Assessing and Reducing Product Portfolio Complexity in the Pharmaceutical Industry

By

Kevin M. Leiter

B.S.E. Systems Science and Engineering, University of Pennsylvania, 2006

Submitted to the MIT Sloan School of Management and the Engineering Systems Division in
Partial Fulfillment of the Requirements for the Degrees of

Master of Business Administration
and
Master of Science in Engineering Systems

In conjunction with the Leaders for Global Operations Program at the

Massachusetts Institute of Technology
June 2011
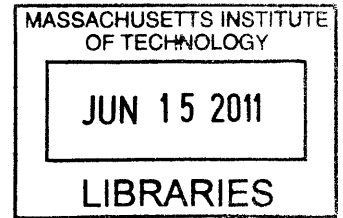
Signature of Author _

May 6, 2011
MIT Sloan School of Management
Department of Engineering Systems

Certified by _____

Dr. Roy Welsch, Thesis Supervisor
Eastman Kodak Leaders for Global Operations Professor of Management
Professor of Statistics and Engineering Systems, MIT Sloan School of Management

Certified by _

Dr. Anthony Sinskey, Thesis Supervisor
Professor of Biology, Health Sciences & Technology, and Engineering Systems, MIT

Accepted by

ancy Leveson
Professor of Engineering Systems and Aeronautics & Astronautics, MIT
Chair, Engineering Systems Division Education Committee

Accepted by _____

Debbie Berechman
Executive Director of MBA Program, MIT Sloan School of Management

This page has been intentionally left blank.

Assessing and Reducing Product Portfolio Complexity in the Pharmaceutical Industry

By

Kevin M. Leiter

ABSTRACT

Overly complex product portfolios lead to inefficient use of resources and limit an organization's ability to react quickly to changing market dynamics. The challenges of reducing portfolio complexity are defining excess complexity, identifying it in the portfolio, and removing it while still delivering value to customers. Novartis Pharmaceuticals, in agreement with the prevalent operational excellence culture, is exploring complexity reduction as a mechanism to reduce waste, costs, and inventory levels.

This thesis proposes the use of a comprehensive complexity reduction approach which targets both large and tail-end products for rationalization. The first complexity reduction focus area, redundant product rationalization, targets medium to large stock keeping units that do not directly satisfy a unique customer requirement. Removing redundant products has two benefits. First, larger products consume more resources, so the cost savings associated with removing a large redundant product are greater than that of smaller products. Second, sales levels will be preserved, as the demand for the rationalized product will shift to the remaining products that still meet the customer requirement in question. The second focus area is the more traditional tail-end pruning. By removing smaller, less profitable products and product groups, critical resources can be reallocated to more profitable products or new product launches.

Novartis has piloted and partially implemented this approach with impressive results. With the support of influential leaders across all functions, Novartis is expecting a reduction of 15% of the portfolio in terms of number of finished product stock keeping units and a reduction of up to $22 million USD in inventory value. Other benefits include improvements in demand forecast accuracy, production write-offs, asset utilization, and replenishment lead times.

Thesis Supervisors:

Dr. Roy Welsch
Eastman Kodak Leaders for Global Operations Professor of Management
Professor of Statistics and Engineering Systems, MIT Sloan School of Management

Dr. Anthony Sinskey
Professor of Biology, Health Sciences & Technology, and Engineering Systems, MIT

This page has been intentionally left blank.

ACKNOWLEDGMENTS

TABLE OF CONTENTS

TABLE OF FIGURES

GLOSSARY

Country Pharma Organization (CPO): Country-specific Novartis affiliates located in each of the local markets that Novartis Pharma conducts business. While these organizations are primarily sales and marketing organizations, some local supply chain and finance operations are performed there. These organizations purchase product from headquarters at Novartis Pharma Basel and then sell the products to distributers, providers, and patients.

Dosage Form: The physical form of a dose of a chemical compound used as a drug or medication intended for administration or consumption. Common dosage forms include pill, tablet or capsule, solution or syrup, aerosol or inhaler, liquid injection, and natural or herbal form. Various dosage forms may exist for a single particular drug, since different medical conditions can warrant different routes of administration (Dosage form, n.d.).

Dosage Strength: The concentration or volume of active ingredient included in a dosage.

Medical Need: Drugs that have been classified as critical treatments for the patient base. These could be drugs that provide life-saving treatments, drugs that have no alternative treatment in the market, or drugs that are part of a pandemic preparedness agreement. There are Global Medical Need drugs as well as drugs that are Medical Needs in specific countries and markets only.

Primary Pack: The first stage of packaging. The primary pack is the mechanism that comes in contact with the product, such as a blister pack, a tablet container, syringe, or bottle. Primary pack(s) are processed into finished packs after customer labeling has been applied.

Chapter 1 - INTRODUCTION AND PROBLEM STATEMENT

1.1 The Pharmaceutical Industry

The pharmaceutical industry has been and will continue facing increasing pressures to reduce costs. These pressures include: skyrocketing research and development (R&D) costs, rapidly decreasing periods of exclusivity, increasing pressure from the generics marketplace, increasing price scrutiny, and greater enforcement of current good manufacturing practices from regulatory agencies (Neway, 2003).

Extremely high R&D costs have always been a characteristic of the pharmaceutical industry. In fact, pharmaceutical industries invest approximately three to four times more in R&D, relative to sales, than traditional manufacturing companies (Cohen, 2005). Additionally, R&D costs continue to increase dramatically. Over the past 30 years, the cost to develop a new drug has increased from $138 million USD in 1975 to $1.318 billion USD in 2006 (PhRMA Industry Profile, 2009).

Patents granting exclusive rights are increasingly hard to come by and significant patent expirations are looming in 2011. In the United States, a loophole allowing companies to receive multiple extensions on their initial patents has been closed by the "Greater Access to Affordable Pharmaceuticals Act," which limits the number of 30-month patent extensions to one (US House of Representatives, 2003). According to International Marketing Services (IMS), patents for products with sales of more than $30 billion USD are expected to expire in 2011 which will continue to shift major therapies to generic dominance (IMS Health, 2011). In general, the price for a drug falls by 20% when the first generic alternative enters the market, and by as much as 90% as other generics enter (Nocera, 2006).

Market growth rates are expected to remain relatively modest in developed markets. According to IMS, the global pharmaceutical market is expected to grow 5-7 percent in 2011, compared to a 4-5 percent increase in 2010, but this growth rate is largely a result of expected growth rates of 15-17 percent in emerging markets (IMS Health, 2011). The introduction and uptake of innovative new drugs in 2011, including five potential blockbuster products, will largely dictate the market growth in 2012 (IMS Health, 2011).

Increasing R&D costs, pharmaceutical price reductions as a result of generic competition and political pressures, and slowing growth rates in developed markets highlight the need for pharmaceutical producers to reduce costs and improve the efficiency in which mature products are managed. Additionally, resources will need to be available to launch and produce the upcoming innovative new products.

1.2   Novartis AG and Novartis Pharmaceuticals AG

Novartis AG was created in 1996 through the merger of Ciba-Geigy and Sandoz, and currently is composed of four divisions: Pharmaceuticals, Sandoz (generic pharmaceuticals), Vaccines and Diagnostics, and Consumer Health (over-the-counter products). In 2010, Novartis AG recorded net sales of $50.6 billion USD, which represents a 14% increase over 2009 net sales (Novartis International AG, 2010). Novartis AG is headquartered in Basel, Switzerland. Novartis' mission statement is:

> *We want to discover, develop and successfully market innovative products to prevent and cure diseases, to ease suffering and to enhance the quality of life. We also want to provide a shareholder return that reflects outstanding performance and to adequately reward those who invest ideas and work in our company (Novartis International AG, 2010).*

Novartis AG is an industry partner with the Leaders for Global Operations (LGO) program at the Massachusetts Institute of Technology (MIT). LGO is a partnership between MIT School of Engineering, MIT Sloan School of Management, and several industry partner companies. LGO fellows receive a Master of Science in Management or a Master of Business Administration, and a Master of Science in one of several participating engineering disciplines. This thesis is the result of a six-month internship within the technical operations group of the Pharmaceuticals division of Novartis.

Novartis Pharmaceuticals AG (Novartis Pharma), the largest division of Novartis AG accounted for $30.6 billion USD in net sales in 2010 (Novartis International AG, 2010). Novartis Pharma employs almost 60,000 full time associates (Novartis International AG, 2010). The technical operations (TechOps) group in Novartis Pharma is responsible for production, distribution, and facilities across the worldwide network. As of 2007, Global TechOps produced

about 350 brands, operated or managed 32 production plants, including 8 third-party plants, and employed 9000 associates (van Laar, 2007). Figure 1 illustrates the global TechOps production network. As of 2011, Novartis Pharma sells products in approximately 140 countries (Novartis Pharmaceuticals Corporate Fact Sheet, 2011). The Pharma Supply Chain (PhSC) group within TechOps is responsible for managing end-to-end material movements between the 32 production sites, to distribution centers, and, finally, to the customers located in the 140 country markets.

Figure 1 - Global TechOps network (van Laar, 2007)
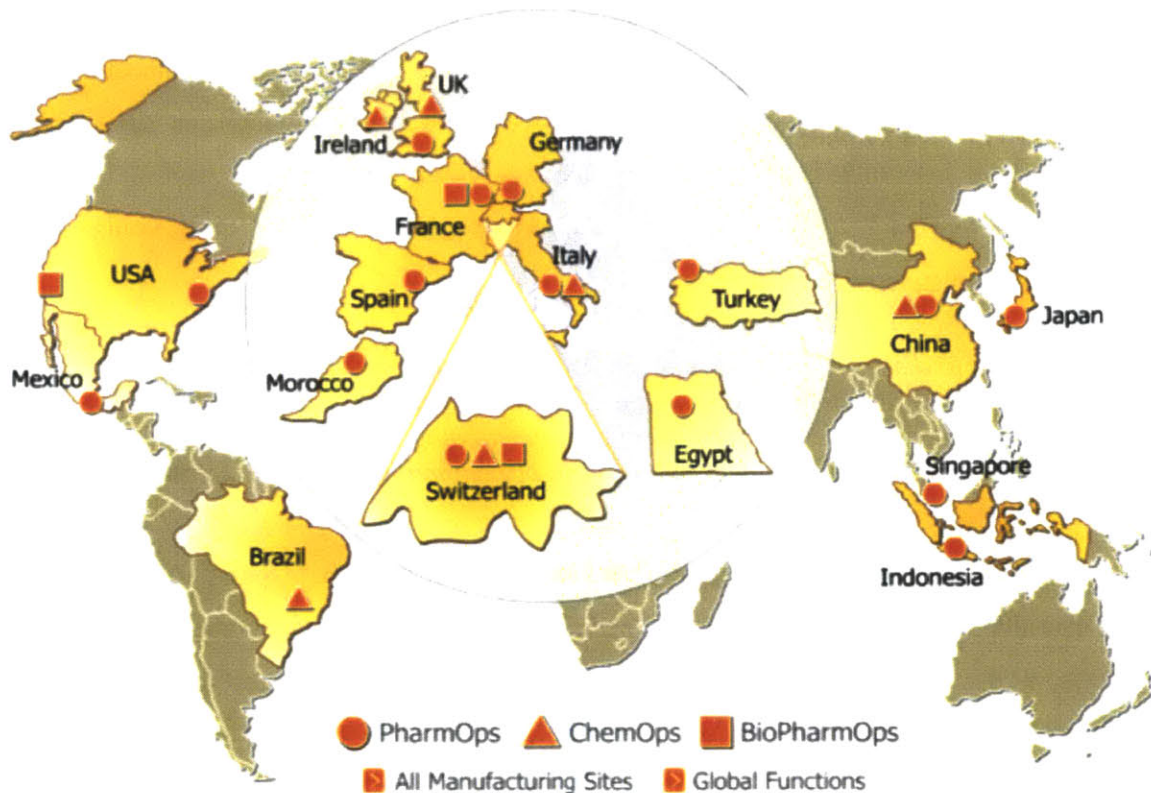
1.3 Operational Excellence at Novartis Pharma – Drive for 5

Operationally, Novartis is well regarded in the pharmaceutical industry. In 2007, TechOps leadership expressed the desire to be the "Toyota of the Pharma Industry" (van Laar, 2007). Operational excellence at Novartis Pharma is founded on three primary pillars: Lean Manufacturing, Process-Oriented Organization (POO), and Enhanced Business Process Re-engineering (eBPR).

In early 2010, Novartis Pharma launched the Drive for 5 program, a comprehensive inventory task force. The vision of the Drive for 5 program is to "catapult Novartis Pharma from a lagging position to a leader in the industry" in terms of average months of inventory on hand, and "to drive the transition to a customer centric, end-to-end integrated supply chain" (Drive for 5, 2010). Figure 2 illustrates the six work streams that comprise the Drive for 5 program, one of which is product portfolio complexity reduction.

Figure 2 - Drive for 5 work streams (Drive for 5, 2010)
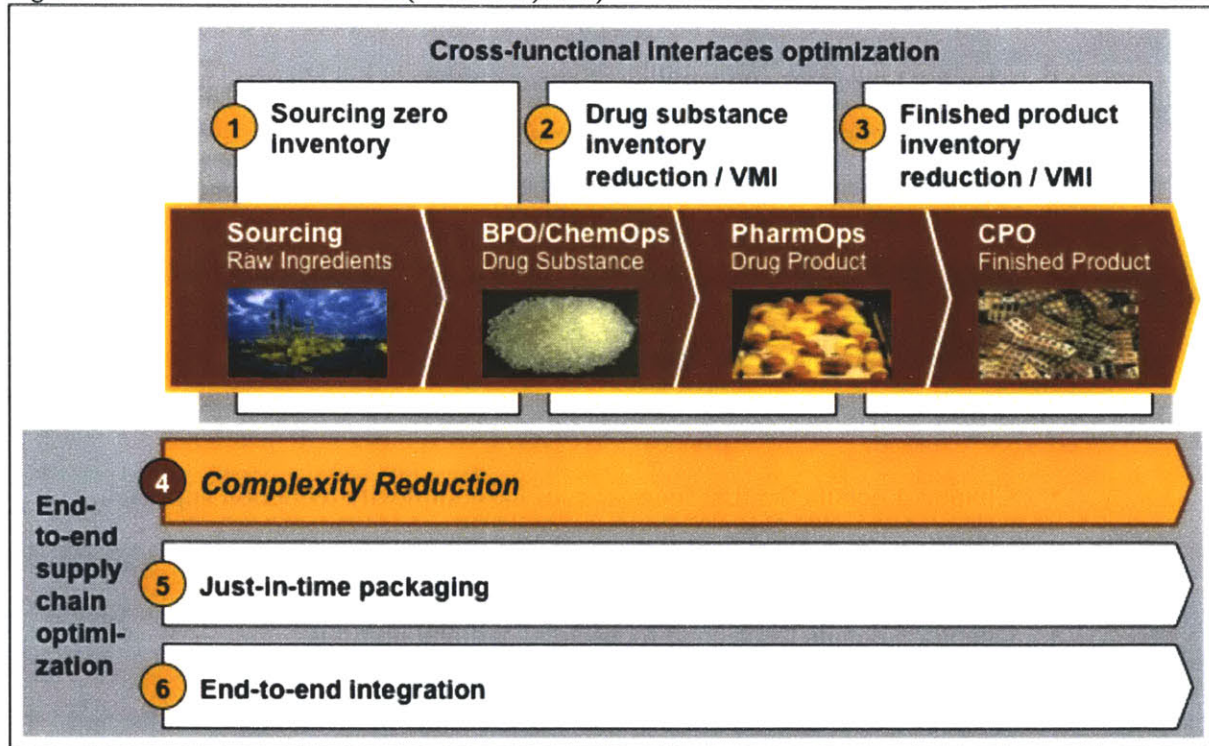
1.4   Motivation for Complexity Reduction and Problem Statement

Industry pressures, including rising R&D costs, selling price reductions, and modest growth rates, are squeezing pharmaceutical companies and resources tighter than they are accustomed to. Novartis Pharma has the advantage of previously instilling an operational excellence culture and has committed to using these fundamentals to remove waste across the entire organization. A preliminary analysis of the product portfolio has indicated the possibility that excess complexity is resulting in inefficient use of resources (see Section 3.2). Novartis is seeking a complexity reduction solution to identify and assess products which, when removed

from the portfolio, allow for more efficient delivery of value to patients, customers, and the organization as a whole. This thesis focuses on the product portfolio complexity challenges and proposes a comprehensive complexity reduction approach applicable to the pharmaceutical industry.

1.5 Thesis Overview

This thesis is organized into the following chapters:

- Chapter 1 provides an overview of current trends in the pharmaceutical industry impacting complexity reduction efforts, background on Novartis AG and Novartis Pharmaceuticals AG, and introduces the problem of portfolio complexity

- Chapter 2 provides a summary of available research around complexity reduction

- Chapter 3 introduces the comprehensive complexity reduction approach discussed in this thesis

- Chapter 4 details the first focus area of the complexity reduction approach: redundant product rationalization

- Chapter 5 details the second focus area: tail-end pruning

- Chapter 6 concludes the thesis with a discussion of key findings, results, and future complexity reduction opportunities

Chapter 2 - COMPLEXITY REDUCTION LITERATURE

The pharmaceutical industry is experiencing unprecedented change in market dynamics, which are causing companies to explore new cost saving concepts such as complexity reduction. Although it is a relatively understudied approach in the pharmaceutical industry, complexity reduction, also referred to as SKU rationalization, SKU reduction, product variety reduction, or product pooling, has been studied and implemented in other industries, such as consumer products and retail. This chapter draws on experiences and literature from other industries to introduce the challenges and benefits associated with complexity reduction.

2.1 Complexity Reduction Challenges

Companies are constantly looking to grow and one of the most common strategies for doing so is to create new products, but, although new products may increase revenues, they do not guarantee profits (Van Hoek, 2006). This way of thinking has manifested itself in the form of large, highly customized product portfolios. Lost in the customization are increased production, distribution, and other organizational costs. However, not all complexity is bad. "Quite often, value-adding complexity is a real competitive advantage and should be actively and efficiently controlled" (Scheiter, 2007).

In addition to resisting the urge to over-customize a portfolio, identifying areas of "value destroying complexity" is another primary challenge to complexity reduction. Scheiter et al. suggests using a "complexity fingerprint" to identify specific areas of excess complexity. The complexity fingerprint, shown in Figure 3, "is created by identifying the specific complexity drivers of a company – such as existing technologies, brands, products, and customers – and comparing this total number against the segment producing 80 percent of total EBIT" (Scheiter, 2007). A large gap, as illustrated by the large yellow area under the Products (SKUs) and Customer drivers, between the total number and the segment producing 80 percent of total EBIT, indicates the need for complexity reduction measures. "The complexity fingerprint is a useful tool because it enables transparency, catches management's attention, and leads to focusing and prioritizing problematic areas" (Scheiter, 2007). A leader in the hypothetical organization with this complexity fingerprint can easily identify the areas in his or her business. For example,

15

packaging is not a driver of value destroying complexity as 17 of the 33 (52%) of the packaging configurations account for 80% of the total EBIT contribution of packaging. Now contrast this with the customer driver, where only 214 of the 2,142 total customers (10%) contribute 80% of the total EBIT. The complexity reduction leader would focus resources and analytical effort to determining if value destroying complexity can be reduced by changing how some of the less beneficial customers (i.e. those falling in the 90% of customers which make up less than 20% of total EBIT) are managed or by recommending the organization stops satisfying these customers demand all together. Additionally, the leader will feel comfortable with the level of complexity in packaging and not need to invest any additional time or effort to reduce it.

Figure 3 – Illustrative complexity fingerprint (Scheiter, 2007)
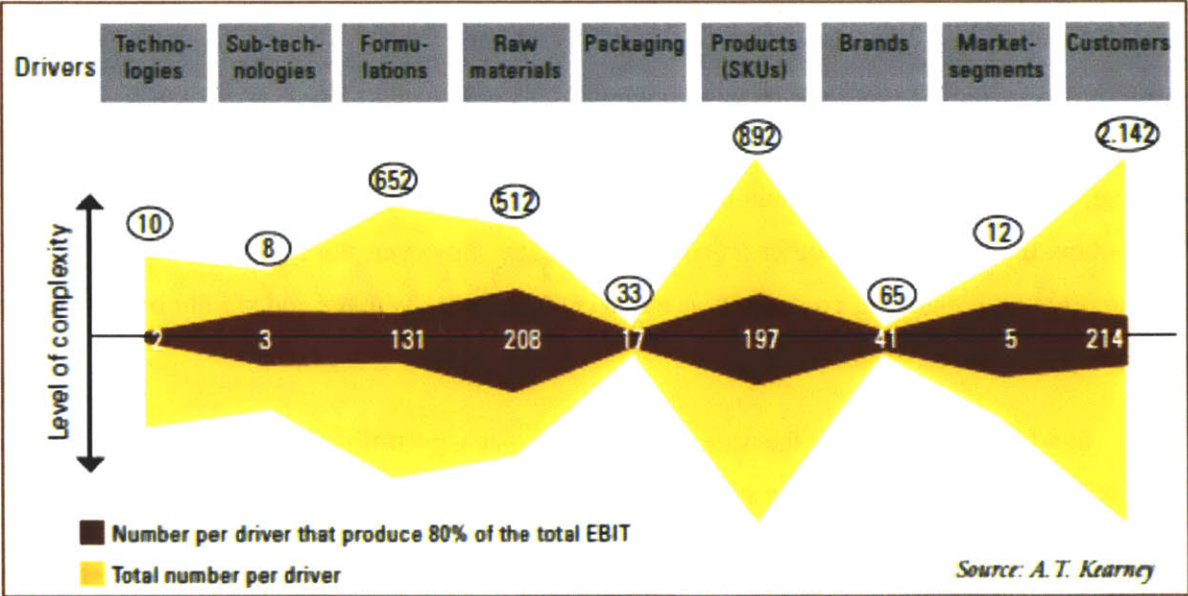
Further, there are risks of reducing complexity in the wrong areas. There is a real risk "that a company cuts too deeply into its revenue streams and discovers it has discontinued products that key customers care for, damaging important relationships" (Van Hoek, 2006). Companies can and should conduct frequent product reviews with customers to ensure the correct products are being targeted.

Lastly, the traditional complexity reduction philosophy, removing tail-end products, does not always achieve the desired results. "Focusing solely on tail-end SKUs has little actual

impact – little change in inventory, gross margin, market share, changeovers, or distribution complexity" (Byrne, 2007). Additionally, any cost savings resulting from tail-end products tend to be short-term as the tail-end of the portfolio always replaces itself over time.

2.2 Benefits of Complexity Reduction

The benefits of a successful complexity reduction process can be felt across the entire organization. In fact, A.T. Kearney, a global strategic management consulting firm, estimates that, "on average, systematic complexity management can lead to an upturn in [earnings before interest and tax (EBIT)] of 3 to 5 percentage points" (Scheiter, 2007). This increase in EBIT comes from optimizing production and logistics, reducing material costs, adjusting service capacities, and increased margins (Scheiter, 2007). Retail sales per SKU at Clorox, a consumer products company with revenue of $5.5 billion in 2010, have grown by more than 25%, and net customer sales per SKU have almost doubled over the past four years as a result of strategically reducing SKUs (Van Hoek, 2006). Lastly, Jie Zhang and Aradhna Krishna found that brands with higher market shares, higher price levels, and more frequent promotions tended to gain share when effective SKU reduction processes are in place (Zhang, 2007). This conclusion was validated with a quantitative model based off of an anonymous online retailer. However, Zhang and Krishna did find that a drastic reduction of SKUs in the same brand had negative impacts on the brand performance, and that brands with small market share were less likely to experience the benefits of complexity reduction.

When uncontrolled and unregulated, portfolio complexity can have detrimental impacts on production. Excess complexity "acts to reduce economies of scale and buyer power, and to increase costs for production and logistics" (Scheiter, 2007). Additionally, "with a plethora of SKUs, forecasting and planning is not only difficult but also requires more of everything – supervisors, training, inventory, production-line changeovers, capital, and time and expense in product development" (Byrne, 2007). When a complexity management process focuses on large, but unnecessary products, production-related benefits include reduced manufacturing footprint, fewer changeovers, shuttered or dedicated production lines, fewer out-of-stocks, and reduced distribution channel footprint (Byrne, 2007).

17

2.3 Summary

This section is meant to be a discussion of some of the research conducted around complexity management to introduce some of the challenges and benefits pharmaceutical companies can expect to experience when they embark on their own complexity reduction initiatives. Unfortunately, quantifying the benefits is difficult because it is hard to isolate the impact of a complexity reduction effort from other changing variables such as market dynamics and other internal initiatives. Complexity reduction, in terms of process and benefits, is extremely cross-functional, thus measurements must be high-level enough to include efficiency gains in production, finance, and marketing. Despite measurement difficulties, most sources believe the expectation of various cost savings and efficiency gains as a result of complexity management is valid, although the magnitude of savings is questioned. However, there is consensus that effective product portfolio management is an essential capability for companies looking to get the most out of their resources and preparing to react quickly to changing market conditions.

Chapter 3 - COMPLEXITY REDUCTION IN THE PHARMACEUTICAL INDUSTRY

Reducing the complexity of a product portfolio can be a powerful mechanism to reduce operating costs throughout the organization. Chapter 2 summarizes some of the literature that is available, but it has become increasingly clear that complexity reduction in a pharmaceutical organization is an understudied topic. Why is there little literature focusing on the pharmaceutical industry? It is likely because, historically, cost reduction has not been a primary focus of large pharmaceutical companies. Demand for medical treatments is largely price inelastic. In fact, pricing in general is not heavily dependent on the cost to produce the product. Pricing is more correlated with the perceived value of the treatment, the size of the potential patient base, the extremely high development costs, and separate negotiations or agreements with local health authorities and large distributers.

Market conditions in the pharmaceutical industry are changing. Some products are becoming commoditized with the rise of higher quality generic products. Development and production capabilities are expanding globally, which is increasing competition. Operational excellence, including cost reduction initiatives, is getting more attention in the industry. Novartis Pharmaceuticals has recognized these new market pressures and is in the process of transforming end-to-end operations. In past years, Novartis has seen a significant increase in average inventory on hand as compared to other large pharmaceutical producers. The Drive for 5 program was launched to drastically reduce inventory levels over the next three years. Complexity reduction is one initiative underway to achieve this goal.

In this chapter, we will focus on Novartis' complexity reduction effort as an example of how excess complexity can be removed from a large pharmaceutical company's product portfolio. First, we will discuss the drivers of portfolio complexity at Novartis. Next, we will provide a description of the current state of Novartis' portfolio as of 2010. Lastly, we will discuss the proposed complexity reduction approach with a discussion of several critical success factors. Subsequent chapters will further detail the two-part complexity reduction approach.

3.1 Drivers of Portfolio Complexity at Novartis

Novartis had approximately 14,000 finished product SKUs in the active product portfolio as of June 2010. This number alone does not have a lot of significance, as consumer product companies can easily have over 50,000 finished product SKUs and still have a very efficient product offering. Similarly, other pharmaceutical companies may have significantly fewer SKUs because of a focus on specific treatments or markets. This section discusses the causes and drivers of portfolio complexity at Novartis in an effort to provide context around the 14,000 SKU value.

The first major driver of SKU proliferation is the number of markets in which Novartis currently operates. As of 2011, Novartis sells products in approximately 140 countries (Novartis Pharmaceuticals Corporate Fact Sheet, 2011). In general, there is a unique SKU created for each market the product is sold in. Some exceptions apply in developing countries where a product with common language packaging is sold. This same SKU can be sold in multiple countries.

The second cause of extensive SKU creation is the introduction of multiple dosage forms, such as film-coated tablets, pre-filled syringes, or sugar-coated tablets, and multiple dosage strengths, which measures the amount of the active ingredient in each dosage, for the same brand in the same market. Again, this varies by market and by brand, but in a major market, it is not uncommon to see more than three dosage forms for a major brand as well as more than three dosage strengths for each dosage form.

The next level down from dosage strength is an assortment of different pack sizes, volumes, and packaging mechanism. For each country, brand, dosage form, dosage strength combination, Novartis creates several different packages to distribute in different sales channels. Generally, each of the combinations mentioned above will have at least one sample size pack for distributers and providers, at least one bulk pack sold to hospitals and clinics, and an assortment of commercial packs.

Further adding to portfolio complexity is the fact that production sites have unique SKUs. For example, if the same product for the same market is sourced from multiple production plants, there will be multiple SKUs created for these products. This is necessary for regulatory

purposes. Products, including the production locations, are registered with regulatory agencies in each market and products from different sites are considered unique regardless of whether the process and materials are exactly the same.

The last driver of portfolio complexity is the difficulty of retiring a product. There are many forces and agreements that restrict pharmaceutical companies from ceasing supply of certain products. For one, it is common for a pharmaceutical company to enter into distribution agreements with other companies or agencies that include a group of products. These agreements usually include a supply requirement for all products for an agreed to amount of time. Breaking these agreements has financial and brand perception implications. Further, Novartis, along with other pharmaceutical companies, enters into charitable agreements in which they agree to supply a market with products independent of profitability. Similarly, Novartis produces some drugs that have been classified as medical needs. Law often restricts retiring charitable or medical need products unless an alternative product is available in the market at a similar price. Finally, pressures from patient groups are often a factor when a company is deciding to end supply. For example, some treatments have been largely replaced by new treatments, but patients who are satisfied with the results of the original treatment are, understandably, not very receptive to switching treatments. This results in a situation where the customer base is shrinking over time and the production of the old treatment is increasingly expensive. It is a difficult decision for a pharmaceutical firm to decide that the patient population is too small to justify continued production.

All of these drivers have contributed to the current state of product portfolio complexity in pharmaceutical companies. The following sections discuss Novartis' current product portfolio and introduces a complexity reduction process that can overcome the described complexity drivers in an efficient and effective manner.

3.2 Current State of Product Portfolio at Novartis

The complexity reduction initiative was launched at Novartis in early 2010 as part of the Drive for 5 operations improvement program. A preliminary analysis of the entire portfolio prior to the launch of the initiative produced the findings summarized in Figure 4. Based on this

analysis, it certainly appears that Novartis has excess complexity and that there are substantial inventory benefits to reducing complexity. The last 60% of SKUs contributes less than 5% of total sales value while making up for 22% of total finished product inventory value. Although

Figure 4 - Sales contribution and finished product inventory contribution of Novartis' product portfolio
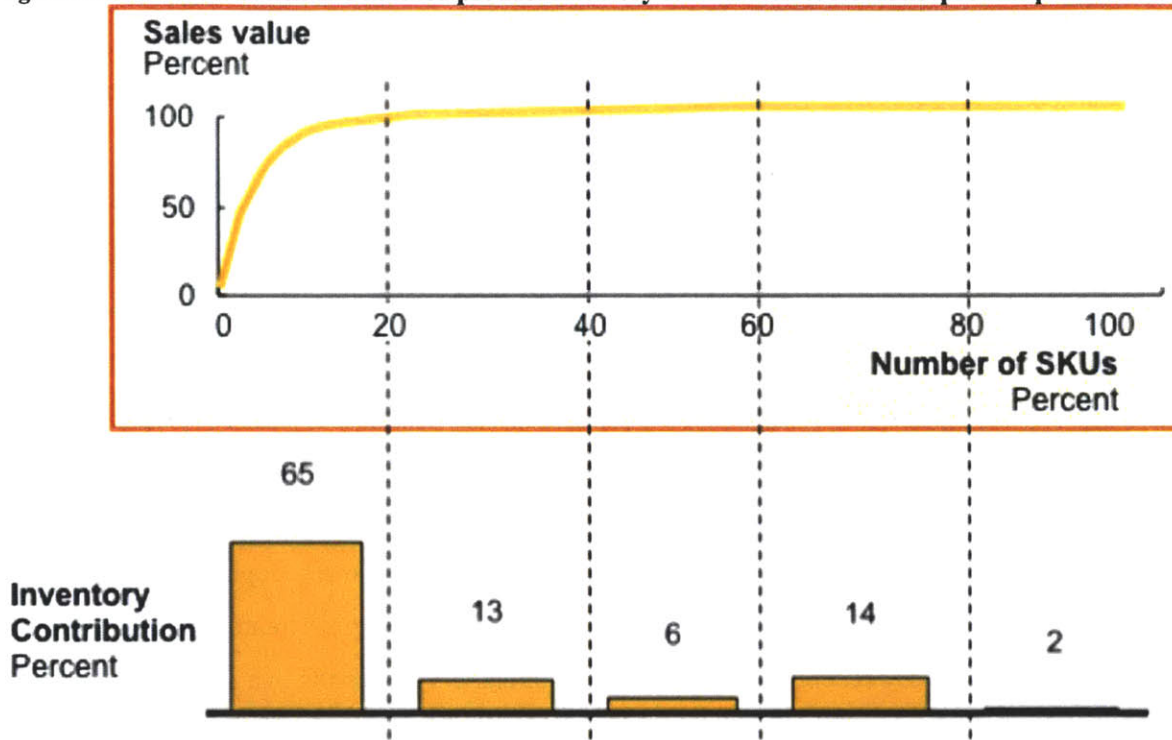
the warning signs of excess complexity are evident, further analysis is needed before Novartis could simply decide to cut production on the tail-end of the portfolio. For example, the tail-end includes some medical need products, sample packs not commercially sold, recently launched products without historical sales, products that are complimentary treatments for very profitable products, and products with supply agreements. Additionally, there are some small volume products that have high profit margins. In an environment with excess production capacity, it may not be beneficial to cut these relatively low sales and volume products.

Figure 5 depicts Novartis' portfolio in a different manner. Sales and inventory are not included in this analysis. The pie chart shows a breakdown of the portfolio by number of SKUs into groups that are relevant to Novartis' strategic objectives in an effort to define the scope of the complexity reduction initiative. As Novartis' top priority is patient care and pandemic

Figure 5 - Novartis Portfolio breakdown by SKUs

Active SKUs as of Oct. 2010
(12,489 SKUs)

Complexity Reduction Focus
(7,861 SKUs)

- Global Medical Need
- Onco or Ophtha
- Other Division
- Complexity Reduction Focus
- Commercial Packs
- Samples and Hospital Packs
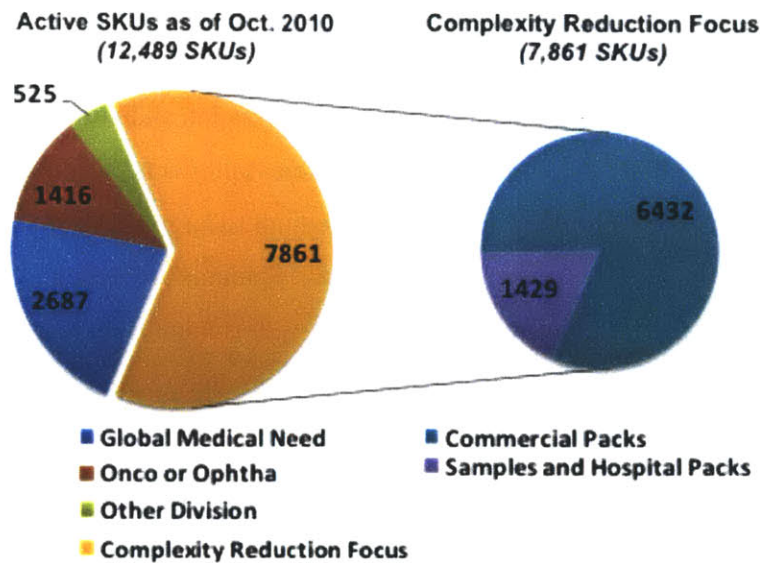
preparedness, medical need products (shown in dark blue) were excluded from pruning consideration. Similarly, oncology products (shown in red with ophthalmology products) were determined to be critical strategic products that would not be considered at this time. Some oncology products could be considered at a later date, but the reputation risk of removing an oncology product was too large in 2010. Ophthalmology products were determined to be out of scope due to a large on-going acquisition. There were too many moving parts and large-scale changes to assess the future ophthalmology portfolio from past data. Lastly, products sold to other Novartis divisions, such as Sandoz and Novartis Consumer Health, were analyzed separately because the pricing and demand characteristics operated very differently from other products sold externally. This left about 8000 SKUs, 1500 of which are samples or hospital packs, to be considered for complexity reduction.

This is a very different picture than the one provided in Figure 4. 60% of SKUs may only account for less than 5% of total sales, but many products that should be evaluated on different criteria and many strategic products are likely included in that 60%. However, there was consensus at Novartis that portfolio complexity can and should be reduced. The key at this point was to develop a process that identifies the correct products in a manner that minimizes sales loss, profit loss, and on-hand inventory while alleviating the necessary resources.

3.3 Proposed Complexity Reduction Process

To effectively reduce complexity in a pharmaceutical product portfolio, it is advisable to have two parallel focus areas: redundant product rationalization and tail-end pruning. These two focus areas are fundamentally different and target different products. Redundant product rationalization, as you can see in Figure 6, targets medium to large SKUs that do not directly satisfy a unique customer need. When these redundant products are removed from the portfolio, 100% of the sales are transferred to remaining products, thus there is no revenue loss. Additionally, these larger products consume more resources and require more inventory. By streamlining the product offering, substantial cost savings can be realized.

Figure 6 - Complexity reduction process
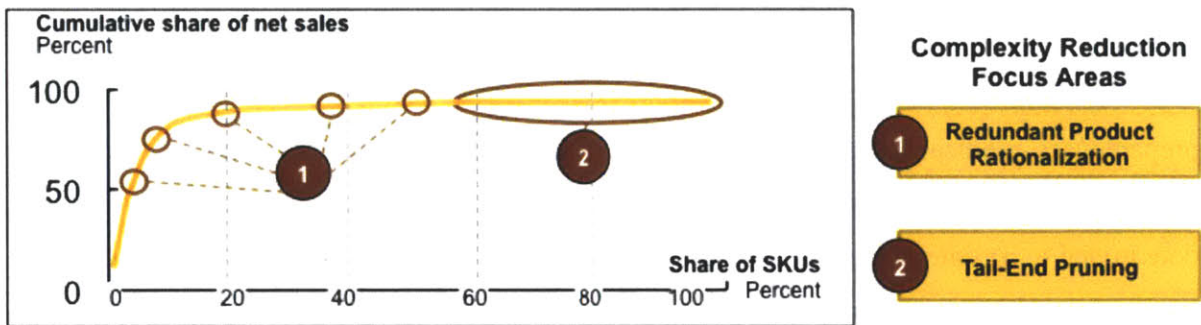
Tail-end Pruning is the more traditional SKU rationalization approach, as it focuses on eliminating the lowest volume, least profitable products from the portfolio. In the pharmaceutical industry, identifying the tail-end is a difficult process. As explained in Section 3.1, many tail-end products are not valid candidates for pruning because of agreements, strategic value, or high profitability (in terms of percent margin). Contrary to other industries with lower margins and relatively less health critical products, there is substantial risk in blindly removing the tail-end of the portfolio. A thorough analysis, detailed in Chapter 5 is needed to accurately identify the tail-end and to identify the small, but critical products that must remain in the portfolio.

Chapters 4 and 5 detail the two focus areas for complexity reduction. The two processes are thoroughly explained, implementation strategies are discussed, and the relative benefits and shortcomings are discussed.

3.4   Critical Success Factors

Complexity reduction is a simple concept and the benefits, in theory, are hard to deny, but in practice it is a difficult process to implement. Adding to this challenge is the fact that the benefits are difficult to quantify and predict precisely. Additionally, there are cultural barriers to this effort at almost every step. Depending on whom you are speaking to in the organization, it may become controversial to talk about removing a product from a market or to talk about reducing production volume at a specific plant. In order to overcome these challenges and successfully implement a complexity reduction process there must be strong vocal support from key stakeholders, the process must be aligned with the organization's strategic goals, data must be of high quality and readily available, and a mechanism to accurately estimate complexity costs beyond cost of good sold must be in place. These critical success factors are discussed further in the following sections.

3.4.1   Key Stakeholders

Before the process can be implemented, a group of influential stakeholders must be gathered. This group, after they agree on the objectives of complexity reduction, will be a necessary influence over others in the organization. Redundant product rationalization is only successful when the marketing organization is incentivized to make operational improvements. A deep-rooted trust in the benefits of complexity reduction may be necessary to implement tail-end pruning, as the difficulties in accurately quantifying complexity costs may make the business case appear to be negative. A strong group of supportive stakeholders will be necessary to overcome the inevitable naysayers. Additionally, the benefits of reducing complexity take some time to develop, especially in the pharmaceutical industry, where deregistering products can take over a year. Key stakeholders must demonstrate patience in the process.

3.4.2   Alignment with Strategic Goals

A great way to gain the support of key stakeholders is to ensure the complexity reduction efforts are aligned with the strategic goals of the organization. Complexity reduction is a powerful tool that has many applications. It can be used as a mechanism to reduce inventories through improved forecast accuracy. It can be used to identify high cost products that could be candidates for divestment to external companies. It can be used to streamline production

25

technologies or even to help free up critical resources in the most efficient manner for new products and production footprint decisions. Additionally, the organization's strategy should include a plan on how to use the resources made available after complexity reduction. These resources could be used to meet unmet demand, alleviate over-utilized equipment, or free up resources in preparation for a large new product launch.

At Novartis, there is an on-going goal of drastically reducing inventories and a culture committed to cost reduction and process improvement. After communicating how complexity reduction naturally supports these organization-wide goals, key stakeholders were eager to support this initiative. If a company's strategic goals include a commitment to high product variety, this process may not get the necessary support to be successful.

3.4.3 Data Quality and Availability

To facilitate an efficient and complete analysis, product, market, and production data must be of high quality and readily available. Both focus areas of the proposed complexity reduction approach require extensive quantitative and qualitative analysis. Some data elements are usually easily available, including sales, volumes, and demand forecast. Other data elements, such as true complexity costs and treatment information, are harder to gather but equally critical to the analysis. Substantial effort must be applied to gathering all of the available data for the entire portfolio before analysis can begin.

3.4.4 Cost Valuation

Lastly, an agreed upon method to estimate complexity costs of individual products is a critical piece of the analysis as well. Complexity costs include cost of good sold as well as other overhead costs that could be avoided if the product is rationalized from the portfolio. These costs include marketing resources, production changeovers, intermediate inventories, testing and quality resources, and regulatory costs. These costs can be significant and need to be included in any SKU reduction business case.

3.5 Summary

The pharmaceutical industry has many intricacies that distinguish it from other industries with well-documented SKU rationalization approaches. These intricacies demand a more thorough analysis of the product portfolio in terms of market usage and production data. The proposed complexity reduction process for the pharmaceutical industry involves a market-centric redundant product rationalization focus as well as a tail-end pruning focus. The redundant product rationalization process seeks to build an efficient portfolio based off of identified customer requirements. If a product does not meet an explicit customer requirement, it should be removed from the portfolio. All identified redundant products, when rationalized, will result in 100% sales compensation by another product that remains in the portfolio. The tail-end pruning process intends to identify small, underperforming products that consume resources that are better used elsewhere. With this process, there is the potential of losing some revenue, but the cost savings, which includes complexity costs, should make up for any loss in revenue. Additionally, the newly available resources should be applied to other products in an effort to grow revenues for lower cost products. In order to successfully implement this complexity reduction approach, there must be strong vocal support from key stakeholders, the process must be aligned with the organization's strategic goals, data must be of high quality and readily available, and there must be a mechanism to accurately estimate complexity costs beyond cost of goods sold. This comprehensive complexity reduction approach has the potential to greatly reduce costs while making critical resources available for reassignment. The following two chapters further detail the two focus areas, redundant product rationalization and tail-end pruning.

Chapter 4 - REDUNDANT PRODUCT RATIONALIZATION

The first of two focus areas for complexity reduction in a large pharmaceutical company is redundant product rationalization. This is a bottom-up approach focusing on identifying true customer requirements, and, then, creating the optimal product portfolio to meet all of the identified requirements. As depicted in Figure 7, all products, including those with high sales

Figure 7 - Redundant product rationalization focus area
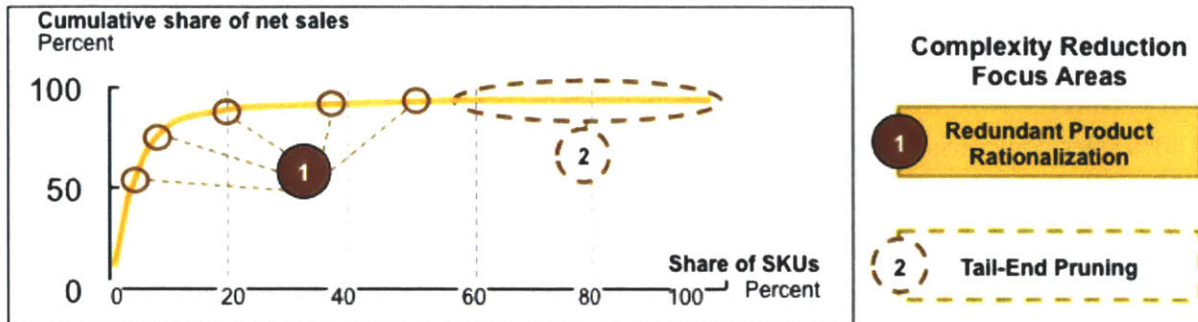
and margin, are in-scope for this exercise. In fact, high volume SKUs offer the greatest cost savings opportunity. Redundant product rationalization seeks to identify and eliminate products that do not directly address a documented customer need. For example, suppose a pharmaceutical company offers both a finished pack to cover one month of treatment and a two-month pack in Brand X in the same market, and suppose both products have extremely strong sales. By speaking with medical providers prescribing this treatment, it is brought to light that patients requiring Brand X must have monthly check-ups, at which point the provider decides whether to continue prescribing Brand X or not. Given this scenario, it is clear that the customer requires a one-month pack of Brand X, and anything in excess of this amount is actually suboptimal because of the potential for the patient to continue treatment beyond the provider's directions. Although it is not immediately clear why the two-month pack has high sales, it is clear that this particular customer requirement can be met with one SKU instead of two. Rationalizing the redundant product (i.e. the two-month pack) has significant benefits, which are detailed in Sections 4.5.2 and 4.5.3. Most notable is the potential to transfer 100% of the sales of the two-month pack to the one-month pack while streamlining sales and operations efforts and improving patient care.

The redundant production rationalization approach piloted at Novartis is detailed in this chapter, along with a discussion of the recommended implementation plan, critical success factors, benefits, and shortcomings of utilizing this approach.

4.1 Process

As previously alluded to, redundant product rationalization is a fundamentally different way of reducing portfolio complexity, SKU rationalization, and streamlining operations. This process is driven by the sales and marketing organization who are the closest to the customers and end-users. Typically, the supply chain or finance organization leads SKU-reduction exercises (Byrne, 2007) but at Novartis, and likely other pharmaceutical and other large corporations, the product and customer knowledge in these organizations is not adequate to identify redundant products. This results in a disproportionate focus on the tail-end of the product portfolio. Because these data are usually available to the supply chain and finance groups, criteria such as low sales, low margin, and low volume are used exclusively to identify SKU rationalization candidates. Although extremely important to the analysis, these criteria alone are not sufficient. Other information, such as health authority agreements, local market purchasing power, complimentary treatments, and medical need classifications, is needed to make informed decisions and to create the optimal portfolio. The best source of this information is the sales and marketing organization. Further, because redundant product rationalization requires deep knowledge of the local customers and market, CPO sales and marketing representatives are critical to this process.

As stated, the success of this approach depends greatly on the involvement and leadership of the sales and marketing group. Unfortunately, there is a natural bias against redundant product rationalization because of the belief in the sales and marketing world that more choices or more products result in more sales. Although the Pharmaceutical industry is different in many ways, a valuable finding from the retail industry, where SKU reduction activities are currently the most mature, can be applied to this case. Research has shown that "brands with higher market shares [and] higher price levels...tended to gain share" with a moderate SKU reduction (Zhang, 2007). With high brand loyalty, large market shares, and high price levels, as compared to retail products, Novartis is poised to actually grow unit sales as a result of applying redundant

29

product rationalization to large and medium sized brands. Communication of the sales and marketing benefits, as well as the operational benefits is essential to gain buy-in from the critical sales and marketing organization. Further, executive support is essential to drive results. When this process was piloted with a CPO in Europe, the direct support of the Region Europe Head, the CPO CEO, and CPO CFO proved invaluable. In fact, a similar process initiated by the CPO supply chain group without the executives' support failed the previous year.

After securing executive and sales and marketing support, the approach highlighted in Figure 8 will facilitate cost savings and increased consolidated margin. Because of new product

Figure 8 - Redundant product rationalization process

1	2	3a	4	5	6
Establish Cross-Functional Team	Set Objectives	Document/ Revise Global Req'ts / Document/ Revise Local Req'ts (3b)	Assess Existing Product Portfolio	Identify and Remove Redundant Products	Monitor Key Performance Indicators

Repeat Bi-Annually

introductions and changing customer requirements, redundant product rationalization should be conducted twice a year. For best results, the process should be integrated into the standard sales and operating planning (S&OP) process. This will ease the process governance effort and facilitate efficient key performance indicator measurement and tracking.

First (Step 1), a cross-functional team needs to be created. The team should be composed primarily of CPO representatives but members from the global supply chain, finance, operations, and marketing organizations should be available in a support role. The exact team make up will vary depending on the country, but there are some key pieces that should be present in all countries. First, the team sponsor should be the country CEO, Marketing Head, or CFO, depending on which individual has the most influence over the sales, marketing, and finance organizations. The sponsor should be present for the kickoff of each review cycle to reinforce the objectives and expectations. Second, the team leader should be an influential member of the marketing group. If the process is incorporated into the S&OP activities, then the leader should

already be actively involved in these regular reviews. Team members should include representatives from marketing, finance, regulatory affairs, supply chain, and quality assurance. Actual time commitments will vary depending on the knowledge areas of each individual, as well as which brands will be the primary focus of the redundant product rationalization. Lastly, to promote process efficiency, every effort should be made to keep many of the same individuals involved in the process for several review cycles.

After the team is established, Step 2 is to set objectives. This step will include informing any new team members of the process. Further, this is where the product scope is determined. Every brand sold in the market does not need to be evaluated every cycle. More focus should be given to brands with high complexity – many dosage forms, dosage strengths, or SKUs. Additionally, qualitative information should be considered in the scoping process. More details of defining the product scope will be discussed in Section 4.4.2. Finally, the team sponsor and team lead should work together to set targets for the number of SKUs to reduce and the expected sales per SKU average based on the defined scope. The importance of this step is to remind the team that they are tasked with identifying products that, when removed from the portfolio, will not negatively impact sales. 100% sales substitution remains the goal throughout the process.

Step 3 is the bulk of the marketing work. This is where customer requirements are documented. The best source of this information is the brand managers at the CPO. They will have critical information about changes in health authority policies, treatment instructions, demand shifts, and growth potential of the brands under evaluation. Additionally, the supply chain and finance team members will provide critical information around inventory levels, write-offs, and forecast accuracy. Lastly, the global team members can provide trends and findings from other CPO, and they can provide an update on any relevant corporation-wide initiatives that may impact redundant product rationalization. All of this information should be documented for future reference and updating. Also, it is useful to pass this information on to other CPOs in order to share further SKU reduction opportunities. Novartis agrees that clear documentation is critical and will be considered a best practice going forward.

After all patient, provider, distributer, and health authority requirements are documented from a local and global perspective, it is time to assess the existing product portfolio (Step 4).

31

This is more of a data management task, but it is a key piece in keeping this process efficient. At Novartis, the CPOs are legally separate entities from the headquarters at Basel, which sometimes hinders data integrity. The CPOs are sometimes on different information technology systems than headquarters, and the type of information available to the CPO is always limited. Most notably, the CPOs have no access to manufacturing cost data or consolidated margin values. Although some data restrictions are required, it has also created an avoidable disconnect between the CPO product portfolio and the global product portfolio. For example, a CPO may have decided to prune an individual SKU from its portfolio, but this decision did not get communicated to global. From headquarters' perspective, the SKU remains active, despite a lack of recent sales activity. Step 4 is an opportunity to reconcile these two portfolios. As previously mentioned, this is not complexity reduction activity as it merely cleanses data, but it will help make this process more efficient, as well as make product portfolio metrics more manageable and accurate.

Step 5 is to identify and remove redundant products. To do this, the customer requirements should be matched to individual SKUs in the portfolio. Figure 9 provides an illustrative example of one of Novartis' larger brands in a single European market. After documenting the customer requirements for this brand, it was determined that a sample pack size, a 28-tablet pack, and a 98-tablet pack were required for each dosage strength. Put differently, the 56-tablet pack size and the hospital bulk pack are not required by the customer. The SKUs highlighted in red denote the SKUs that were removed from the portfolio because they do not meet a specific customer requirement. During this process, it is important to document the rationale behind removing a particular SKU. In this case, SKUs were removed for one of two reasons: the demand for the hospital pack can be satisfied by the largest commercial pack or the medium packaging quantity is not required. It is also useful to document which SKUs will compensate for the sales and volume of the redundant products after they are removed. Note that when the medium pack (56-tablets) were removed, the pilot CPO realized a shift of 90% of sales to the larger pack size and 10% of the sales of the 56-tablet pack shifted to the smaller pack size. Similarly, 100% of the sales of the hospital packs were shifted to the 98-tablet pack. To promote

32

Figure 9 - Illustrative example of identifying redundant products

consistency across all CPOs and to aid the creation of summary reports, all brands should be evaluated using the brand review worksheet; a selection of which is shown in Figure 10. The next part of Step 5 is to create summary reports for the current redundant product rationalization cycle. Figure 11 depicts selections of summary reports by CPO and by brand. This is a global perspective and is useful to summarize the expected impact of the latest review cycle, as well as to compare CPOs to each other. Because this process is heavily contingent on the leadership of individuals scattered across the world, it is useful to compare the results on a CPO level. Further, if one CPO observed a change in the customer requirements of a brand, it is likely that other CPOs would be able to use that information as they review the same brand in their market. With all of the information recorded, the redundant products should now be removed from the local and global portfolios, and the benefits of a streamlined product offering will begin to be realized.

Figure 10 - Selection of brand review worksheet (illustrative data)

CPO:	CPO 1
Brand:	Brand X

Dosage Form	Strength	Market Usage	Material		Material Description	Pack Size	Prune?	Comments	If YES, which SKU will compensate sales (incl. %)		Secondary SKU (incl. %)	
FCT	150	H	718425	X	FCT 150MG 20(X14) DEH	280	Yes		718424	100%		
		M	718423	X	FCT 150MG (4X14) DE	56	Yes		718424	90%	718427	10%
			718424	X	FCT 150MG (7X14) DE	98	No (cite need in comments)	Also serves as hospital pack				
			718427	X	FCT 150MG (2X14) R25	28	No (cite need in comments)	Patient need				
		S	718426	X	FCT 150MG (X14) DES	14	No (cite need in comments)	Health Authority requirement				
	300	H	718430	X	FCT 300MG 20(X14) DEH	280	Yes		718429	100%		
		M	712811	X	FCT 300MG (4X7) R25	28	No (cite need in comments)	Patient need				
			718428	X	FCT 300MG (4X14) DE	56	Yes		718429	90%	718432	10%
			718429	X	FCT 300MG (7X14) DE	98	No (cite need in comments)	Also serves as hospital pack				
			718432	X	FCT 300MG (2X14) R25	28	No (cite need in comments)	Patient need				
		S	718431	X	FCT 300MG (X14) DES	14	No (cite need...					

Figure 11 – Selection of CPO and brand summary reports (illustrative data)

CPO:	CPO 1

Brand	# Current SKUs	Current Sales per SKU	# Pruned SKUs	Expected Sales per SKU	Comments
Brand T	62	$ 1,854,870	25	$ 3,108,160	Prune all N2 Packs (Medium)
Brand U	54	$ 1,579,392	23	$ 2,751,199	Prune all N2 Packs (Medium)
Brand V	33	$ 1,316,099	6	$ 1,608,566	Prune all N2 Packs (Medium) and Hospital Packs
Brand W	14	$ 1,149,539	4	$ 1,609,355	Prune all N2 Packs (Medium) and Hospital Packs
Brand X	20	$ 446,247	8	$ 743,745	Prune all N2 Packs (Medium) and Hospital Packs
Brand Y	24	$ 168,767	2	$ 184,110	Can not prune pack sizes, only replace SKUs (Tender)
Brand Z	31	$ 194,051	4	$ 222,800	Compensat...
Total	238	$ 1,171,449	72	$	

Brand	Brand Y

CPO	# Current SKUs	Current Sales per SKU	# Pruned SKUs	Expected Sales per SKU	% Reduction in SKUs	% Improvement - Expected Sales per SKU	Comments
CPO 1	54	$ 1,579,392	23	$ 2,751,199	43%	74%	Prune all N2 Packs (Medium)
CPO 2	42	$ 1,205,895	23	$ 1,712,371	55%	42%	Prune all Medium Packs
CPO 3	48	$ 1,002,544	6	$ 1,573,994	13%	57%	Prune 160mg strength
CPO 4	14	$ 800,654	4	$ 1,497,223	29%	87%	Prune all N2 Packs (Medium) and Hospital Packs
CPO 5	20	$ 698,723	8	$ 859,429	40%	23%	Prune all N2 Packs (Medium) and Hospital Packs
Global Summary	178	$ 1,175,508	64	$ 1,952,662	36%	66%	

Key Findings:	- Medium pack sizes are not required by most patients and 100% sales compensation is confirmed - 160mg strength not required - Hospital packs can be replaced by larger pack sizes

The final part of the redundant product rationalization approach is to establish and track key performance indicators (KPI). The redundant product rationalization KPIs should not be separate from overall portfolio complexity KPIs or metrics. It is difficult to determine what exactly are the best KPIs; this discussion continues in Section 6.3.2. A good place to start when determining KPIs is to speak with the people who will be using this information. After discussions with Novartis, it was determined that three measures would be adequate: sales per SKU, total number of active SKUs, and average duration of SKU pruning implementation. The first measure, sales per SKU, should be measured at the global, regional, and local CPO level. Because the overall objective of complexity reduction is to increase efficiency without sacrificing the top line, this is a critical measure. Average margin per SKU would be even better, but, because this information could not be communicated across the organization, it was decided

34

that sales per SKU would serve the purpose better. Secondly, the total number of SKUs is intended to monitor the number of new SKUs created. This is more of a monitoring device on if the complexity reduction process is being followed or not. Lastly, a significant amount of work has to be done to implement the pruning of a SKU. Approval from the local health authorities must be obtained. In the past there has been a tendency to forget about the SKUs that are in the pruning implementation process because it can last for well over a year. The third measure intends to keep focus on the pruning implementation process, as the benefits of complexity reduction will not be realized until all purchasing, production, and distribution activities have ceased for these products. These three measures should provide management with an idea of how the portfolio complexity is changing over time and how effective the overall complexity reduction process is.

4.2 Scope Definition

Having a strong, yet manageable, approach is important to successfully reduce portfolio complexity, but defining the correct scope for redundant product rationalization is just as critical to realizing benefits and maintaining organizational momentum. This approach will not produce the same results in all markets or for all products. Many factors will influence the potential results, such as maturity of product and market, external influences, leadership, customer influence, and current complexity level. For example, Novartis chose to run a proof-of-concept pilot with a European CPO because they had an extremely high level of complexity (in terms of total number of SKUs, SKUs per brand, and sales per SKU), strong leadership, close proximity and relationship with headquarters, and, perhaps most importantly, the local health authority had recently launched an initiative to drive down the prices of pharmaceutical products by simplifying the portfolio variety. In order to remain competitive in the market, the CPO needed to reduce the portfolio complexity and do so in the most efficient way possible. By employing high-level analytics, we can prioritize which products and markets to focus this approach on first. In an ideal world, this type of analysis would be conducted on the entire portfolio, but the level of effort required, diminishing benefits, and various uncertainties around doing so makes a prioritization approach more appropriate.

4.2.1 Market Scope

Implementing this process and training each CPO on the required tools will take significant time and effort. Because of this, it is a good idea to prioritize the markets in which redundant product rationalization is implemented. First, each market should be segmented into groups with common characteristics. The implementation lead should look at maturity of the market, resources available at the local level, and consumer behaviors to perform this segmentation. At Novartis, all CPOs are organized into different regions. Although there is some variation within each region, the CPOs in each region share many of the stated characteristics beyond simply geography. Further, the organizational structure (common leadership) supported region segmentation. The regions at Novartis are AMAC (Asia-Pacific, Middle East and African Countries), Europe, GEM (Group Emerging Markets), Greater China, Japan, Latin America, and North America.

The following analysis was done for each of the market segments to identify which individual markets are best suited for redundant product rationalization. Figure 12 plots all of the CPOs in Novartis' European region. The vertical axis is average SKUs per brand, which is a basic measure of the portfolio complexity of the CPO. The ideal number of SKUs per brand is

Figure 12 - Novartis Region Europe CPO prioritization analysis (illustrative data)

= Redundant Product Rationalization Focus Area

36
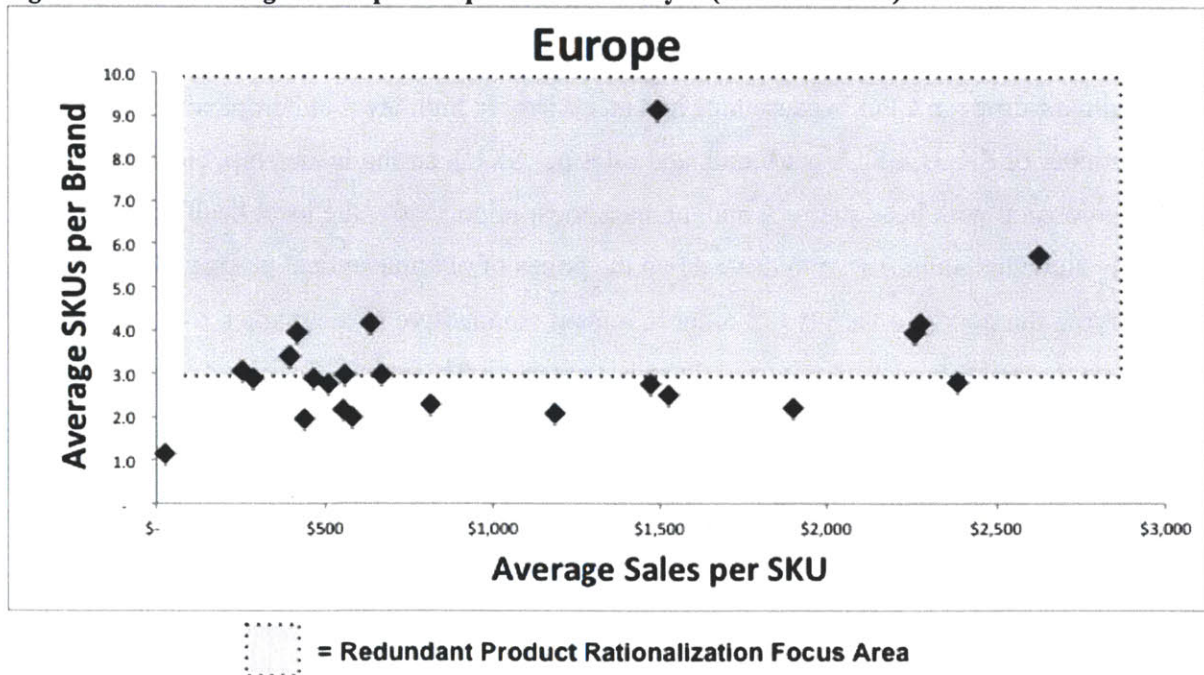
up for debate, but it is clear that the higher the value, the greater the opportunity for SKU reduction is. The horizontal axis is average sales per SKU in each market. This is more of a proxy for the potential cost savings of SKU reduction. Pruning large SKUs with higher absolute costs increases the potential cost savings. Average cost per SKU would be a better measure, but as previously discussed, cost data is considered confidential and not shared between headquarters and the CPOs. Thus, in the interest of transparent communication, it was decided to use sales per SKU as a proxy for the savings opportunity. It is worth noting that a lower average sale per SKU (in United States Dollars) does not remove the CPO from consideration for redundant product rationalization. In fact, the focus area for this approach (highlighted in Figure 12 covers all CPOs above a minimum average SKUs per brand. For Novartis, we decided to look first at CPOs with an average of more than three SKUs per brand. A brand with one sample SKU, one small patient pack, and one large patient pack is fairly optimized and thus is deprioritized. Depending on the results of the pilot and future roll-outs, additional CPOs maybe included.

4.2.2 Product Scope

After identifying which markets will utilize the redundant product rationalization approach, the next step is identifying which brands to evaluate. This is done primarily at a CPO level. Similar to selecting which markets to implement this process in, the more complex brands offer the greatest cost saving opportunities. By plotting each brand within the market on the graph in Figure 13 we can identify the most complex brands in the CPO portfolio. The CPO should focus first on brands that have a high number of SKUs. Additionally, brands with many dosage forms-strength combinations could present an opportunity to prune a whole dosage strength of a brand if it is not required by the customer. Lastly, the size of the bubble relates to the total sales of the brand and will translate into the cost saving opportunity.

The brands in the focus area will present the best use of time and resources for the CPO. As iterations of the redundant product rationalization process are completed, the bubbles on the chart should move closer and closer to the origin and the size of the bubbles should increase. Some brands need not be evaluated every cycle even if they remain in the focus area. If the customer requirements do not change regularly, it will be satisfactory to do an annual evaluation.

37

The CPOs should be empowered to determine the best product scope for this approach, but the global organization should set aggressive overall complexity reduction targets to continue to drive performance.

Figure 13 - Brand prioritization analysis

Brand Selection

Number of SKUs

Dosage Form - Dosage Strength Combinations

Size of bubble relative to total sales (USD)

⋮ = Redundant Product Rationalization Focus Area
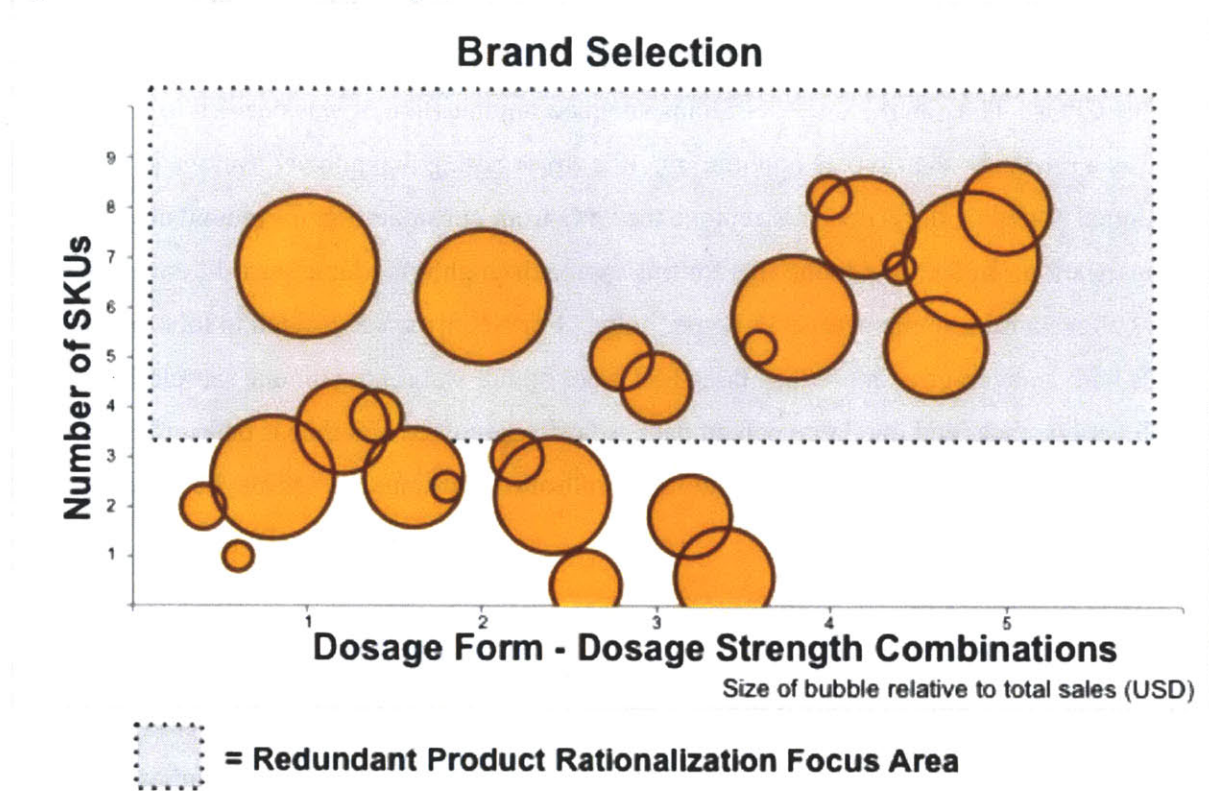
4.3   Implementation in Local Markets

The implementation of a new process can take some time, and the redundant product rationalization process is no different. At Novartis, the scope definition analysis outlined in Section 4.2, dictated much of the implementation strategy. First, a proof-of-concept pilot was conducted on a limited number of brands in one CPO. The next step is to implement the process in a small number of pilot CPOs that are representative of many of the other CPOs not included in the pilot. After the pilot, process feedback and results will be gathered, allowing for process improvement before the global rollout. The last step is to pass the refined process off to a regional implementation team. Each team should be intimately familiar with the process and should determine the implementation strategy within a specific region. Depending on the region,

it may not be necessary to implement this process in every market. Some CPOs with efficient portfolios could be deprioritized if the regional implementation teams so decide.

Five CPOs were chosen for the pilot implementation. These CPOs were chosen because they have high portfolio complexity, they are from a variety of regions, and they are a variety of market sizes. This subset of markets, when the pilot is completed, will provide an abundance of knowledge applicable to other markets included the global rollout. As of December 2010, the proof-of-concept pilot in the selected European CPO was completed but the process was only tested out on a selection of brands from the entire portfolio. The upcoming pilot will include the entire portfolio for each of the pilot CPOs. Figure 14 details the proposed pilot implementation plan. The five CPO pilot will take six months to

Figure 14 - Pilot implementation plan
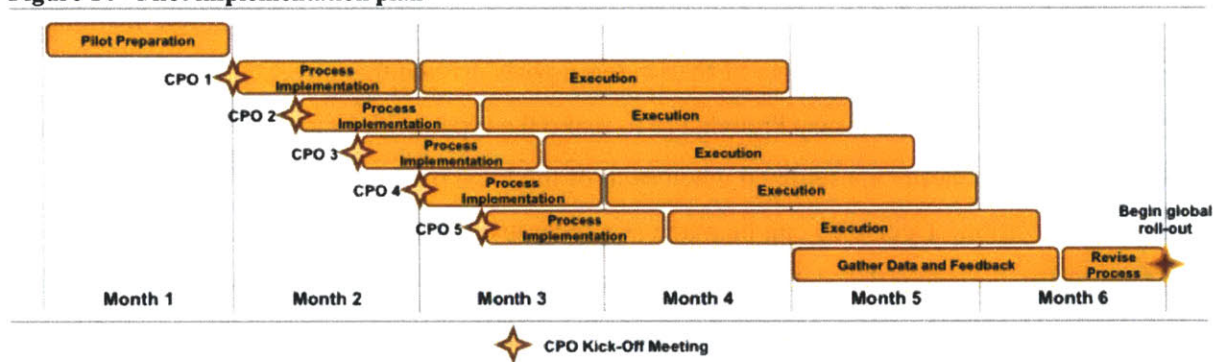
complete. A global implementation team should travel to each CPO for the kick-off meetings to train the local teams on how to use this new process. Each CPO will then have three months to implement and execute the process for their entire portfolio. The global implementation team will then gather data and feedback from all of the pilot CPOs, revise the process as needed, and prepare for the global rollout.

As of December 2010, the proof-of-concept pilot has been completed and the redundant product rationalization concept has proven to be feasible and effective. The limited pilot rollout will test the process in diverse markets as well as test out training and implementation tactics. This information is prerequisite for the global rollout. Additionally, with the successful completion of the pilot, there will be a significantly large resource group with knowledge of and

experience using this approach. These resources will be critical in future implementation efforts. In fact, three of Novartis' largest and most mature regions are represented by at least one CPO in the pilot. Resources from these CPOs should be used for the regional implementation teams.

While this implementation plan begins to address one critical success factor, resource availability, the following section addresses other key considerations for a successful redundant product rationalization process implementation.

4.4 Critical Success Factors

The redundant product rationalization approach detailed in this chapter has the potential to transform how pharmaceutical companies manage and streamline product portfolios. To maximize the impact, in terms of cost reduction, process efficiency, and resource utilization, there are several success factors that need to be addressed. First, the marketing organizations in the local market must be supportive of the strategic goals driving this effort. The marketing group has much of the necessary knowledge to make the types of decisions this process requires. Secondly, larger benefits are realized when each of the local markets are coordinated by the global organization. Decisions can be made at a local level, but with consistent tools and general guidelines distributed by the global organization, significant cost reductions can be realized at production facilities supplying multiple local markets. Lastly, a formal information transfer process within the local market and across the global network will reduce the amount of effort required to implement this process as well as reduce the resources and time required to execute the process on an on-going basis.

4.4.1 Local Marketing Support

The sales and marketing organizations in each local market have the best insight into the local customer requirements and are, thus, critical to executing this process. Complicating matters within Novartis is that the CPOs, which primarily perform sales and marketing functions, are not always concerned with production cost reduction initiatives. The key to overcoming this challenge is to communicate the benefits for the CPOs, such as reduced product forecasting efforts, reduced unit costs and transfer prices, and increased compliance with local health authorities, while also explaining the critical role they play in capturing larger benefits for the

40

global organization. Performance goals and metrics can provide some additional incentives to comply with the process and to aggressively target redundant products. Further, recognition of the top performing CPOs, including the individuals responsible for executing the process, is an effective motivational tactic. In large organizations, it is important to remember that local or satellite groups can sometimes feel like they are pressured into different initiatives by the global organization. Recognizing and rewarding process compliance and innovation will send the message that this process is owned by the CPOs and that the global organization is there to support the process wherever possible.

4.4.2   Coordination with Global Organization

Although much of the knowledge base required to execute this approach is held within the local markets, the global organization is also critical in maximizing the benefits. First, central management and governance of the process is necessary to drive results and to maintain links between different markets. The global headquarters is an ideal place for this management because they have the necessary vision across the global network and they have the credibility to overcome some local dissention. Second, the global organization is in a position to share best practices across all local markets. At Novartis, it is uncommon for CPOs in different regions to communicate regularly, so it is unlikely that best practices or suggestions would make their way across the entire network organically. There must be a linking device and headquarters is a natural fit. Finally, headquarters has the insight on production issues or future strategies and should pass down this information to the local markets. There could be instances where the local market has determined that one of two SKUs in a brand should be pruned, but there is not a strong preference as to which one. The global organization, with detailed information on global volumes of each pack size and detailed production cost data for each SKU, could add insights to make this decision. Additionally, if a specific production technology is in the process of being phased out, the global organization could suggest making that brand or other product group a priority for the next review iteration.

4.4.3   Formal Information Transfer Process

With all processes and initiatives, a formal information transfer mechanism is critical to ensure the longevity of this recurring process. The global organization will have to train local

markets on how to use this process effectively, but there are not enough resources to do this training in every single market or to do the training repeatedly. Consequently, the individuals receiving the training must be comfortable enough with the process to execute it independently during the next cycle. This includes training any new team members and expanding it to products not analyzed during the implementation cycle. Additionally, the global organization, in the coordinating role, will compile the best practices in each local market. A formal information transfer process will help disperse this knowledge to all markets.

4.5   Benefits of Redundant Product Rationalization

When successfully implemented, the overwhelming benefit to redundant product rationalization is that end-to-end operations can be streamlined without losing any revenue. This is especially significant in the pharmaceutical industry because of the relatively large margins realized on almost all products. There are certainly exceptions and the larger recorded margins are partly in place to cover extremely high unallocated overhead and development costs, but, in general, the tail-end of a pharmaceutical portfolio is still profitable, especially when compared to industries such as consumer products. As it will be discussed in Chapter 5 assessing and removing the tail-end of the portfolio is still an essential piece of SKU reduction, but removing redundant products can offer different, and sometimes larger, efficiency improvements. We will begin this chapter with a case study and discussion of the results realized in the proof-of-concept pilot conducted at one CPO in Europe. We will then have a general discussion around the expected benefits for the local markets as well as the global organization. Unfortunately, because the pruning process in a pharmaceutical company can take multiple years, we do not yet have actual data to quantify the benefits, but they are founded in sound operational theory.

4.5.1   Case Study: Redundant Product Rationalization Proof-of-Concept Pilot

In 2009, the supply chain group at a CPO in Europe set out to reduce operating costs by reducing portfolio complexity. The initial effort targeted 30% of the active portfolio, focusing on tail-end or retiring products. By the end of 2009, the supply chain led team had incorporated a SKU rationalization process into the country's S&OP process and had identified about 15% of the portfolio (by number of SKUs) for pruning (Höcht 2009). The percent reduction of SKUs is

certainly significant, however, more new products were either launched or planned to be launched within the next six months than were identified for pruning. This left the CPO with a larger portfolio than before the SKU rationalization effort was launched. It quickly became clear that the marketing organization had agreed to prune only products scheduled to be replaced by new launches and that the actual complexity of the portfolio was changed little. The supply chain group's challenged marketing's recommendations, but were unsuccessful in reducing the portfolio further.

One year later, the energy behind complexity reduction drastically changed. The local health authority was actively lobbying Novartis and other pharmaceutical producers to lower the prices of pharmaceutical products and even suggested reducing the variety of the product offerings to do so. Additionally, the head of Novartis' Region Europe organization, with the support of the CEO, CFO, and marketing head of the CPO, asked the marketing group to rethink the SKU rationalization effort and to drastically increase the amount of aggression applied to identifying unnecessary products. The stated objectives were to increase sales per SKU, reduce write-offs, reduce inventory value, reduce administrative costs, and to increase sales of larger SKUs or brands. With this clearly stated mission, the same team set out to assess the portfolio further and to identify complexity reduction opportunities.

By following the approach detailed in this chapter, the CPO was able to realize a 20% reduction in the overall portfolio, including new product launches. The effort focused on larger brands. Figure 15 provides a summary of the results of the proof-of-concept pilot for seven large brands. Within these brands, the CPO was able to reduce 30% of the portfolio without losing any revenue. Because these SKUs are large SKUs, the costs savings associated with rationalizing these products is much higher than pruning products that are seldom produced, marketed, or distributed. More discussion around the benefits for the local market and for the global organization follows this section.

Figure 15 - Selected results from proof-of-concept pilot

Brands Reviewed	Active SKUs in Local Portfolio	Rationalization Impact	Remaining SKUs	Driver
Brand A	24	-2	22	• Cannot prune SKUs – High packsize variety necessary
Brand B	54	-23	31	• Medium pack pruned – 100% sales compensation confirmed
Brand C	62	-25	37	• Medium pack pruned – 100% sales compensation confirmed
Brand D	31	-4	27	• 4 redundant or non-critical SKUs pruned with no sales loss
Brand E	33	-6	27	• Hospital packs pruned and pruning of medium pack to be evaluated
Brand F	14	-4	10	• Hospital packs and medium packs – replaced by other commercial pack
Brand G	20	-8	12	• Hospital packs and medium packs – replaced by other commercial pack

In these 7 brands, the CPO achieved 30% reduction in SKUs (72 SKUs) without sales loss

4.5.2 Local Market Benefits

There are plenty of incentives for the sales and marketing organizations to be behind a complexity reduction effort. First, customer requirements are put under extreme scrutiny, which results in a deeper understanding of exactly what the customer demands. Additionally, with fewer products, the local markets have fewer SKUs to forecast, fewer marketing efforts, and less inventory write-offs. Further, with fewer SKUs in each brand, the demand is essentially being pooled, which can greatly reduce demand uncertainty and reduce safety stocks. Lower production costs results in lower transfer prices and increased margins. Increased volumes in fewer SKUs also means more frequent production runs in a batch production system, which will improve the CPOs ordering flexibility by reducing the minimum order quantities. The largest benefit of the redundant product rationalization process for the local markets is the ability to realize all of these benefits while continuing to increase customer service levels, further improve patient care, and maintaining revenues.

4.5.3 Global Benefits

Benefits at the global level are primarily production related. First, the increase in demand forecast accuracy has benefits that trickle down throughout the whole value chain. Intermediate product inventories can be reduced at each production step. Order fulfillment, or service levels, will increase. Inventory write-offs will also reduce as the demand volumes increase. Resource utilization will increase as there are fewer product changeovers.

By focusing on larger SKUs, the magnitude of these benefits increases greatly. The larger the product, the more costs, in terms of materials, production, distribution, and marketing, there are. This approach allows an organization to capture these large scale cost savings without sacrificing revenue.

4.6 Shortcomings of Redundant Product Rationalization

With the potentially significant benefits for both the global and local organizations detailed in the previous section, it is appropriate to acknowledge some shortcomings of the redundant product rationalization process. First, this process is resource intensive. Customer requirements must be gathered accurately for this process to succeed. This can be time consuming, especially in the pharmaceutical industry where the term "customer" can mean many different things. A pharmaceutical customer can be a patient, provider, distributer, or health authority. At Novartis, patient care is always paramount, but it is clear that all other customers need to be satisfied in order to deliver effective patient care. Much time and effort must be invested in gathering these vital requirements. Additionally, executing the process can take significant amounts of time and requires a cross-functional team with a vast amount of market and product knowledge. Standardized tools, prioritization tactics, and on-going process improvements are critical in reducing the amount of time and resources required for this process.

Secondly, the success of this process is heavily dependent on the support of an influential leader in the organization. This is evident in the fact that the proof-of-concept CPO had limited success in the initial implementation. After the marketing and finance heads at the CPO expressed their support behind the process and the importance of reducing the portfolio complexity, the CPO realized much improved results.

Lastly, the redundant product rationalization process does not address unprofitable products, failed or end-of-lifecycle products, or products manufactured with outdated processes or retiring resources. The second half of the complexity reduction approach, tail-end pruning, intends to address this shortcoming. The redundant product rationalization approach will streamline the portfolio of a company's core products, while the tail-end pruning approach seeks to eliminate products that are no longer worthwhile to produce and distribute.

Although removing redundant products is not the only action that must be taken to reduce the complexity of product portfolio, it does focus on an area that is often neglected. It is easy for a company to assume the product offering of a brand with strong sales and projected sales is efficient and not worth the effort of improving, but, as it has been detailed in this chapter, there are significant benefits to removing redundancy.

4.7   Summary

This chapter details the first of two focus areas for the recommended product portfolio complexity reduction approach for pharmaceutical companies. Redundant product rationalization is a bottom-up approach to reducing portfolio complexity. The approach seeks to identify and eliminate products that do not directly address a customer need. By removing medium to large SKUs, the organization can capture significant benefits including production cost reductions, increased demand forecast accuracy, and lower inventories, without sacrificing revenue. This approach was validated in a proof-of-concept pilot at a CPO in Europe. The CPO was able to reduce 30% of the SKUs in seven of the larger brands, and they have observed no decline in sales revenue. Following these impressive results, Novartis Pharma has approved an additional pilot with three regions and five CPOs. The results from this full-scale pilot will prompt any necessary process revisions before a global rollout.

Chapter 5 - TAIL-END PRUNING

Tail-end pruning is the second and final focus area of the complexity reduction approach. This process includes identifying and eliminating the tail-end of the portfolio in an effort to focus resources on larger, more advantageous products. The tail-end consists of products with low demand, low margins, high production costs, and low growth potential. These could be products that are going to be retired or replaced, and it can include products that have failed to meet expectations. Figure 16 highlights the difference between the two complexity reduction focus areas.

Figure 16 - Tail-end pruning focus area
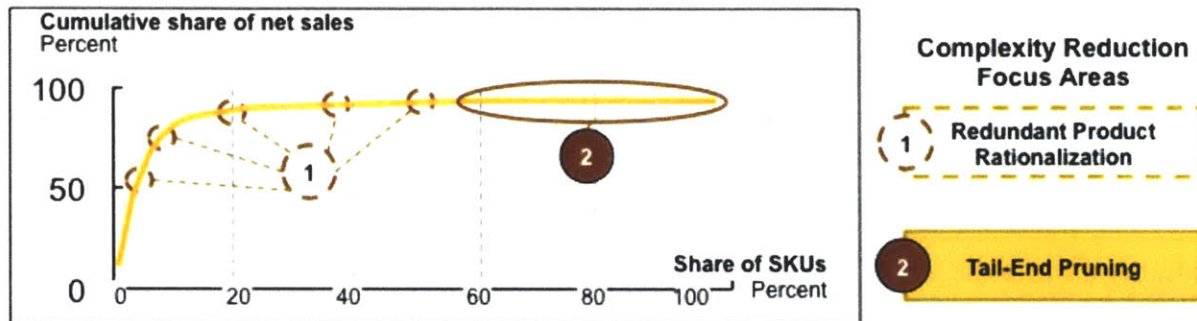
Chapter 5 includes a detailed description of the tail-end pruning approach. Further, a method to define and identify the tail-end of the portfolio is discussed. Additionally, this chapter includes a short discussion around quantifying the impact, critical success factors, benefits, and shortcomings of tail-end pruning.

5.1   Approach

As previously stated, the objective of tail-end pruning is to identify and remove small, less-profitable products in order to redistribute resources amongst larger, more profitable products. This sounds very straight forward, but, as many companies have realized, it becomes extremely difficult when you get down into the details. Additionally, this is not a one time project. The tail-end constantly reincarnates itself in the form of different products, thus a regular tail-end analysis must be completed to ensure the most efficient use of resources. Similar to the redundant product rationalization, best results are realized when the tail-end pruning

process is incorporated into regular planning activities such as an annual sales and operations planning review.

As seen in Figure 17, tail-end pruning is a five-step process, which seeks to transform an operations efficiency theory into a manageable and tactical portfolio review. The first step is to

Figure 17 - Tail-end pruning process

Repeat Annually
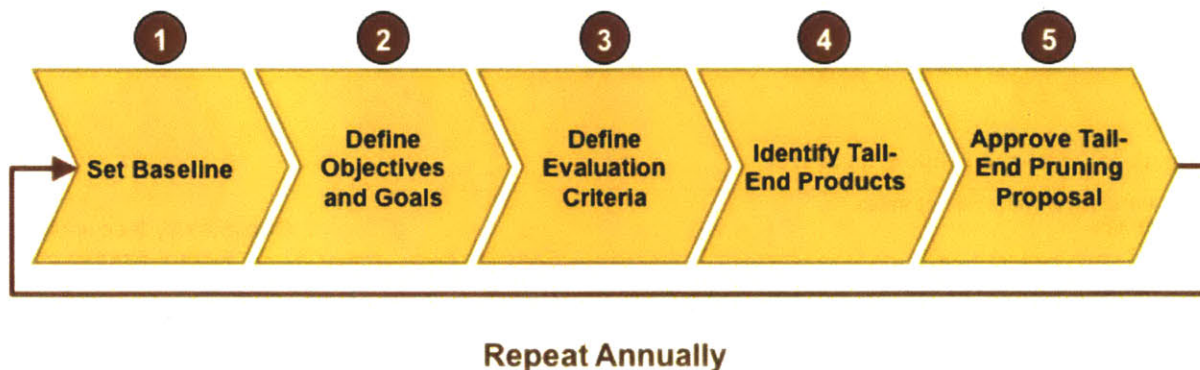
identify the baseline portfolio and gather all relevant data at an SKU level. It is important to take a snap shot of the portfolio in order to scope the analysis, but all effort should be made to get current and complete data. Data from a full year is usually appropriate in the pharmaceutical industry unless there are a lot of products in which sales or production activity occurs less frequently than at least once a year. If this is the case, then multi-year data is appropriate. Data elements must include, but are not limited to, sales, costs, demand forecast, inventory levels and value, write-offs, volume, percent margin, and absolute margin. Additionally, bill of materials and market information should be included. Lastly, production issues, such as long changeover times, small batch sizes, supplier management problems, and quality issues should be gathered for all relevant SKUs.

Step 2 is to define the objectives and goals of the current iteration of tail-end pruning. Before discussing appropriate objectives and goals, it is helpful to discuss the different tail-end pruning options. The goal of tail-end pruning is to remove the smallest, least profitable products from the portfolio, but the definition of "small" and "least profitable" depends on the context. The smallest products in the entire portfolio are different than the smallest products in a region, CPO, or product group. It is advisable to assess the portfolio at the largest level where common

48

criteria can be applied to accurately characterize a product's performance. Similarly, the tail-end could be the smallest brands, dosage forms, dosage strengths, or SKUs. Each of these groups impact different parts of the value chain in the pharmaceutical industry, and, thus, pruning these groups has a different impact on costs. Figure 18 shows a typical pharmaceutical value chain and illustrates potential areas of cost savings when different product groups are pruned. Clearly,

Figure 18 - Pharmaceutical value chain and cost implications of pruning different product groups
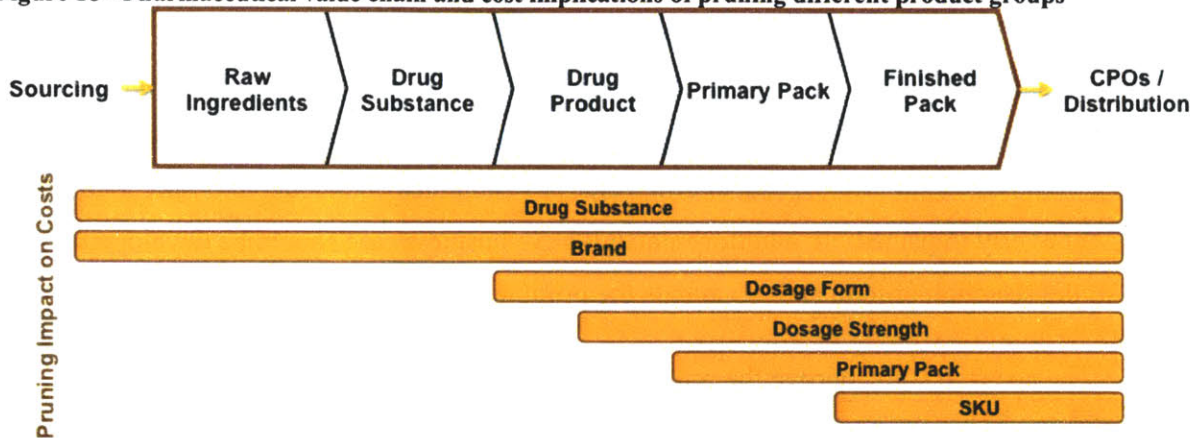
pruning an entire brand has the potential to save costs across the entire value chain, while pruning an individual SKU only reduces packaging and distribution complexity costs. That being said, there is a much larger potential revenue loss from pruning a whole brand because customers cannot switch to an alternate SKU.

Objectives and goals should specify which level of the portfolio is being targeted. Additionally, strategic goals should be supported by the tail-end pruning objectives. This could include targeting resources and capacity in a specific production plant, it could target specific production resources or technologies, or it could focus on certain regions or CPOs. The ideal target for tail-end pruning is to maximize margins, but with hidden complexity costs, this is hard to implement. A more feasible target is number of SKUs.

The next step in the tail-end pruning process is to define evaluation criteria. This should include both operations and marketing criteria and should be general enough to apply to the entire portfolio, or at least to the entire complexity reduction scope. There should also be a mix

of leading and trailing indicators to account for growing or declining products. At Novartis, the following criteria were used to evaluate the portfolio: net sales (USD), 2012 sales forecast (USD), volume sold (number of packs), margin (percent), margin (USD), average sales per SKU (for tail-end brand pruning), and production weak points (qualitative suggestions from production plants). Next, step 4 is to apply the evaluation criteria. Those products, either SKUs or brands, that meet the criteria are labeled as tail-end and subject to further pruning evaluation. After the portfolio is evaluated against the criteria, a qualitative check should conducted to make sure the suggested products are valid for a pruning proposal. This could include a market-centric analysis to ensure that one market, in terms of percentage of sales, is not over represented in the pruning proposal. Similarly, a product group analysis should be conducted to ensure a business unit is not overly impacted. In addition, a quantitative business case should be developed to confirm the selection criteria and to validate the pruning proposal.

The last step is to approve the pruning proposal. A thorough review by sales and marketing is necessary as a sanity check. At Novartis, the pruning proposal was distributed to the CPOs for feedback. The CPOs were asked to approve or reject the pruning of each SKU in their respective markets. If an SKU was rejected, a detailed explanation was required and the CPOs were asked to suggest an alternate SKU for pruning. Some common reasons cited for rejecting an SKU were local distribution agreements, local medical need, and specific customer requirements. These are all valid reasons for keeping an SKU and they are all pieces of information that are not readily available when assessing the portfolio from a global perspective. CPOs also often rejected an SKU on the basis of high sales in the market. This reasoning should be challenged, as from a global standpoint the high production costs could make it prohibitive to supply the product. After gathering the CPO feedback and evaluating the feedback, a final pruning list was submitted to a global steering committee for final pruning approval. Shortly thereafter, pruning implementation commenced and production on the identified tail-end products was stopped as soon as possible.

This five-step tail-end pruning process is tactical in nature and meant to remove subjective analysis wherever possible. For a relatively efficient portfolio, this analysis should be

done on an annual basis. It may be necessary to conduct the process on a bi-annual basis for highly complex and rapidly changing portfolios.

5.2 Identifying the Tail-End

Applying the evaluation criteria can be done in many different ways. This document discusses two potential methods to identify the tail-end. The first applies a mixed integer programming optimization model. This method is ideal when the data quality is extremely high, and when the technical knowledge and computing resources are available. The second method, which was used at Novartis with noteworthy results, applies thresholds to each criterion in order to identify tail-end products. This method is more manual, but can be used in the absence of perfect data. This method is also preferred in cases where qualitative data must be incorporated into the analysis.

5.2.1 Applying Mixed Integer Linear Programming Optimization

Linear programming is a mathematical method for determining a way to achieve the best outcome in a given model for some list of requirements, or constraints, represented as linear equations. Utilizing mixed integer linear programming (MILP) to minimize the impact of pruning the tail-end of the portfolio is effective only when data quality is very high. Ideally, complexity costs would be incorporated with the product costs, thus establishing a true cost measure of production and management of a particular product as well as establishing a measure of true profit as a result of the products remaining in the portfolio. If a company is confident in the cost valuation calculations, MILP can produce an optimal pruning proposal based off of customizable constraints.

The decision variables of the MILP are all binary variables corresponding to every SKU. A zero value for a particular decision variable indicates the SKU should remain in the portfolio. Alternatively, a value of one indicates the SKU should be included in the pruning proposal. The objective function seeks to minimize the profit of all SKUs included in the pruning proposal. An alternate objective function minimizing revenue could be adequate in the absence of high quality cost data or if confidentiality agreements restrict the use of profit data. This objective function would produce a slightly misleading optimal solution as many products with low revenue but

high percent margin would be included in the pruning portfolio. Depending on the products in question, these SKUs likely should remain in the portfolio.

The constraints of the MILP will include a minimum number of SKUs to include in the portfolio as well as several constraints reflecting the organization's strategy. Creating a constraint that indicates a minimum number of SKUs to include is necessary for a portfolio of products that generally have positive margins. Without this constraint, only SKUs with negative margins would be included in the proposal and a MILP model is not necessary to identify these products. The minimum number of SKUs in the proposal does not mean that all identified products must be pruned, rather, it provides guidance on which products to further evaluate for pruning. The real power of the optimization model comes from the remaining strategic constraints. The organization can limit the number of SKUs, revenue value, or profit contribution from a particular business unit, region, or CPO. For example, a valid constraint would limit the number of European products included in the pruning proposal. Similar constraints can be set up for all other regions. Production constraints could also be incorporated. By using bill of materials data, we could set a constraint that specifies a threshold for the mass of a specific drug substance included in the pruning proposal. This could either be a greater-than or less-than constraint depending on if the strategic goal is to free up more supply of the drug substance through pruning or if the goal is to limit the reduction in drug substance consumption. Further, constraints could be applied to production volumes at particular plants. The required resources for upcoming new product launches should be considered when determining these constraints. The last constraint is a binary constraint on all decision variables. If the model is determined to be infeasible, the minimum number of SKU constraints should be lowered, or the thresholds for the other production and market constraints should be loosened.

The MILP approach will create an optimal pruning proposal given the stated constraints, but the proposal must still be thoroughly reviewed by all parties before implementation approval. This model is effective because it provides an unbiased pruning proposal based off the available data. You can also quickly run different scenarios and compare different pruning proposals. On the other hand, the model does require extensive computing resources. A model with 14,000+ binary decision variables will have a significant computer processing time. MILP is not a

difficult tool to understand, but it does require a human resource with experience using this optimization approach. Because of the scenario-running capabilities, the MILP analysis is recommended in all situations where cost, profit, bill of materials, and demand data is considered complete and accurate. If the completeness or the accuracy of the available data is questionable, a more manual approach, which was the primary approach at Novartis, is recommended.

5.2.2 Case Study: Identifying the Tail-End with Imperfect Data at Novartis

Novartis has an abundance of data and the quality is generally high, but the manner in which costs are calculated does not accurately reflect complexity costs. Because of this limitation, a manual approach to identifying the tail-end was used. The result was a high quality pruning proposal that was largely approved by the CPOs and by global leadership. The only draw-backs to this process is that biases were introduced earlier on in the process and it is more difficult to run different scenarios.

The first step in identifying the tail-end was to segment the portfolio and choose which echelons would be evaluated for pruning. Portfolio segmentation was done in a manner that all products in one segment can be evaluated by the same set of criteria and threshold values. For Novartis, this meant separating products sold to other Novartis divisions, namely Sandoz and Novartis Consumer Health. Within each segment, it was decided to focus on two product echelons: whole brands and individual SKUs. Therefore, Novartis has four product groupings to create evaluation criteria for. Both Pharma brands and other division brands have the same criteria, but the threshold values are vary depending on the group. The evaluation criteria included: margin (USD), percent margin, average margin per SKU, volume (packs), and production weak point. Threshold values were set at levels that resulted in the desired number of brands being included in the proposal. Brands were included in the proposal if they were identified as a weak point or if the brand met three of the four other criteria. Weak points were weighted heavier because these were the major cost drivers. In some cases, an expensive supply decision needed to be made in order to continue production. The brands that were included in the portfolio were then evaluated for pruning consideration as well as recommended for divestment. If a divestment partner could be identified for these tail-end brands, the divestment income would more than balance any lost revenue from discontinuing production.

Individual SKUs were evaluated along slightly different criteria, which included: net sales, 2012 sales forecast, percent margin, volume, and production weak point. Different threshold values were set for Pharma SKUs and for other division SKUs. SKUs that are weak points and meet at least one other criterion or SKUs that meet at least three different criteria were included in the pruning proposal. With this logic, Novartis was confident that it had accurately identified the true tail-end of the portfolio. Proposed individual SKUs were further assessed for pruning feasibility and distributed to the CPOs for approval.

Through two iterations of tail-end pruning, Novartis was able to approve about 1100 SKUs for pruning as well as propose an additional 1800 SKUs, which are pending approval. These numbers are significant, as, assuming 75% of the proposed tail-end SKUs are approved, almost 15% of the portfolio has be rationalized in an effort to reduce costs and reallocate resources to new and growing products.

5.3   Critical Success Factors

Two noteworthy success factors are relevant for tail-end pruning: integration with standard operating processes and alignment with strategic goals.

5.3.1   Integration with Standard Operating Processes

The first critical success factor once again addresses the need to make complexity reduction a regularly scheduled process rather than a one-off special project. This applies as much to tail-end pruning as anything else. Given some time, the tail-end always reemerges. The best way to ensure tail-end pruning is repeated on an annual basis is to incorporate it into the standard operating procedures. The process is an ideal fit for an annual sales and operations planning session. Tail-end pruning can be conducted at the same time as redundant product rationalization as they focus on different parts of the portfolio.

5.3.2   Alignment with Strategic Goals

Secondly, tail-end pruning must be aligned with the organization's strategic goals. Goals around new product launches, plant capacity, production technologies, and new market development can and should be incorporated into this process. If a mixed integer linear

programming model is utilized, these goals are explicitly included as constraints. At Novartis, strategic goals were used to justify the evaluation criteria. Citing various strategies is also a valuable tool when attempting to obtain approval of the pruning proposal. A proposal founded on specific goals important to the organization has a much greater chance of success.

5.4 Benefits of Tail-End Pruning

Tail-end pruning is similar to good housekeeping. It does not directly lead to huge cost savings, but it is something that needs to be done regularly to prevent waste from building up and slowing the system down. It takes significantly less effort and time to vacuum a rug that is clear of unnecessary and out of place clutter. Tail-end pruning has a similar function in complexity reduction. With all of the clutter removed from the portfolio, efficient complexity reduction is possible; activities, such as redundant product rationalization, take less time and resources. The Toyota Production System speaks of "lowering the water level in the river to expose all the rocks, [in order] to chip away at all the problems" (Ohno 1988). Not only does tail-end pruning facilitate efficient complexity reduction, but it also lowers the water level enough to identify larger complexity issues in the portfolio. Additionally, resources that were consumed by managing tail-end products are now free to focus on larger products and available to chip away at more important problems.

Tail-end products also tend to have, proportional to sales, high inventory values. There is also a greater risk of production write-offs when producing low volume products. Lastly, production changeovers for tail-end products are frequent and expensive. Pruning the tail-end can improve an organization's performance across these measures as well.

5.5 Shortcomings of Tail-End Pruning

The primary shortcoming of tail-end pruning is the potential to lose revenue. In theory, the revenue will be compensated by increased sales in other products by repurposing resources, but this dynamic is difficult to quantify and validate. In the pharmaceutical industry, the tail-end is often still marginally profitable when complexity costs are not considered. Further, some tail-end products are instrumental in driving sales of other products. For example, an unprofitable

product may be a complimentary treatment with an extremely profitable product. In these cases, the tail-end product should be identified and should remain in the portfolio.

When compared to redundant product rationalization, the cost savings are also much smaller. Tail-end products consume fewer resources, thus, fewer costs can be recovered through rationalization. This is not to say tail-end pruning is unnecessary, but the scale of the cost savings will be smaller than redundant product rationalization.

5.6 Summary

A comprehensive complexity reduction approach must include tail-end pruning. The tail-end consists of products with low demand, low margins, high production costs, and low growth potential. By pruning the tail-end, an organization can expect to reduce inventory, reduce inventory write-offs, reduce changeovers, and realized reduced costs for the products that remain in the portfolio.

The pruning process detailed in this chapter is one way to implement a regular tail-end review. When the pruning objectives and evaluation criteria support strategic goals, the results can be impressive. Novartis has been able to implement this tail-end process in the supply chain group and has seen significant support from both the finance and marketing organizations. What was once purely an operations improvement initiative is now a unifying force across the whole company.

The magnitude of cost and margin impact may not be as large as redundant product rationalization, but tail-end pruning is an effective facilitator of complexity reduction.

Chapter 6 - CONCLUSION

The primary purpose of this thesis is to offer an actionable and repeatable product portfolio complexity reduction process for application in the pharmaceutical industry. Specifically, Novartis Pharmaceutical's product portfolio was analyzed in detail and the comprehensive approach was validated through several case studies at Novartis. Effective complexity reduction facilitates efficient delivery of value to patients, customers, and the company.

As expected, an effective complexity reduction approach in the pharmaceutical industry must focus on the entire portfolio and must seek to efficiently meet customer requirements while maintaining a global production perspective. Further, the complexity reduction approach must be aligned with the organization's overall goals, vision, values, and strategy in order to build the requisite internal support. Two focus areas, redundant product rationalization and tail-end pruning, make up the comprehensive complexity reduction approach. Redundant product rationalization focuses on larger products that consume more production and marketing resources. By identifying true customer requirements, rather than inferring market preferences, the product assortment for these large brands can be tailored to meet requirements and cost savings are realized by removing redundant products. Tail-end pruning focuses on smaller products that consume resources that are better applied elsewhere. The analysis focuses on gathering data in an effort to define characteristics of tail-end products. These characteristics include low sales, low absolute margin, low percent margin, low volumes, and high write-offs. Both focus areas of complexity reduction are cross-functional and require support and resources from all groups in the organization.

Similar to other industries and companies, there has been a long standing belief at Novartis that extensive product customization is necessary to fully satisfy the diverse set of customer requirements. This results in SKU proliferation and significant production complexity. This project improved Novartis' efficiency and profitability by reducing global production costs. Further, complexity reduction will facilitate Novartis Pharma's future strategic goals by allowing Novartis to react quickly to changing global markets and customer demands. While developing

this approach, it was important to consider customers' needs, the value the product delivers, and regulatory and production related questions.

Given the beliefs of the sales force, one of the primary stakeholders in this effort, it was quite an accomplishment to get 70% of the SKUs in the initial proposal approved by the CPOs and by the global organization. In fact, this is a far higher percentage than Novartis has achieved in past efforts. At the end of the first iteration of tail-end pruning, 43 brands and 1,100 SKUs were approved for pruning. This resulted in a 7% reduction in the total number of SKUs and an expected reduction in total inventory value of up to 2%. Additionally, Novartis' is expecting improved forecast accuracy, increased plant utilization, lower production costs, reduced lead times, and reduced production and inventory write-offs.

To close out this thesis, we will summarize the key findings, review the benefits, and suggest future opportunities to expand the impact and improve the efficacy of complexity reduction. Novartis is well on its way to realizing a more efficient way to produce critical pharmaceutical products without jeopardizing patient care, and efficient complexity reduction is just one of many of reasons why.

6.1   Key Findings

Product portfolio complexity reduction in the pharmaceutical industry is not a short-term battle. It requires constant attention and the fundamentals of complexity reduction should be ingrained in every part of the organization. Developing and testing this approach at Novartis has been an enlightening experience for all parties involved. The following is a discussion of the key complexity reduction findings.

In the pharmaceutical industry, the whole portfolio should be targeted for complexity reduction. Focusing solely on the tail-end will limit the potential improvements in costs and profits. Just because a product is profitable does not mean it is the best use of resources. With the wide range of profit margins on pharmaceutical products, exploring alternate uses of resources is especially important.

Second, organization-wide support is necessary to successfully implement and maintain a complexity reduction process. The decision to remove pharmaceutical products from the portfolio is a controversial decision. If the complexity reduction efforts are aligned with the overall strategic goals of the company, widespread support is easier to obtain. Additionally, this is not just an operations task, and if groups within the organization believe this, then the process will fail. The analysis is cross-functional, including everything from patient treatment patterns to production batch sizes. More importantly, the benefits are cross-functional. Marketing focuses resources on core products. Finance has fewer demand forecasts to produce. Operations can better utilize resources when there are fewer changeovers.

Third, redundant product rationalization, a customer-centric approach to complexity reduction, can deliver more significant cost savings without jeopardizing revenues or customer relationships. In fact, health authorities are beginning to realize the link between product costs and product variety. The increase in variety is often not worth the increase in cost. One could argue that, in addition to efficiency gains, redundant product rationalization helps increase customers' satisfaction.

Fourth, the tail-end of the portfolio, when left alone, will always resurface. Regular maintenance is necessary to avoid consuming expensive resources on low-profit products.

Lastly, even if a perfect new product introduction process is in place, there is still a need for complexity reduction. An organization can create exactly the SKUs that the customer truly demands, but customer requirements change over the lifetime of a product. The perfect product today may not be the perfect product next year. This complexity reduction process monitors market dynamics and ensures the portfolio is up-to-date, meets customer requirements, and is waste-free.

6.2   Results

At the time of writing this thesis, Novartis has completed one iteration of tail-end pruning, conducted a small scale proof-of-concept pilot for redundant product rationalization, created a proposal for a second iteration of tail-end pruning, and scoped a large scale redundant

product rationalization pilot. Pruning implementation has commenced for over 1100 SKUs, and an additional 1800 SKUs have been proposed for pruning. All of this work was completed in a six-month period starting in June 2010. As implementation has not concluded for the first wave of tail-end pruning, there is little data to quantify the benefits and results of complexity reduction.
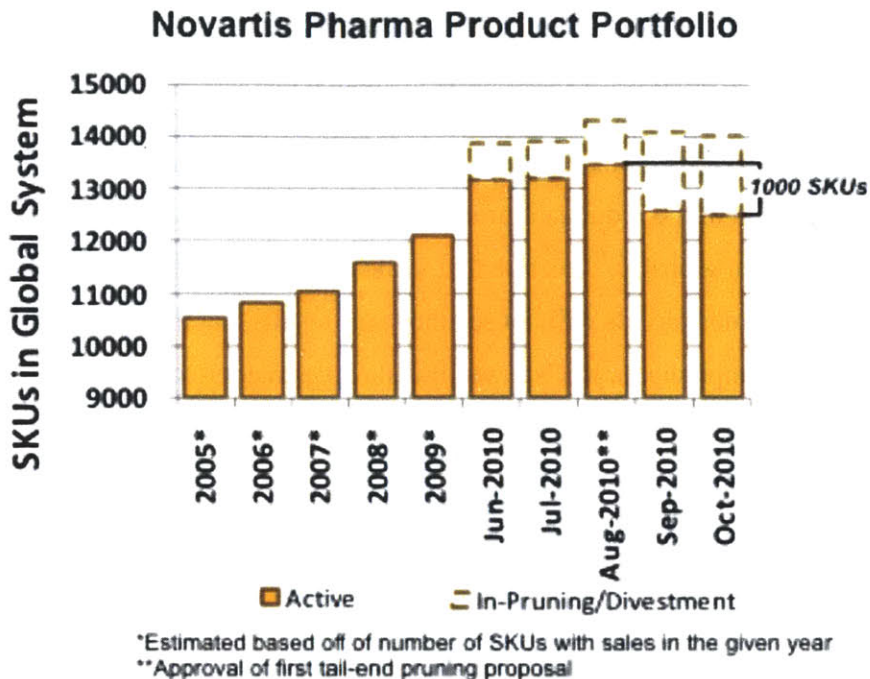
One undeniable result of this research and approach is that complexity reduction is getting organization-wide attention and support. Senior leadership believes in the benefits of complexity reduction and has made it a top strategic priority. In fact, the project champion for the Drive for 5 operational excellence initiative, of which complexity reduction is a major part, was recently recognized by Novartis AG CEO, Joe Jimenez, and Chairman of the Board, Dan Vasella, for his excellent contribution to productivity. Only four individuals are recognized with this honor annually, and this is the first time anyone in TechOps, Novartis Pharma's operations group, has received the honor. Individual accolades aside, complexity reduction is a topic of conversation in the finance group, marketing group, across the operations organization, and at the CPO level.

In addition to getting attention and support, the complexity reduction process implementation has made significant progress. The tail-end process is implemented and managed by the global supply chain group. Relationships with region and CPO leadership are established and a mechanism to solicit and record the local market feedback is in place. There have been past pruning efforts at Novartis, resulting in minor organizational impacts. Prior proposals were approved at rates well below 10% and the cost savings were minor. The systematic tail-end pruning approach detailed in this document resulted in a 75% acceptance rate in the first iteration. This vast increase in the acceptance rate is caused by a number of factors including, increased organizational support behind complexity reduction, better analysis, more appropriate proposals, and transparent evaluation and selection logic. In addition to tail-end pruning, the redundant product rationalization concept has been validated at a European CPO and a larger pilot is approved for 2011 to test the process implementation strategy.

The total number of SKUs in the active portfolio has already drastically changed just six months after the launch of the complexity reduction initiative. Figure 19 shows the size of

Novartis' portfolio in terms of number of SKUs. There was an increasing trend for five years prior to June 2010. Since then, the trend has been reversed and the number of SKUs is actually

Figure 19 - Number of SKUs in Novartis Pharma portfolio

Novartis Pharma Product Portfolio

*Estimated based off of number of SKUs with sales in the given year
**Approval of first tail-end pruning proposal

decreasing. With the approval of the second iteration of tail-end pruning and the results of the redundant product rationalization on the horizon, this downward trend is expected to continue.

The primary Drive for 5 program objective is to reduce inventory levels by up to 40%. Based off of current inventory value, it was estimated that the 1100 SKUs approved for pruning in August 2010 would result in an inventory reduction of up to $22 million USD. Considering the minor impact on sales, this number is impressive. As part of the approved pruning list, 43 complete brands were approved for pruning. Pruning a whole brand has end-to-end savings as all intermediate inventories associated with these brands can be reduced. This highlights the importance of pruning the highest possible product echelon when attempting to maximize cost and inventory savings.

6.3 Future Opportunities for Novartis

Despite the significant progress made and admirable results achieved in the past six months, Novartis has several opportunities to improve the complexity reduction foundation they have established. These future opportunities are something most organizations could benefit from and they build upon the basic process implementation that has been successful at Novartis.

6.3.1 Full-Scale Redundant Product Rationalization Implementation

After completion of the redundant product rationalization pilot, the process should be revised and implemented globally. It is true that some markets will not immediately need to use this approach or that some markets will not see the same results that the proof-of-concept CPO observed, but a global implementation is a worthwhile investment to continue the complexity reduction way of thinking. Developing markets will someday be mature markets. By implementing this process in these developing markets, Novartis will be avoiding potential complexity issues in the future. The overall complexity reduction process is designed to remove complexity before high complexity becomes an issue.

6.3.2 Portfolio Complexity Governance, Metrics, and Dashboard

The second future opportunity for Novartis is to create robust complexity governance measures, metrics to track the overall portfolio complexity, and a dashboard to exhibit the current status of portfolio complexity. If someone were to ask the question, "how complex is the portfolio?" there would be no easy answer. Novartis should explore defining key performance indicators for the portfolio. Number of SKUs is not an adequate measure of complexity because there is no "right" number of SKUs. It is difficult to determine when an organization has too many SKUs, and it is equally difficult to determine when the organization has too few SKUs. Measures such as average margin per SKU could be a good place to start as it would provide an incentive to grow margin while reducing the number of SKUs.

6.3.3 Identification of Future Complexity Reduction Focus Areas

The first two iterations of tail-end pruning focused on brands and individual SKUs, but as discussed, there are a number of other product echelons to choose from. Brand was chosen because of the potentially high cost and inventory impact, but by the second iteration it was becoming more and more difficult to find brands small enough to justify pruning. A

methodology to select which level – drug substance, dosage form, dosage strength, etc. – to focus tail-end pruning efforts on would be a valuable process improvement.

6.3.4 Revised Cost Valuation Process

As previously mentioned, the traditional way of allocating costs to a product does not necessarily reflect the true cost of producing that product. It also does not account for cost interdependencies between different products. It is possible that producing one product makes another product more expensive, or vice versa. A revised cost valuation process that quantifies complexity costs would be very valuable for future complexity reduction efforts. Further, a revised cost valuation process would also help to quantify cost savings for future pruning proposals.

6.3.5 Complexity Reduction in New Product Introductions

Both redundant product rationalization and tail-end pruning aim to reduce complexity in a mature portfolio. More effort could be made to reduce the complexity before it makes it into the portfolio. By managing new product introductions with a complexity management perspective and creating only the necessary SKUs from the beginning, additional registration, regulatory, and testing costs could be saved. This would not replace the current complexity reduction approach, but it is another step towards maintaining an efficient portfolio at all times. Some decisions, such as mandating the same pack sizes of a brand in each market, could go a long way in reducing complexity before it becomes a problem.

6.4 Closing Statement

Portfolio complexity is a hidden drain on an organization's efficiency. Overly complex portfolios can strain resources in marketing, finance, and operations. Even worse, blockbuster products can be held below their full potential because non-core products are monopolizing resources. The complexity reduction approach in this document is meant to provide an actionable and repeatable method to assessing and removing excess complexity in a pharmaceutical portfolio. Novartis, especially the complexity reduction team, has been open to adapting insights from other industries. SKU rationalization or reduction is a topic usually discussed in the consumer products industry, but Novartis sought to pioneer the approach in the

pharmaceutical industry as part of an operations transformation program. Now, Novartis is beginning to experience the benefits of simplifying the portfolio. Going forward, Novartis will be in a position to react quickly to changing market conditions, and effective management of portfolio complexity is one of the reasons why.

BIBLIOGRAPHY

Alfaro, J A, & Corbett, Charles J.(2003). The value of SKU rationalization in practice (The pooling effect under suboptimal inventory policies and nonnormal demand). *Production and Operations Management*, 12(1), 12 - 29. UC Los Angeles: Retrieved from: http://escholarship.org/uc/item/4fv6g512

Byrne, B. (2007). Finally, a Strategic Way to Cut Unnecessary SKUs. *Strategy & Leadership, 35*(1), 30-35.

Cargille, B., Fry, C., & Raphel, A. (2005, June 2005). Managing product line complexity. *Operations Research and the Management Sciences (OR/MS) Today*, 32

Cohen, F. J. (2005). Macro trends in pharmaceutical innovation. *Nature Reviews Drug Discovery* , 4(1) 78-84.

Disteldorf, H., & Walberer, A. (2009). Controlling complexity in the chemical industry. Chicago, Illinois: A.T. Kearney.

Dosage form. (n.d.) *TheFreeDictionary.com*. (2011). Retrieved March 11 2011 from http://encyclopedia.thefreedictionary.com/dosage+form

Drive for 5 - communication document. (2010). Novartis Pharmaceuticals AG. Unpublished manuscript.

Höcht, C., & Thiem, A. (2009). IQP IAMD project: *SKU rationalization and pruning 2009 -* steering committee presentation. Unpublished internal Novartis document.

IMS health forecasts global pharmaceutical market growth of 5-7 percent in 2011, reaching $880 billion | press releases | press room Retrieved 3/13/2011, 2011, from http://www.imshealth.com/portal/site/imshealth/menuitem.a46c6d4df3db4b3d88f611019 418c22a/?vgnextoid=119717f27128b210VgnVCM100000ed152ca2RCRD&cpsextcurrch annel=1

Neway, J. O. (2003). PAT in a Connected Manufacturing Environment. *Pharmaceutical Technology,* 27(10), 46.

Nocera, J. (2006, July 1). *The New York Times.* Retrieved March 13, 2011, from Generic Drugs: The Window Has Loopholes : http://query.nytimes.com/gst/fullpage.html?res=9403E4DC1530F932A35754C0A9609C 8B63

Novartis International AG. (2010). *Novartis group annual report.* Basel, Switzerland: Novartis International AG.

Novartis pharmaceuticals corporate fact sheet. (2011). Retrieved March 7, 2011, from http://www.novartis.com/downloads/newsroom/corporate-fact-sheet/2a_Pharmaceuticals_EN.pdf

Ohno, T. (1988). *Toyota production system: Beyond large-scale production* (illustrated, reprint ed.) Productivity Press.

PhRMA Industry Profile. (2009). *www.pharma.com.* Retrieved March 10, 2011, from http://www.phrma.org/files/attachments/PhRMA%202009%20Profile%20FINAL.pdf

Ramdas, K. (2003), Managing product variety: an integrative review and research directions. *Production and Operations Management*, 12(1): 79–101. doi: 10.1111/j.1937-5956.2003.tb00199.x

Scheiter, S., Scheel, O., & Klink, G. (2007). *How much does complexity really cost?*. Dusseldorf, Germany: A.T. Kearney.

US House of Representatives. (2003, June 17). *www.govtrack.us.* Retrieved March 23, 2011, from H.R. 2491 [108th]: Greater Access to Affordable Pharmaceuticals Act: http://www.govtrack.us/congress/billtext.xpd?bill=h108-2491

Van Hoek, R., & Pegels, K. (2006, April 1, 2006). Growing by cutting SKUs at Clorox. *Harvard Business Review, 22.*

van Laar, T. (2007, May 31). *lgo.mit.edu.* Retrieved March 13, 2011, from alumni web seminars: https://lgosdm.mit.edu/VCSS/web_seminars/docs/vanlaar_041808.ppt

Zhang, J., & Krishna, A. (2007). Brand-level effects of stock keeping unit reductions. Journal of Marketing Research, XLIV (November 2007), 545-559.