by simple moving average values, products with significant changes in the forecast volume each week would suggest a large increase or decrease in the order volume. This allows the planners to keep track of any irregular order patterns of the customers. For root-cause analysis purposes only, the daily order and shipment information for Wal-mart and Target, Gillette's two largest customers, was collected through the database, as well. This customer specific information was consolidated into weekly buckets, and the planner alerted the customer service team if any unusual activities were found. The root-cause file compiled by the planner is sent to the customer service center representative who further investigates the unexpected order patterns of those problematic SKUs throughout the week.

#### **4.2.2 Weekly Processes - Day 2**

Once the forecast is generated by the demand planner and consolidated into monthly buckets, the forecast file is passed to the supply planning team by Day 2. Supply Planning spends about 5-10 minutes loading the weekly file, which would overwrite the existing monthly forecast file that was loaded in the beginning of the month. The original thought was to continue

inputting the Demand Plan forecast, which will be overwritten by the Quick Response forecast, manually. However, during the initial phases of the project, the senior level management team decided that the Quick Response forecast will be loaded directly into system and replace the existing forecast and be planned to that. The Supply Planning team imported the forecast and planned it as the primary forecast instead of having one operational plan and another theoretical number generated for the purpose of the project.

Once the forecast volume is entered into the system, Supply Planning’s SAP system will update the production plan to reflect the change in volume from the previous week. Depending on the size of the change and the inventory level, the supply planner would alert the production manager with the changes in the production schedule. Below (Table 2) is a sample forecast pass table for product SKU G02654 for the months of March and April, 2006. Depending on the number of days in the Gillette fiscal calendar, the weekly numbers are multiplied by four or five weeks to create the monthly volume, which is loaded onto the Supply Planning system.

**Table 2: Sample Forecast Pass**

DmdUnit	DmdGroup	Loc	Begin	Dur	Type	FcstID	Qty	Model
G02654	TOTCPD	US04	022606	35D	1		21985	DEFAULT-MODEL
G02654	TOTCPD	US20	022606	35D	1		14780	DEFAULT-MODEL
G02654	TOTCPD	US30	022606	35D	1		27550	DEFAULT-MODEL
G02654	TOTCPD	US04	040206	28D	1		17588	DEFAULT-MODEL



### **4.2.3 Weekly Processes - Day 3**

During the third day of the week, the representative from the Customer Service Center (CSC) collects the available-to-promise (ATP) information. This file is collected from the inventory database and provides information on how many product cases are available for delivery when a customer orders from specific distribution center, as of 4 p.m. on the third day of the week. Around the same time of the day, the Supply Planning planner downloads the weeks forward coverage information, using the on-site inventory level and the most recent forecast volume that was passed on the first day of the week. Addition to the inventory information, the CSC analyst prepares a root-cause file for the problematic SKUs determined by the demand planner on Day 1. The analyst typically reviews the weekly order files to determine the specific customers who ordered more than usual, and determines if there are any promotional activities that were not communicated to the team earlier.

The Demand Planning planner prepares PowerPoint presentations, which include a total volume graph and deep-dive graphical illustrations of the problematic SKUs order and shipment history, as well as the forecast volume.

### **4.2.4 Weekly Processes - Day 4**

The Quick Response project team holds face-to-face meetings every Thursday afternoons. Each member of the team is responsible for presenting the tasks assigned to them. The team leader reviews the weekly scorecard, which measures the key performance metrics described in the next section. As a group, everyone collectively reviews the ATP, Demand Planning review, and Supply Planning review that were prepared by each representative during the week.

The team then discusses topics identified in the previous meeting. This has been very beneficial to the success of the project, as many unforeseen issues arose through the course of the

project. For example, an unexpected decline in sales during the months of July made the group aware of the bonus ounce promotion, which was not part of the every day process. Throughout the project, the group would be faced with a number of unexpected outcomes, resulting in a deviation from the original planning process. When this occurred, the entire group came to a consensus on how to deal with the problem effectively.

### ***4.3 Performance Measures for Success***

Due to the cross-functional nature of the project team, each member of the group was focused on different aspects of the performance of the forecast plan. In order to ensure the entire team was aligned to the same objectives, the team closely followed the performance metrics listed below. By closely monitoring these key performance metrics each week, the team focused on balancing different operational objectives such as customer service, efficiency, and asset utilization. These metrics can be broadly categorized into customer service (i.e. FTFR, OTMC), functional metrics (i.e. accuracy, attainment, bias, COV), and working capital (weeks forward coverage, DIOH). Although the project started in June, the performance measures were calculated starting the week of July 11<sup>th</sup>, 2005, in order to incorporate the two week firm period. In other words, the Quick Response forecast volume was truly in effect two weeks after the first forecast was passed.

- Coefficient of Variance (COV): this metric measures the relative uncertainty of demand. By closely following this measurement, the team is able to adjust the predictability of the changing demand, and potentially reduce or increase safety stock levels in the inventory model. For the purpose of the scorecard measuring, the team calculated this measure by using the twenty-six week average daily forecast volume.

$$COV\% = \frac{\text{Standard Deviation of Demand}}{\text{Average Daily Forecast}}$$

In other words,

$$\text{Error "e"} = \text{Actual Demand} - \text{Forecast Demand}$$

$$\text{Mean Absolute Deviation (MAD)} = \frac{\sum_{i=1}^n |e_i|}{n}$$

$$\text{Coefficient of Variation (COV)} = \frac{1.25 \times MAD}{\text{Average of Forecast Demand}}$$

- **First Time Fill Rate (FTFR):** This measure represents the percentage of what was shipped on the first shipment versus what was on the original order. It is expressed as a percentage. For the Quick Response project, the overall FTFR, as well as the Wal-Mart and Target's FTFR, were pulled from a central data hub available for the customer service group.

$$FTFR = \frac{\sum \text{Units Shipped on the First Shipment of the Period}}{\sum \text{Units Ordered for the Period}}$$

- **On Time Material Confirmation (OTMC):** this metric measures the number of deliveries that arrived on time, as specified in the buyer's order instructions. In the case when there are no specific instructions set by the buyer, the number of deliveries that arrived on time compared to the standard lead time is used for this metric.

$$OTMC = \frac{\text{Number of On-Time Delivery Hits}}{\text{Total Number of Deliveries}},$$

where *Number of On-Time Delivery Hits* = Buyer's requested date (or window), or due date using the standard lead time.

- **Weeks Forward Coverage:** this measurement represents inventory coverage to meet demand requirements. For example, a 5 week WFC could mean that there is enough

inventory on site to cover 5 weeks of demand. This number is calculated using the current on-hand inventory volume divided by the most up to date forecast volume for the future weeks.

- **Weighted Forecast Accuracy:** this metric measures the ability of an organization to anticipate marketplace demand. It demonstrates in percentage terms how close the forecast is to the actual demand for a specified lag period. For the case of this project, the weighted forecast accuracy was measured at a two-week lag, since the firm period was two weeks long.

$$WFA = 1 - ABS \left( \frac{\sum SKULevelForecast - SKULevelOrder}{\sum SKULevelOrder} \right)$$

- **Forecast Attainment:** Attainment compares the forecast data against the actual shipments and orders. This metric allows the planner to ensure that the overall forecast performance falls within the acceptable margin of error.

$$Attainment = \frac{\sum SKULevelOrder}{\sum SKULevelForecast}$$

- **Forecast Bias:** This metric measures the degree of which demand is overstated or understated for a specific period in time. When viewed over time it provides the planners the directional bias in forecast that may be driving error.

$$Bias = \frac{\sum SKULevelForecast - SKULevelOrder}{\sum SKULevelOrder}$$

All of the key performance indicators listed above were collected and monitored throughout the course of the ten-month project. Chapter 5 will review the performance of these specific metrics and its impact on customer service and inventory level.

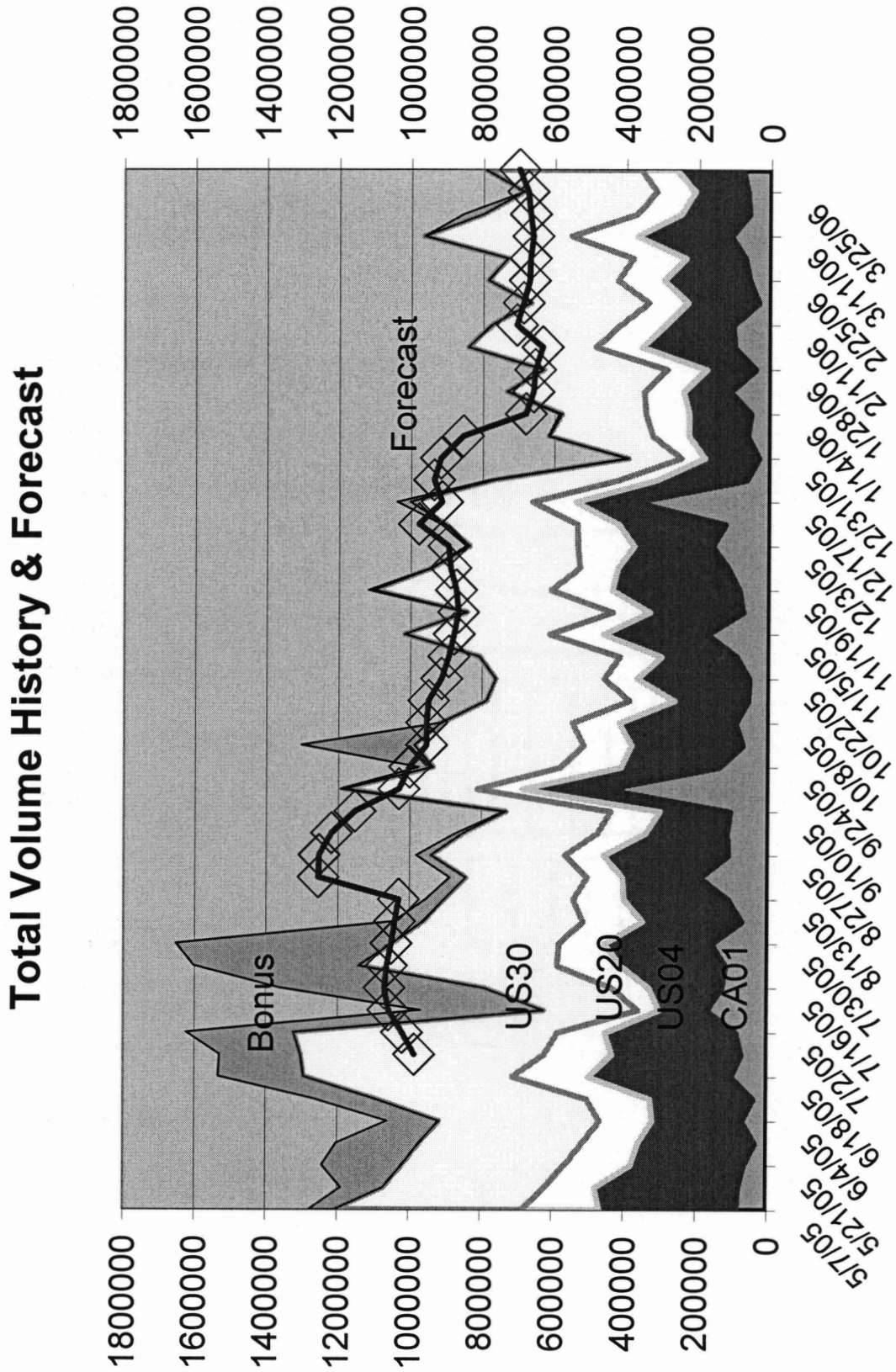
## **Chapter 5 – Results of the Quick Response Project**

### ***5.1 Overall Performance Review***

The Quick Response project was successful in many levels. The project has proven that the supply chain of the Gillette Company was able to receive weekly demand signals and execute them at the manufacturing plants. Production has demonstrated that the company has an agile responsive supply network with strong supplier collaboration, which handled the new process without any glitches. During the first week of the pilot project, the forecast generated by the Quick Response project added more than 3.9 million units of products to the July and August supply pass, compared to the existing Demand Planning forecast volume that was passed the previous month. By successfully being able to produce the 40% increase in production during the first couple weeks of the project, the Gillette supply planning team truly demonstrated the manufacturing flexibility under a constrained environment. Not only did they utilize this new forecast pass to better produce the right product mixes for the company, but they also demonstrated the ability to work with their vendors and strategic partners.

Figure 9 shows the order history of the twenty SKUs, by each distribution center, and the total forecast volume that was passed to Supply. The forecast is calculated using a twelve-week moving average, which was lagged by two weeks due to factory's firm period. However, there were a couple of changes to this calculation. During the week of August 18, the team decided to include the bonus volume history into a selective group of products, after a bonus ounce program analysis (see section 6.4 for further explanation of this study). Additionally, that same week, the team has adapted the seasonality forecast number as the primary forecast volume.

Figure 9: Order History and Quick Response Project Forecast Volume



The significant improvements in the key performance measures are also strong indicators of the success of this project. Throughout the project, the customer service levels were nearly 100%, the coefficient of variance improved over 30% points, and inventory coverage was at a desirable level. The following sections will further elaborate the details of the group's performance based on these key performance metrics.

In addition to the ability to smoothly execute the new planning process, the group also proved that they could effectively respond to unexpected changes in the supply and demand patterns. Throughout the course of this ten-month project, several unanticipated problems occurred. During the process design period, the team was not aware of the impact of the promotions activities, seasonality factors, possible shortage of supply, and other resource issues. Therefore, a business process was not designed for these issues, but the group became proactive in reacting to these unexpected issues and implement new processes during the course of the project. Further details about these issues are documented in Chapter 6.

## ***5.2 Improvements in Key Performance Indicators***

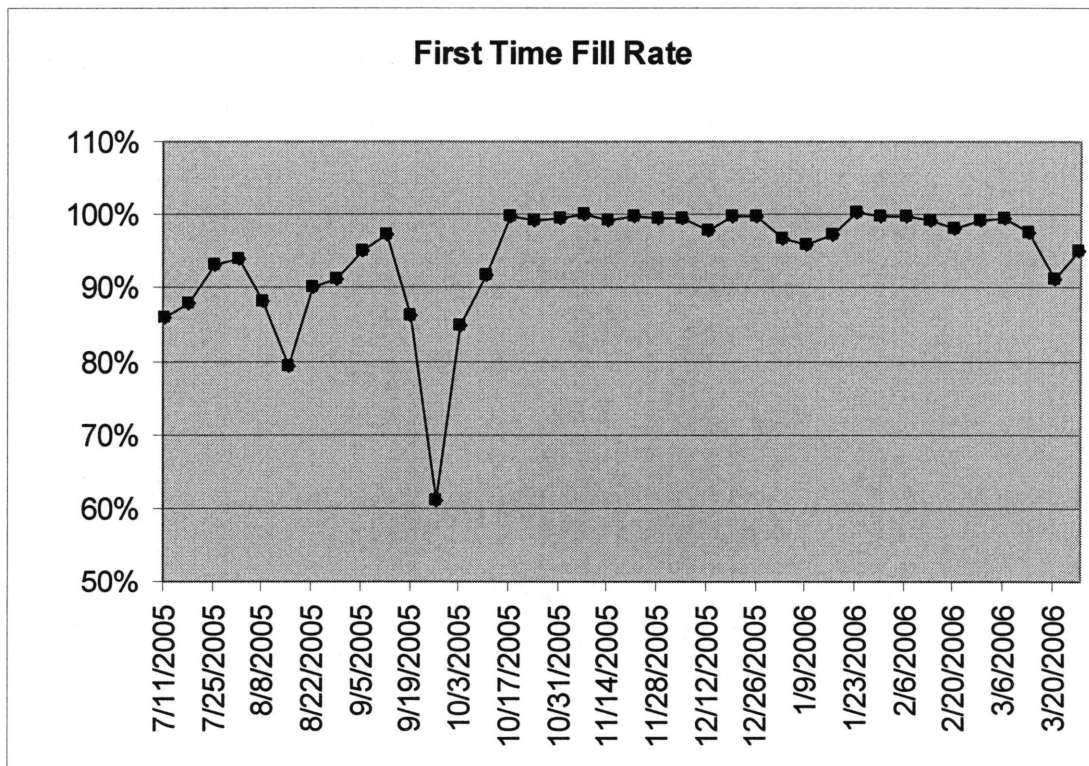
### **5.2.1 Customer Service**

As shown in Figure 10, the First Time Fill Rate for the twenty pilot SKUs have improved as the project went on. Prior to the launch of this project, during the months of April, May, and June of 2005, the twenty products provided a 94%, 90%, and 90% first time fill rate, respectively. Because of the sudden increase in production volume, the first week of the project only provided 86% in first time fill rate. However, this, relatively low customer service level has improved dramatically to consistently deliver above 95%, after the third month of the launch of the project. During the initial phase of the project, a couple of unanticipated events caused two major service

issues. The team reacted to these events and brought up the service rate back to an acceptable level.

The first decrease in service level was caused by the ending of the bonus ounce promotions program. Not only did the forecast volume decrease during this time period due to the shift in orders to the promotional products, but the normal demand returned to these open stock items once the promotion was over. The second dip in service level was caused by a quarantine hold of over 3.1 million units of shave-prep gels from the manufacturing line that produces the QR pilot products. This quality hold was due to a micro-bacteria issue that forced the Supply organization to remove these products from the supply chain, until further testing was complete. By expediting the shipping between distribution centers with higher inventory levels, adjusting the production schedules, and leveraging the responsive supplier network, the team was quickly able to bring up the service levels to provide nearly perfect service to its customers.

**Figure 10: First Time Fill Rate**





## **5.2.2 Improvements from the As-Is process**

Although the Quick Response forecast volume was the only forecast volume that was passed to the Supply Planning system, the Demand Planning group continued to produce forecast volumes as part of its monthly as-is process. This number was never operationalized, but only resided in the existing demand planning system for download, if needed. In order to analyze the benefits of the Quick Response project, the team continued to monitor and compare the performance of both Quick Response and Gillette's National Demand Planning (NDP) – Personal Care business unit's forecasts. In Figure 11 and Figure 12, the Quick Response project showed a remarkable improvement in forecast accuracy and attainment, during the first month of the project. During the month of July, Quick Response's forecast predicted the demand at least 10%-points higher than the current Demand Plan would have predicted. Although the NDP number caught up with the Quick Response with the next month, by including a seasonality factor in September, Quick Response out performed, once again. The sudden drop in forecast accuracy was most likely caused by the holiday season pre-build and other irregular activities.

Midway through the pilot project, the NDP organization agreed to remove the volume constraints on the forecasting process. This led to better volumes and more accurate forecasts by removing the existing bias associated with the financial plan. (Details about de-linking from the financial plan are discussed in section 6.3). By doing so, the forecast performance of Gillette's Demand Planning became very close to Quick Response throughout the rest of the project. This proved that the team was able to make a permanent change to the existing Demand Planning processes, and impact the entire organization.

Figure 11: Accuracy - Quick Response vs. Gillette Demand Planning

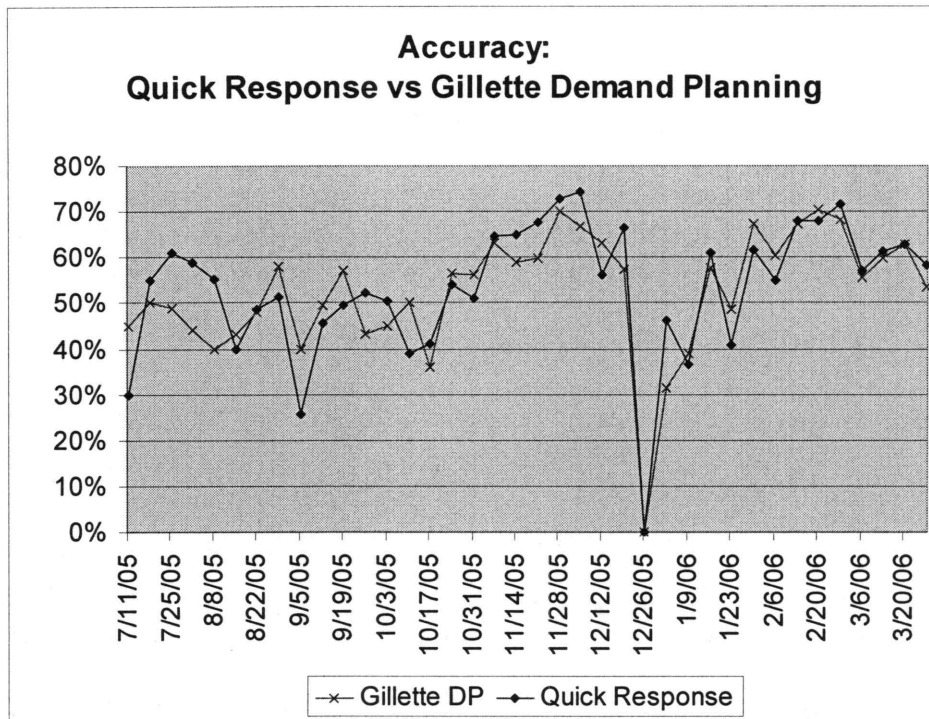
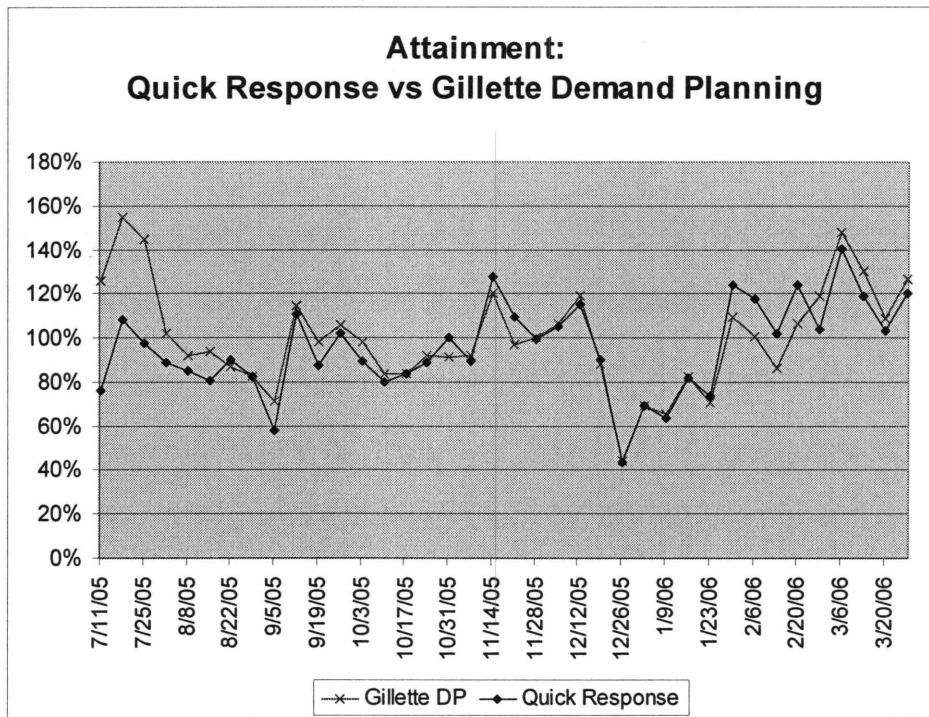


Figure 12: Attainment - Quick Response vs Gillette Demand planning

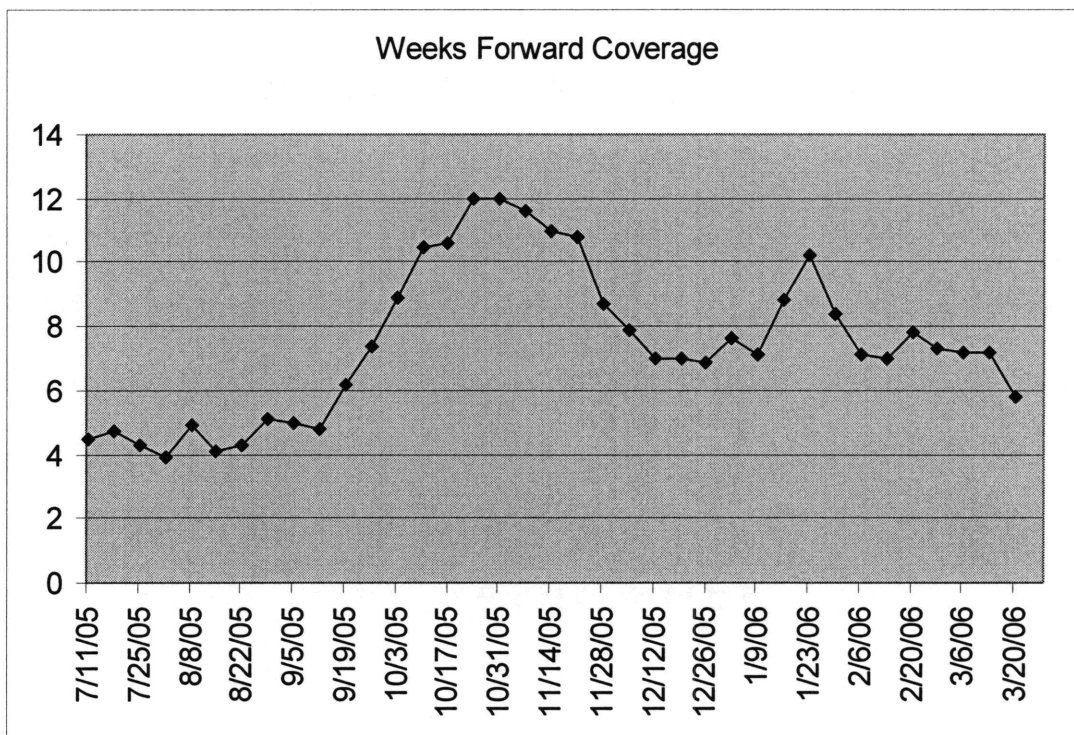


Similar to the forecast accuracy performance, Quick Response forecasts showed a 40%-point drop in attainment during the initial stages of the project. Attainment reached very close to a 100%, the most desirable performance for this metric, as early as the second week of the project and remained in a desirable range. The performance of the two different processes, in terms of attainment, became similar once the existing Demand Planning numbers were financially de-linked from the trade-flow.

### 5.2.3 Inventory

When the project initially started, the forecasts were significantly lower than the actual demand, causing service issues and producing negative forecast bias. This resulted in shortages,

**Figure 13: Weeks Forward Coverage**

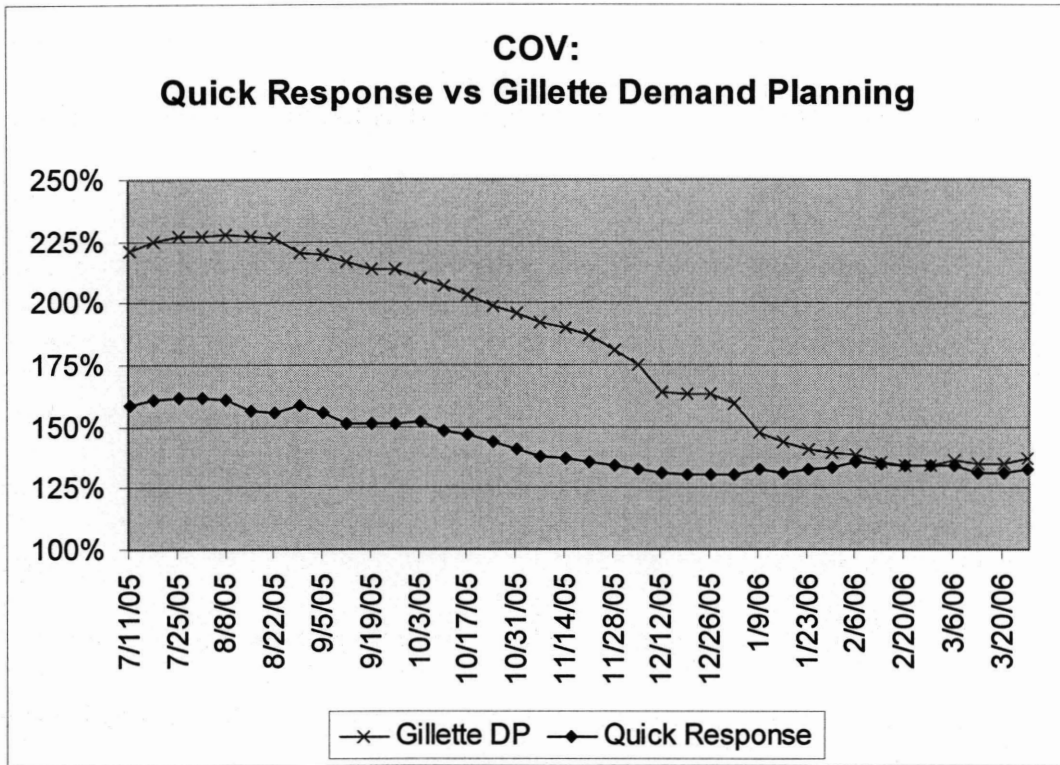


and the inventory levels were lower than desired. The quarantine hold on the week of September 5<sup>th</sup>, due to the micro-bacteria issue did not help the matter, either. Therefore, the Quick Response project focused on bringing back the inventory level to the 7 weeks forward coverage, the value considered to be desired throughout the Personal Care business unit.

However, there were several reasons the weeks forward coverage level has gone beyond the typical 7 weeks coverage during the fourth quarter of 2005. In a constrained production line like this particular production line QR works with, inventory level heavily depends on batching. During the end of the season, a new product launch for the company forced this production line to pre-build inventory in order to free up capacity for the production of the new products. This reflected the true realities of manufacturing capacity constraints, which were unanticipated during the planning stages of the project.

Additionally, another reason the inventory didn't come down as expected was because the team did not actually adjust the safety stock parameter in the planning system. The way the planning system works is it recommends a number to the planner that is invisible of the safety stock and they only adjust it when there is a shortage. After noticing the improved forecasts and other metrics, the team should have adjusted the safety stock planning system for every SKU based on their individual variance in forecast error, rather than following one standard weeks forward coverage number for all product flavors.

Figure 14: COV - Quick Response vs Gillette Demand Planning



The Coefficient of Variance (COV) level for the Quick Response forecast numbers were more than 50%-points higher than the monthly Demand Planning forecasts. Based on Agarwal and Holt's safety stock sensitivity analysis, this difference in COV percentage translates into reduction of Days Safety Stock up to 4.3 days, which may be up to \$210,000 in dollarized safety stock savings, if the inventory planning system was adjusted. Once again, due to the de-linking of the current Demand Planning to the financial commitment, the two forecast numbers converged towards the end of the project. (Figure 14)

## **Chapter 6 – Impact of the Quick Response Project on the Overall Supply Chain**

This chapter explains how the Quick Response impacted the overall supply chain of the company through its weekly demand planning process. The project team has dealt with many unforeseen events that occurred during the project, and many business decisions made during the weekly meetings have permanently changed the way demand planning is done at Gillette.

### ***6.1 Reduction of Firm Period***

For the project, the Quick Response team was able to prove that the factory could reduce the firm period to two weeks. They informed them that a more frequent demand signal load will lead to more frequent requests to change the production schedule, inside of the current month to react. Without the reduction of the firm period to two weeks, the factory would have had to change within the firm period more often than they would like. By making the changes operational and implementing processes that support those changes, the change in the production schedule were less disruptive to the factory and external partners or vendors. If changes are requested during the firm period, the changes are much more disruptive to the factory and overall supply chain as they are considered special requests.

In order to reduce the firm period for a product category, the team evaluated the entire supply chain when making that decision. In order to increase flexibility at the finished goods product level, where the firm periods are reduced, re-engineering of the manufacturing processes took place. The Quick Response team ensured the supply planning team can be operationally sound to support those shorter firm periods. This meant negotiating with the vendors and

partners, as well as assessing how much safety stock the plant needed in raw material. It was also important to be able to reduce lead time between the primary factory and the vendors that provided the raw material. Through this sort of evaluation, the team negotiated what the breakeven point is in terms of safety stock that the factory or the vendor needed to carry. This would ensure they were covered to be able to make the changes in the third week after the demand pass. There are a whole series of event that needs to take place between the factory, global supply planning, and the vendors to make the change happen. The firm period cannot be reduced without changing the processes around it. Otherwise, it will be very disruptive to the process, and most likely resulting in having difficulty supporting changes in the firm period, or periods close to it. During the ten month of the project, the manufacturing plant for the Personal Care division continued to prove the ability to accept and deploy changes in the demand stream, close to the two week firm period. The Quick Response team was able to demonstrate that the factory had the ability to have the supply end closely aligned with true demand variability.

## ***6.2 Elimination of Supply Warehouse***

When the pilot design became operational, the team decided to eliminate the supply warehouse. Traditionally, the supply warehouse held inventory back, before it was distributed throughout the distribution network. By being able to shorten the firm period, the manufacturing plant could change its productions plan constantly, depending on how the demand is coming in throughout the month. Therefore, the inventory would be deployed to the distribution centers right away, eliminating the need to hold any inventory in the supply warehouse. For these twenty pilot SKUs, Gillette does not carry any safety stock in the supply warehouse.

The only reason they carry inventory in the supply warehouse is because of the distribution center variability and volatility. If manufacturing can react fast enough at the factory level, then the need for a supply warehouse disappears. The team took advantage of the manufacturing flexibility and therefore, eliminated need for the supply warehouse. They can react at a reasonable amount of time and produce what they need, when they need it. Therefore, the group leveraged the manufacturing flexibility to remove the supply warehouse, and reduce extra inventory in the system.

### ***6.3 De-link Demand Plan to Trade-Flows***

Operationally, when the Quick Response project first went live, there was a huge gap between the existing demand planning number and the twelve week average forecast generated by Quick Response. The Quick Response number was reflecting a much higher forecast that was based on the actual sales that were seen in the last twelve weeks. Therefore, it helped the business unit become aligned with what was actually happening in the market place and reflect consumption rate at an operational level.

The Corporate culture at Gillette was to always over deliver, so the trade-flows were always biased low. The trade-flow is serves as the basis of the dollarized forecast of what the division is committing to the company. These trade-flow numbers are prepared by the market analysis team. They predict the market size and the company's market share. They also take an estimate of what the consumption is going to be, and prepare inventory assumption and the resulting shipment and forecast, based on that information. From a demand planning perspective, the market analysis group is not measured against forecast accuracy, so they were not accountable for that. Historically, when inventories get out of hand, the fingers pointed the



forecast. This pressured Demand Planning to make the demand plan close to the trade-flow, so if the General Manager is signing up for a 100 units, the demand plan would reflect this and forecast a 100 units, in order to prevent inventory from building. As a result, most business units were faced with major service issues because the trade-flows were always biased low.

In the beginning of the pilot, the product line was facing record high market share, but the trade-flow was slow to react to that. The Demand Planning organization understood that production had to be increased, but the group was forced to align to the trade-flow. Another major reason was that the group was seeing two months of consistent oversells and they were expecting competitive activities. They were continuously taking market share from its competitors, and the group was expecting the competitors to react. Therefore, there was a reluctance to increase the forecast very high.

On the other hand, when the Quick Response project started and the team looked at the twelve-week moving average, they started planning to a much higher number. As a result of that, and the numbers didn't have the bias to aligning with the trade-flow numbers. Over the course of the project, Gillette's Demand Planning group was able to convince management to de-link themselves from the financial numbers and truly align the demand plan to actual demands and other business intelligence. Once this happened, the KPIs for the demand plan have shown drastic improvement and there were even a couple of weeks where the demand plan outperformed the Quick Response numbers.

#### ***6.4 Dealing with Promotional Programs***

During the month of July 2005, the group noticed a sudden decrease in customer order volume. The group quickly found, through the customer service team's root-cause analysis and

dialogs with the promotional planning team, that for six of the twenty SKUs, there was a bonus ounce promotion offered. In order to follow the order patterns of the bonus volume, the team added the bonus SKUs to the watch list and monitored the history of those bonus SKUs. Because the customers were no longer ordering the open stock volume while the promotion was offered, the overall volume dropped by more than 700,000 units from the last week of June to the first week of July.

Once the bonus program was shut down, the volume of the open stock items did not accurately reflect the true demand of the products. While certain flavors had a sudden increase in volume simply because of the bonus ounce promotion, other product's volume were simply shifted to the bonus SKU and returned to the open stock once the promotion was over. Some questions that arose during the meeting were:

1. Should bonus SKU volume be included in the order history when calculating the moving average forecast?
2. Was this true demand, or did they simply order because it was a bonus program?

In order to answer these questions and for the forecast to reflect this change in demand pattern, the team conducted a simple bonus analysis exercise. The analysis found that adding bonus volume to the forecast calculation would help the forecast accuracy when the forecast was close to or lower than actual order volume, whereas adding bonus volume would not help accuracy when the forecast was already exceeding orders. Orders lower than forecast volume may suggest the customers ordered simply because it was a promotional program, which does not reflect true demand. Therefore the order volume for these bonus SKUs correlated to the open stock SKU should not be included in the order history. However, orders close to or higher

than the forecast volume may suggest bonus volume reflects real demand by customers and will continue to order them regardless of the promotional activity.

To follow this logic, the project team decided to include order history of the partnering promotional item to the calculation of the twelve week moving average, when the forecast was lower than actual order volume, after the promotion was over. This change in forecast calculation added nearly 250,000 units to the forecast plan during the week of August 18<sup>th</sup>.

Due to time constraints and other resource issues, the team was not able to design a sophisticated process for handling promotional activities, and further improvements are needed. Managing promotions and the volatility of it was underestimated in the planning process.

## ***6.5 Dealing with Seasonality***

Due to the nature of the consumer usage patterns, female shave gel products showed a significant increase in demand during the summer time, followed by a significant drop in sales when the weather gets cold (i.e. September and on). Therefore, the Quick Response team conducted a seasonality analysis to deal with these seasonal products. Seasonal products were defined as products that have a consistent and predictable lift or decline in the current month versus the volume in the previous quarter. The seasonal factor was calculated by averaging the lift or decline in orders and shipments across the years, and only products with at least two and a half years of history were chosen for this analysis. The seasonality factors were multiplied and added to the actual forecast volume at the SKU-location level.

By August 18<sup>th</sup>, Supply Planning adapted the seasonal forecast number, as the seasonal forecast continued to perform better than the straight forward twelve week average forecast. The team continued to monitor both results with and without seasonality to monitor the performance.

More than 200 product – location – month combinations were identified as seasonal, with a general trend of positive seasonality for the summer months and negative seasonality for the colder months.

## ***6.6 Cross-functional Collaboration***

This project truly demonstrated the benefits of working in a cross-functional group. The Quick Response project team was a cross-functional team with representation from all major areas of the company's supply chain, including Supply Planning, Demand Planning, the Customer Based Forecasting team, and the Customer Support Center. The Customer Support Center encompasses revenue management, order management, as well as other customer service functions for the organization.

This group held weekly meetings, where the different silos in the supply chain communicated with one another. The weekly meetings pulled the groups together to discuss weekly issues. Each individual was responsible for publishing weekly reports on the different function's and the team came together to review root-cause issues. They were addressing things on a weekly-basis and we could "react" to those issues on a weekly basis verses monthly. In the currently existing monthly planning cycle, the communication among different functional groups was minimal, and they communicate to their counter parts on an as-needed basis.

## **6.7 Other Outstanding Action Items**

### **6.7.1 Promotional Planning**

The twelve-week average does not work for large unforecasted promotional programs, and the QR signal was too simple an approach for these programs. A more effective way of communication the daily or weekly promotional intelligence needs to be designed. More importantly, the large daily spikes or dips to the organization needs to be communicated, since the supply planning organization receives forecasts in monthly buckets, but is still measured against the shorter planning process. Additionally, in this simple demand planning forecast, the team needs to come to a consensus on what will happen to the promotional volume after it occurred. A decision on whether the bonus SKU's order volume needs to be added to the history, or if the change in demand pattern needs to be adjusted due to the promotional activity needs to be decided. The team must agree upon on how big the promotion has to be to get special attention from the planners, in order for them to manually override the statistical forecast volume.

### **6.7.2 Root-Cause Analysis Process**

When unexpected spikes occurred during the project, the team did not have enough resources to develop an effective root cause process that could understand the business drivers and affect process improvements. Although the customer service representative could confirm which customer ordered an unusually large volume of products, the next step of what to do with the information was not defined clearly in this project group. It was also not clear how the business could incorporate specific business intelligence such as "Customer A orders on Tuesdays," in the demand pass and apply it to supply planning. By effectively managing such

business intelligence, the company will be able to improve safety stock levels and deployment strategies.

### **6.7.3 Safety Stock Level**

Despite the improvement in weighted forecast accuracy and coefficient of variance, the safety stock inventory model was never adjusted to reflect this improvement in the inventory model. It is recommended that in addition to what the current inventory level is, the team should track what the ideal inventory level should be. The target Weeks Forward Coverage is going to continuously change over time, especially when there is a pre-build, then the ideal inventory is going to go up because of the pre-build component.

The team must balance the idea of adjusting the safety stock number each day based on the newest and greatest information, and the other side of the argument that if you adjust too often, you may lose visibility to what is really going on in the supply system. If this project was to be repeated in the future, the team needs to reconcile which views they are going to have, and the inventory models should reflect this, as well. In the beginning of the project, the team should identify how the data flows through the system, and what actually changes inventory levels, and as the forecast accuracy changes, how the inventory model should change. One really needs an agreement from the entire team that every part of the process is going to be modified as a part of it. This was one component that was missing in this Quick Response project. Although the team closely followed the weekly performance progress of the weekly demand forecast, the team did not adjust any inventory models to further improve the supply chain performance. Inventory models that are up-to-date would eliminate unnecessary inventory from the system.

## ***Chapter 7 – Recommendations and Conclusion***

Overall the Quick Response project was a success. The Supply Planning team successfully imported the forecast and planned it as the primary forecast instead of having one operational plan and another theoretical number generated for the purpose of the project. Everyone, including senior management, bought into the Quick Response Demand. They signed up for it and they sponsored the team to hold true to the forecast numbers created by this project group. The entire organization was measured to the Quick Response numbers for the selected SKUs' performance, and everyone communicated to the different functional areas and commercials based on the QR demand. The entire organization was aligned to support the project.

By successfully manufacturing the 3.9 million unit increase in production during the first two weeks of the project launch, Gillette's Personal Care production line has demonstrated the manufacturing flexibility it could provide. Majority of the key performance indicators used to measure the progress of the project have out-performed the forecast generated by the existing demand planning process. The continuous improvements in the metrics throughout the course of the project also show that the performance of the Quick Response project has continued to advance.

The project team was able to prove that the supply chain was responsive enough to react to weekly changes in demand plans, by reducing the factory firm period down to two weeks and eliminating the supply warehouse. The Quick Response project also affected a permanent change to the organization by proving the benefit of disengaging the demand forecast plans from the financial trade-flow commitments. It has also developed a simple method of dealing with

promotional programs and seasonal products, and encouraged the communication among different functions of the supply chain.

Under a monthly demand planning process, the only changes made during the month are related to undersells and oversells. However, with the Quick Response project, Supply Planning is able to see the weekly demand pass, as well as both the undersell and oversell performance, so the planning team has more information available on hand to produce the right amount of supply to align to the demand.

If the plant had the luxury of planning freely without any capacity constraints, the process would have been closer to a lights-out approach. The system would receive a forecast stream, run the plan, generate the products needed, and deploy it. Ultimately, minimal effort would be required by the planning organizations and the system would get a demand stream that is really based on statistical average, the 12-week moving average. However, the reality was that this was a little more challenging with the promotional activities going on, where the demand planner had to massage the numbers, and supply planning faced capacity issues. Therefore, this simple demand planning process would work best for business units that do not have too many promotional or seasonal activities going on. The project team considered further expanding the project into other product categories with the Personal Care business unit, but the uncertain nature of the company's future due to the recent merger with Procter & Gamble held them back from further expanding the project.



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