OPERATIONAL EFFECTIVENESS OF CELLULOSE FIBERS BUSINESS OF Weyerhaeuser Company: CAN THE COST TRENDS OF 2005 BE REVERSED?

By

Brian Henderson
Certified General Accountant, 1988

PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF BUSINESS ADMINISTRATION

In the Faculty of Business Administration

Executive MBA

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SIMON FRASER UNIVERSITY

Fall 2006

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Approval

Name: Brian Henderson, C.G.A.

Degree: Master of Business Administration

Title of Project: Operational Effectiveness of Cellulose Fibers Business of Weyerhaeuser Company: Can the Cost Trends of 2005 be Reversed?

Supervisory Committee:

Dr. Andrew Gemino
Senior Supervisor
Associate Professor
Faculty of Business Administration

Dr. Mark Moore
Second Reader
Senior Lecturer
Faculty of Business Administration

Date Approved: December 8, 2006
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Abstract

The Cellulose Fibers Business of Weyerhaeuser Company sells market pulp produced at manufacturing facilities located in North America. The Company has sought to operate utilizing a differentiation strategy. A proportion of its product offering is ruled by a commodity market. The Company must recognize the need to compete on cost. This project defines a strategy for operational effectiveness improvements at Weyerhaeuser. This strategy impacts the notion of differentiated products that must be produced cost effectively.

The Company experienced unusual cost increases in 2005. Analysis in this paper found they resulted from weather related incidents and world economic events. Expectations of cost reductions may therefore be unrealistic. To regain some ground lost focus should be placed on areas where management can exert control. This analysis suggests Weyerhaeuser must lower it costs by reducing waste and maximize efficiency in the short term, and effective deployment of capital in the longer term.

KEY WORDS: Operational Effectiveness; Cost; Differentiation.
Dedication
To Wilana

Thank you for your continued love and support in this never ending quest.
Acknowledgements

I would like to thank Weyerhaeuser and Simon Fraser University for making this opportunity available. I would also like to thank the Kamloops EMBA Cohort: instructors for their guidance and knowledge, and students for their encouragement and friendship.
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1.0 Introduction

The global market pulp industry is very fragmented. Being fragmented means competition is fierce. Michael Porter suggests that fragmented industries are characterized not only by many competitors but also by generally weak bargaining position with suppliers and buyers. Marginal profitability can be the result. Success depends on a number of factors; one of the most important is cost.

This paper will recommend a competitive strategy for cost reduction for the Cellulose Fibers business of Weyerhaeuser Company Limited. Weyerhaeuser is a North American company with its head office located in Seattle, Washington. The Cellulose Fibers business produces and sells market pulp to customers around the world.

The paper begins with an introduction to Weyerhaeuser Company. The firm description begins with a brief history of the company, followed by an identification of ownership and control. Next we describe the corporate strategy (Weyerhaeuser Company). The firm (Cellulose Fibers Business) is described, including its strategic business units, key products and customer markets.

The market pulp industry will be examined to determine the nature of competition in the industry. We will define the industry we are examining by size and geography, as well as a listing of competitors. Porters’ 5 forces analysis is then used to understand the

---

1 Michael E. Porter; Competitive Strategy: techniques for analyzing industries and competitors: with a new introduction; The Free Press, 1998; pg 206
complexity of competition in the industry. Of particular importance to us in this paper are three specific factors: bargaining power of customers, as this will help us understand if cost increases can or should be passed on to customers; bargaining power of suppliers – can the cost increases be avoided through tactics in dealing with suppliers; and rivalry amongst competitors – are uncompetitive cost structures important.

Weyerhaeuser Company Cellulose Fibers Business will be studied to understand how it can compete in this industry. The supply chain is detailed to gain an understanding of the product flows. The value chain will also be examined to understand what functions or activities add value to the process. We then look at cost drivers through the value chain to ascertain what the key cost drivers of each value adding activity are.

Core competencies will be considered in order to understand how Weyerhaeuser competes in the market pulp industry and to analyze if there is a sustainable competitive advantage. The current strategy is also examined to see if the core competencies are being adequately exploited. This is followed by a financial performance analysis of both Weyerhaeuser Company as a whole and the Cellulose Fibers Business in particular to numerically support our position.

The cost structure of the production and delivery processes will be studied to understand the causes of cost escalations experienced during 2005. The cost components of these processes are then considered individually to develop recommendations for short and
long term strategies that support the strategic direction of the business and that will support continued participation and success in the market pulp industry.
2.0 The Challenge

The challenge this paper addresses is one of understanding the cost escalations experienced during 2005 that have reduced profitability for the company. During 2003 Weyerhaeuser' Cellulose Fibers Business experienced cost escalations of 3.3% in the components of cost to manufacture market pulp. In 2004, those costs increased a further 4.3%. In 2005 the cost to produce market pulp increased 11.3% from the previous year.

As the company expands its supply chains and begins supply chain collaboration, one message comes through loud and clear - customers expect to pay less for goods as time goes on. Not only does the end use customer expect to pay less, but the intermediary manufacturer also expects that over time costs will decrease. There is also a feeling among leadership at the senior level that costs need to be brought back in line, and that with better management cost to manufacture and deliver will drop. In order for that to happen, one must understand the drivers of the cost increases, and what can be done, both in the short and the long run to reduce costs and improve profitability.

One cannot hope to affect change or reverse trends without understanding the reasons for the trend. We will examine the components of cost to manufacture and deliver market pulp to gain an understanding of the causes for the cost escalations. By understanding the forces on supplier costs, we will speculate if the forces will change in the future. More
importantly, we will make recommendations to improve the cost structure of the business, both now and in the longer term.
3.0 Description of the Firm

3.1 History

Weyerhaeuser has grown steadily and remained a leader in the forest industry for over a century. In 1900, Frederick Weyerhaeuser and his partners bought 900,000 acres of forestland in the Pacific Northwest. Six years later, a sawmill that evolved into Willamette Industries was built in Dallas, Oregon. And in 1911, the roots of MacMillan Bloedel were planted with the purchase of 10,000 acres of forestland in British Columbia. MacMillan Bloedel and Willamette both later became part of Weyerhaeuser.

The Company added to its sawmills in 1929 by building the world’s largest sawmill at the time in Longview, Washington. Weyerhaeuser established the nation’s first certified tree farm in 1941 in southwest Washington and began practices that laid the foundation for future forest management. In the 1950s, Weyerhaeuser began making bleached paperboard and papers. Timberland was purchased in the southern United States, and in 1957 a merger established a national packaging business. Weyerhaeuser launched the High Yield Forestry program in 1967, helping make Weyerhaeuser managed forests among the most productive in the world. Their current approach combines the economic benefits of High Yield Forestry with a concern for habitat, wildlife, water quality and other forest values.

Weyerhaeuser expanded its Canadian operations in the 1960s with purchases of sawmills and Kamloops Pulp and Paper, and then continued its expansion in the southern United
States with mills and timberlands acquired from Dierks Forests. Weyerhaeuser acquired MacMillan Bloedel, Trus Joist International and Willamette between 1999 and 2002. These acquisitions put the company further on its way to becoming the global leader in forest products.

3.2 Weyerhaeuser and Cellulose Fibres
Weyerhaeuser Company is the second largest North American forest products company, with sales in excess of $22.6 billion US. It is organized into 5 segments: Timberlands; Wood Products (known as iLevel) which comprises industrial and residential building materials; Cellulose Fibers and White Papers; Containerboard Packaging and Recycling; and Real Estate. It currently employs approximately 53,600 people, and is ranked number 89 in the Fortune 200. In 2004, sales were broken down as 45% Wood Products; 5% Timberlands; 19% Cellulose Fibers and White Papers; 20% Containerboard, Packaging & Recycling; and 11% Real Estate. The profits for 2004 were 28% Timberlands; 36% Wood Products; 5% Cellulose Fibers and White Papers; 9% Containerboard, Packaging & Recycling; and 22% Real Estate.

The Cellulose Fibers Business is a component of the Cellulose Fibers and White Papers segment. Also included in this segment are Coated Groundwood and Liquid Packaging Board businesses. In 2004, the Cellulose Fibers business sales were 6.5% of the Weyerhaeuser Company total, or 36% of the Cellulose Fibers and Fine Papers segment

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2 http://www.weyerhaeuser/aboutus/ourhistory
total. Profits for 2004 were 12% of the corporate total, and 149% of the segment total (White Papers operated at a loss in 2004).

Weyerhaeuser produces bleached chemical cellulose fibers which are used in a variety of applications ranging from papermaking and absorbent products to other applications in the specialty cellulose area, such as making cellulose based textiles, construction materials and fillers for plastic molding compound products.  

3.3 Ownership and control

Weyerhaeuser is a public company, traded on the New York and Toronto stock exchanges. 81% of its shares are held by institutional and mutual fund owners. 507 different institutions hold its shares. The top institutional holder is Franklin Resources Inc., which holds approximately $1.1 billion worth of stock, approximately 7.3%.  

3.4 Corporate strategy

Weyerhaeuser's vision is to become the best forest products company in the world and a global leader among all industries. Key components of the corporate strategy are:

- Make the “Roadmap for Success” the Weyerhaeuser way of doing business and build a customer-focused future. Elements of the Roadmap  

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3 http://www.weyerhaeuser.com/ourbusinesses/pulppaperpackaging/pulp/aboutpulp
4 http://finance.yahoo.com/q/mh?s=wy
include achieving superior safety performance, implementing reliable manufacturing processes, and developing a diverse and high-performing workforce.

- Lead the industry in sustainable forest management and manufacturing excellence.
- Focus efforts on large-scale businesses that can be leaders in their defined markets; seek global opportunities for them.
- Increase efficiency by leveraging scale using common processes.\(^5\)

### 3.5 Overview of Major Business Segments

Weyerhaeuser is an international forest products company that operates in five major business segments that make products fundamental to human needs in a socially and environmentally responsible matter.

- **Cellulose Fiber and White Papers** businesses help people communicate by producing a variety of papers and the cellulose fiber to produce these papers. They also make cellulose fiber for absorbent products and specialty uses such as photographic film.
- **Containerboard Packaging and Recycling** business produces the paper, boxes and bags that move products from factory to store to consumer, then recover and recycle used paper and make new paper products.

\(^5\)http://www.weyerhaeuser.com/aboutus/ourvision/
• Real Estate businesses provide shelter by building homes and developing land.
• Wood Products businesses manufacture and distribute the building materials –
dimension lumber, engineered lumber, panels and appearance wood – for homes
and other structures.
• Timberlands business sustains it all by growing and harvesting trees in a
renewable cycle.\textsuperscript{6}

The table below shows corporate revenues by business for the years 2003 through 2005.
It also shows contribution to earnings for the various sectors of Weyerhaeuser. In 2005,
Cellulose Fibers Business was responsible for 6% of total revenues for the Company.
Their earnings were zero for the year (the $444 million loss is attributable to the Fine
Papers Business).

\textsuperscript{6} http://www.weyerhaeuser.com/aboutus/weyerhaeuserinbrief.pdf
Table 1  Corporate Businesses and Products

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<tr>
<th>Corporate Businesses and Products</th>
<th>Revenue $000’s US</th>
<th>2005</th>
<th>2004</th>
<th>2003</th>
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<td></td>
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<td>Veneer</td>
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<tr>
<td>Engineered I-Joists</td>
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<td>3%</td>
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<tr>
<td>Engineered Solid Section</td>
<td></td>
<td>4%</td>
<td>3%</td>
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<td>Logs</td>
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<td>Other Products</td>
<td></td>
<td>5%</td>
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<td>Cellulose Fibers &amp; White Papers</td>
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<td>7%</td>
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<tr>
<td>White Papers</td>
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<td>11%</td>
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<tr>
<td>Coated Groundwood</td>
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<td>Liquid Packaging</td>
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<td>Other Products</td>
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<td>Containerboard, Packaging &amp; Recycling</td>
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<td>Containerboard</td>
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<td>Packaging</td>
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<td>16%</td>
<td>16%</td>
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<td>Recycling</td>
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<td>Kraftbags &amp; Sacks</td>
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<td>Other Products</td>
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<td>1%</td>
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<tr>
<td>Westwood Shipping &amp; Other</td>
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<table>
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<th>2004</th>
<th>2003</th>
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<td>Wood Products</td>
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<tr>
<td>Cellulose Fibers &amp; White Paper</td>
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<tr>
<td>Containerboard Packaging &amp; Recycling</td>
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<tr>
<td>Real Estate</td>
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<tr>
<td>Westwood Shipping</td>
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Source: Table by Author, data from Weyerhaeuser Company Annual Report
3.6 Cellulose Fibers Products, Customers, and Suppliers

This section describes the Cellulose Fibers mill system (including the market pulp available from the integrated paper mills), that produces and sells between 2.5MM ADMT and 2.8 MM ADMT annually. This represents between 4 and 5 percent of the total pulp market.

The business is separated into three Strategic Business Units: Absorbents, Papergrade, and Specialty. Figure 1 indicates the end use markets for each of the Strategic Business Units. The Absorbents SBU includes both Absorbents and Bulking families. Specialty Paper, Print Writing and Tissue Towel all belong to the Papergrade SBU. Specialties SBU consists of all others.
Absorbent fibers are usually produced in roll form and shipped to manufacturers of sanitary disposable products, who then disintegrate the thick sheets into individual fibers to give their products bulk, softness and high absorbency. Untreated absorbent products are used primarily in applications such as baby diapers, feminine hygiene and bed pads. They are for use in higher powered fiberization equipment and provide maximum absorbency, wicking (the absorbent ability to pull moisture away through capillary action) and distribution of liquid. These grades are usually made of southern softwood fibers and are sold in roll form. Treated absorbent products are used in the same applications as untreated. They include a debonding agent which enhances fiberization,
thus these grades are often used on machinery where low energy use in fiberization is critical.\(^7\)

Papergrade fiber products are usually produced in bale form and shipped to manufacturers of papergrade products such as printing papers, writing papers and tissue. Northern softwood fibers are excellent carrier fibers. These grades are characterized by thin walled, flexible fibers. They are easily refined and exhibit superior reinforcement properties in papermaking applications. Southern kraft softwood fibers are longer, have thicker walls and greater fiber stiffness than northern softwoods. Southern softwood also provides excellent reinforcement for papermaking applications.\(^8\)

Weyerhaeuser manufactures a broad range of specialty cellulose fibers supporting diverse end use applications, including:

- Textiles and non-wovens
- Pet care
- Ethers and carboxymethylcellulose (CMC)
- Thickening agents
- Specialty packaging
- Technical specialty applications
- Proprietary high-bulking fibers.

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\(^7\) http://www.weyerhaeuser.com/ourbusinesses/pulppaperpkging/pulp/productsandservices/fluffabsorbent.asp

\(^8\) http://www.weyerhaeuser.com/ourbusinesses/pulppaperpkging/pulp/productsandservices/papergrade.asp
Cross linked fiber (X-Link) is an proprietary engineered fiber used for filtration, personal care products, meat pads, multi-ply board and tissue and towel products.\(^9\)

The Cellulose Fibers manufacturing group is comprised of five mills whose only products are market pulp. These mills are located in Port Wentworth, Georgia; Flint River, Georgia; New Bern, North Carolina; Kamloops, British Columbia; and Grande Prairie, Alberta. A sixth mill which produced dissolving pulps located in Cosmopolis, Washington, has recently been permanently closed. A seventh mill produces primarily market pulp is located in Columbus, Mississippi. Also located on this site is a Coated Groundwood Paper mill. The eighth mill in the Cellulose Fibers manufacturing system is the Columbus Modified Fiber mill, also located in Columbus, Mississippi. The business also sells excess pulp on the open market that is not used in the paper making process from Weyerhaeuser paper mills located in Dryden, Ontario; Prince Albert, Saskatchewan; Bennetsville, South Carolina; Hawesville, Kentucky; and Plymouth, North Carolina.

\(^9\) http://www.weyerhaeuser.com/ourbusinesses/pulppaperpckging/pulp/productsandservices/specialtycellulos e.asp
Source: Weyerhaeuser internal documents

Figure 2 lists which Cellulose Fibers manufacturing mills produce which products. The mill in Columbus is located in eastern Mississippi near the Tennessee-Tombigbee waterway and is served by its own short line railroad. The mill produces papergrade, untreated and treated absorbent grades. The Columbus Modified Fiber facility uses a patented flash drying process to produce X-Link fibers. The mill in Flint River, Georgia produces untreated and treated absorbents, as well as textile/non-woven products. The Port Wentworth mill is located at the Port of Savannah in Georgia, one of the largest


forest products port on the U.S. east coast. This location gives the mill a competitive cost and logistical advantage for meeting export customer needs.\textsuperscript{12} Port Wentworth produces both baled papergrade products and untreated absorbent products. New Bern mill was among the first pulp mills in the United States to use oxygen bleaching, eliminating the need for bleaching with elemental chlorine. This has been followed by an upgrade to reduce the amount of water used by the mill, thus reducing effluents by almost half and decreasing odiferous gasses.\textsuperscript{13} They produce both untreated and treated absorbent grades of pulp.

The Grande Prairie mill is located in the Peace River country of northern Alberta, and is surrounded by boreal and sub-alpine forests. Their softwood product has strong, fine, flexible fibers produced from species such as spruce and pine and is valued for its uniformity, strength and purity by papermakers around the world.\textsuperscript{14} The Kamloops pulp mill began operation in 1965 on its A Mill, and in 1972 in B Mill. B mill produces a fully bleached softwood kraft grade manufactured using selected residual chips from sawmills in the interior of British Columbia. The primary wood species for this grade are White/Englemann spruce and lodgepole pine. The fiber length and low coarseness result in excellent sheet strength and exceptional surface uniformity and smoothness. A mill manufactures a pulp from 100% softwood residuals and a controlled blend of mini chips,
wood shavings and screened sawdust. 15B mill also produces a semi-bleached interior Douglas fir product used in manufacturing fiber cement.

4.0 Industry and External Analysis

4.1 Industry Definition:

The global market pulp industry is worth approximately $25 billion annually. Market pulp is manufactured in over 25 countries around the world. The pulp industry is very fragmented as no competitor has more than 6% of market share\(^{16}\). The pulp industry is also very "international" as over 80% of all market pulp is exported from the country of manufacture. Over 51% of all market pulp travels across an ocean\(^{17}\). Some of the companies that compete in the industry include: Weyerhaeuser, Canfor, Norske Canada, Pope & Talbot, Alberta Pacific, Mercer, Tembec, West Fraser, Bowater, Domtar, Irving, UPM-Kymmene, Metsa Botnia, Stora Enso, Sodra, Billerud, M-Real, Rottneros, Ilim Pulp, Arauco, Sappi, CHH, Boise, International Paper, Koch Cellulose, Smurfit Stone, Buckeye, APP, April, Aracruz, and CMPC. Due to consolidations over the past 5 years, this list is substantially shorter than it was previously; however, the industry remains fragmented.

The average annual growth rate of industry sales from 1995 to 2005 was 3.5%\(^{18}\). In 2005 compared to 2004, the growth rate dropped to 2.2%\(^{19}\). The customers for market pulp are mainly paper and paper board makers. The paper grouping includes: newsprint, printing and writing paper, tissue and sanitary paper products, unbleached kraft paper, and other

\(^{16}\) Salman Partners; PPPC International Pulp Week Customer Forum; May 2006
\(^{17}\) Weyerhaeuser internal presentation document
\(^{18}\) Hawkins Wright; Outlook for Market Pulp, April 2006; pg. 5
\(^{19}\) ibid
specialty packaging and industrial paper products. Paperboard includes linerboard and corrugated medium, solid bleached board, and other recycled paperboard²⁰.

Market pulp consists primarily of hardwood and softwood kraft pulp, deinked market pulp based on recycled fiber, and relatively small amounts of bleached chemithermomechanical market pulp (CTMP) and cotton linter pulp. These commodities are produced generally for use in papermaking. Market pulp also includes dissolving pulp (or so-called special alpha pulp), which is also sold in the global pulp market but typically used in processes other than papermaking, such as in production of synthetic rayon and other cellulose polymers²¹.

4.2 Five Factor Analyses

4.2.1 Threat of Entry
The threat of entry is high. A barrier to entry is the capital cost of entering the industry. A greenfield scale plant would cost in the neighborhood of $1 billion US. However, while the capital costs are high, the industry has added supply side capacity. Some companies are building scale greenfield projects in areas of the world where fiber grows quickly and labor is inexpensive in an attempt to gain competitive advantage through low cost strategy. These companies are not new to the industry, but are Scandinavian or South American companies who already compete in market pulp.

²¹ Ibid.
Two factors which support the high threat of entry are low switching costs and minimal brand equity. Switching costs are relatively low. Once a papermaker or diaper maker knows how to run a certain fiber on his machine, they tend to want to continue to use that fiber. However, they are also extremely cost sensitive, so when their converting margins shrink, they are not averse to learning to use other, more inexpensive fibers. Brand equity also has some value, but it is related more to the technical support a company can provide with its products than simply its products. A papermaker or diaper maker will value the technical expertise a company can provide in helping understand how to set up the paper machine to optimize productivity, but due to price sensitivity and low switching costs they will try to force the price down or go to another supplier.

4.2.2 Threat of Substitutes
The threat of substitute products is low. There have been attempts at producing pulp from materials other than cellulose, but these have been unsuccessful at penetrating the market for making paper or other products. Substitution in this industry really only occurs between types of pulp, such as between hardwood and softwood, or northern softwood and southern softwood. The distinguishing features are the characteristics of the fiber; however paper makers continue to learn how to make paper with different types of fiber, as the most important criteria in their purchase decision is price.

4.2.3 Bargaining Power of Customers
All factors point to this effect being high. Market pulp is basically a homogeneous product. Pulp can be classified by its end use, such as paper grade, absorbents, or specialty pulps. However, there is not much difference between northern and southern
paper grade pulp, and interchangeability is high. The most important criteria to a buyer is price, and the buyer will learn how to make paper out of whatever pulps they choose to buy. A cost to switch between competitors is low. There is no special equipment required to use one competitors’ pulp over others. Pulp is packaged in two primary forms, dried into sheets and baled, or dried into a continuous sheet and rolled. Paper makers are set up to handle either one form or the other. Some pulp manufacturers can ship in either form, but usually a single method is used in a mill. What influences a buyer to drop a competitor are service attributes rather than product attributes such as inconsistency of product, unreliable delivery, erroneous documentation, etc.

There is information asymmetry in the industry. Pricing is published, formally announced and varies only by region (i.e. North America, Asia, and Europe may have different published prices). These prices typically don’t vary by more than 10%, but are meant to reflect the economic realities of that region. Buyers then negotiate discounts from published price with competitors, often playing one competitor against others. Buyers often enter into annual contracts with competitors, obtaining higher discounts for assurance of business. Manufacturers tend to be somewhat risk averse, as fixed costs are high and they cannot afford idle capacity. For those who do not enter into annual contracts, or have capacity over and above contracted volumes, there is a spot market where brokers peddle pulp at the going rate. Spot market activity (volumes and prices) are monitored frequently by both competitors and buyers, and published price changes are usually the result of what is happening in the spot market.
There is a large degree of backward integration in the industry. It was estimated that more than 85% of US pulping capacity was integrated with paper and paper board facilities in 2000, and less than 15% was offered for sale as market pulp\textsuperscript{22}. While the same assumption cannot be made world wide, these statistics provide an indication of the extent of backward integration of the customers. Paper markets are over supplied. Demand for paper is price sensitive. Higher paper prices ultimately limit demand. This transfers to market pulp. Pulp buyers are price sensitive, driven by paper converting margins giving customers extremely high bargaining power.

4.2.4 Bargaining Power of Suppliers
The power of suppliers is high. The main inputs to market pulp manufacture are fiber, labor, energy, chemicals, and transportation.

4.2.4.1 Fiber
There are minimal substitute inputs for fiber. Fiber supply is geographic. Manufacturers set up mill locations close to fiber supply, as transportation costs are a very large percentage of costs. Bargaining power of fiber suppliers increases when demand for the fiber is high, and decreases when there is excess supply for the given demand. In most markets where Cellulose Fibers operates, supply and demand are balanced. Emerging issues that affect the supply/demand balance are capacity increases of Oriented Strand Board manufacturing facilities in Georgia, which is putting upward pressure on fiber prices, and the slowdown in housing starts which is forcing some lumber manufacturers in Canada to take market downtime, reducing the volume of residual chips on the market.

\textsuperscript{22} USDA; United States Paper, Paperboard, and Market Pulp Capacity Trends by Process and Location; 1970 – 2000; Peter J. Ince; pg. 28
A factor that reduces the bargaining power of fiber suppliers is concentration. If a pulp manufacturer uses residual chips, the fiber supply tends to come from a number of different suppliers, usually unrelated. Likewise, if a pulp manufacturer uses standing timber, if purchased from the private market, there tends to be numerous small suppliers (typically land owners, ranchers and farmers).

4.2.4.2 Labor
There are minimal substitute inputs for labor. While not overly labor intensive, pulp manufacture requires people to run the machines, as well as maintain the machines, and engineers to trouble shoot the machines. An average mill in North America or Europe that was built after the war produces about 300,000 admnt of pulp annually. It employs between 280 and 300 employees, and has a productivity ratio of about 3 tons per day per employee. New, scale mills being built in South America today will produce approximately 1,000,000 admnt of pulp annually. They would also employ between 280 and 300 employees, having a productivity ratio of 10 tpd/employee. There is supplier concentration in the labor market. Trade unions represent a large portion of the workforce, and where trade unions do not exist, companies tend to treat their employees in a similar fashion regarding wages, benefits, and working conditions.

4.2.4.3 Energy
Pulp mills are large consumers of electricity to run their machines, and heating fuel to create steam. Some are capable of generating enough electricity to be self sufficient, but still require heating fuels to generate steam. There is supplier concentration in the energy field, thus the bargaining power of these suppliers is high.
4.2.4.4 Chemicals
Similar to energy, pulp mills are large consumers of chemicals for cooking and bleaching their product. These chemicals are not available just anywhere or from anyone. Chemical suppliers are also concentrated, and thus have bargaining power.

4.2.4.5 Transportation
Bulk cellulose fibers, either in bale or roll form, are not easy to transport. They are difficult to handle due to their size and weight. As mentioned earlier, 80% of market pulp is exported from the country of manufacture. It is shipped either by truck, rail, or marine. More often than not, all three modes of transportation are utilized in getting product from manufacturer to customer. Concentration of suppliers is a major factor in high bargaining power for suppliers of transportation. There are not many marine transportation companies. There are not many railways, and usually only one or two when it comes to local service. There are many trucking companies, however service agreements between truckers and both railways and marine companies have concentrated the suppliers for this mode of transportation as well.

One factor that reduces the bargaining power of suppliers is minimal threat of forward integration. Some fiber supplier integration exists due to the regional characteristics and manufacturers risk aversion (securing supply through contracts or sawmill ownership). The odd pulp mill is owned by the employees, typically if unsuccessful and on its last legs. Otherwise, no utility, chemical supplier, or transportation company owns (or would want to own) a pulp mill. An additional factor that lowers bargaining power is the low degree of differentiation of the supplier inputs. A gigajoule of gas is a gigajoule of gas, a
pound of chlorine dioxide is a pound of chlorine dioxide, and a work hour is a work hour, no matter where in the world you are.

4.2.5 Rivalry Amongst Competitors
Rivalry amongst competitors is high. As stated earlier, it is a fragmented industry. Pulp is a commodity. No one has control over price.

There is over capacity in the industry. Current estimates are that annual demand is approximately 48.5 million air dry metric tones\textsuperscript{23}, and supply is estimated at 51.5 million admt\textsuperscript{24}. Over the next 5 years, demand is expected to grow 1.1\% per year (almost all of it from China), to reach a demand number of 51.2 million admt in 2010\textsuperscript{25}. Capacity increases (either announced or under construction) will average 1 million tons per year over the next 5 years, bringing capacity to about 56.5 million admt in 2010. Most of the capacity increases will come on line in 2007 and 2008.

There are huge exit barriers, especially in Canada and Europe. The costs of closure include social obligations and recognition of the human cost to long serving workers and management and the local communities. Severance costs tend to be high, and depend on labor contracts, pension plan obligations, and local laws. There are potential environmental obligations and clean up costs. A company closing a pulp mill, if

\textsuperscript{23} Hawkins Wright; Outlook for Market Pulp, April, 2006; pg. 11
\textsuperscript{24} Ibid, pg. 13
\textsuperscript{25} Ibid, pg. 11
integrated, most likely will damage relationships with federal and local governments. It is estimated that closure costs in Canada range anywhere from $30 to $100 million\textsuperscript{26}. It is sometimes cheaper to run below cash costs than to bite the bullet and take capacity out of the system.

Profitability in the market pulp industry is bounded on the top side by paper markets (when input costs are too high for paper makers, production drops, reducing pulp demand). Profitability is also bounded on the bottom side by cash costs required to keep producing ("on the ropes" producers who need to continue to operate for cash flow, or are unwilling to shut down). Exchange rates also have a bit to play, as the US dollar tends to be the currency of choice for the industry. As the US dollar weakens, US producers become more profitable. However if the local currency strengthens against the US dollar, the cost to manufacture increases and margins erode (as is currently the case with Canadian manufacturers who are uncompetitive).

The players in the market tend to compete on price. Price competition is more likely when:

- There are high fixed & sunk costs (high exit costs).
- Excess capacity exists.
- There are a large number of competitors.
- There is a mature product/slow growth.

\textsuperscript{26} Hawkins Wright; Outlook for Market Pulp, April 2006; pg. 16
• Products are not differentiated.

• Prices and terms of sales are not observable.

All of these factors are present in the pulp market.

4.2.6 Industry Attractiveness

The market pulp industry is not very attractive at present. It is likely that the threat of substitutes will remain low. The industry will continue in a state of over capacity for the foreseeable future, therefore there is no need for paper makers to look to substitution products for cellulose fibers. The bargaining power of customers will continue to stay high, if not intensify. Paper demand will continue to shrink due to electronic substitution. The homogeneity of pulp will not change much. Paper manufacturers will be driven by price, as their converting margins will determine whether they run their machines or not. Some paper assets will most like change hands as integrated manufacturers look at their asset portfolios. This could create consolidation of customers, intensifying the bargaining power of customers.

The bargaining power of suppliers will continue to be high. Supplier concentration will not subside. Although not as powerful or as radical as they have been in the past, trade unions will continue to exist and represent workers in the pulp industry. Utilities have been de-regulated for a number of years now, so there is little reason to expect much change in suppliers of electricity and gas. Likewise, the concentration of chemical companies and transportation suppliers will not see significant change. Competitors in
the industry will have to attempt to find customers closer to home if they want to regain 
power from transportation providers.

The threat of entry will remain high. The supply side of the industry continues to add 
capacity in an attempt to win the lowest cost race. Papermakers, faced with rising input 
costs and flat returns, will find ways to improve quality with lower cost fibers. Rivalry 
amongst existing competitors will continue to be fierce. Industry growth will remain flat. 
Capacity will increase. Prices will fall. Exit costs will remain high at best, if not escalate. 
Whatever rents exist today will dissipate. Over the next 5 years, demand is expected to 
grow 1.1% per year (almost all of it from China), to reach a demand number of 51.2 
million admt in 2010. The Chinese are the most price dependant buyers in the world. 
Their buying patterns send signals to the rest of the industry indicating potential pricing 
changes. Consolidation will continue in the industry, but probably not through asset 
transfers. Old high cost capacity will close down in North America and Western Europe, 
to be replaced with scale mills in South America and Asia. Capacity increases (either 
anounced or under construction) will average 1 million tons per year over the next 5 
years, bringing capacity to about 56.5 million admt in 2010. Most of the capacity 
increases will come on line in 2007 and 2008. The capacity is being built in Latin 
America and Asia and is primarily hardwood. These areas are most economical to serve 
the Chinese. Throughout the world, paper makers will continue to learn how to replace 
higher cost softwood with lower cost hardwood. A large question mark from a supply 
standpoint relates to meeting increasing Chinese demand. The largest untapped fiber 
source in the world is close to China. Russian fiber is entering the market slowly.
Infrastructure issues will eventually be resolved. If the political climate becomes conducive to out of country manufacturers building plants in Russia, then we will see more capacity come into play in the industry. This is already starting to happen, and International Paper is currently building a plant in Russia.

In the short term it will likely become increasingly difficult for competitors to raise capital, especially sustaining capital. Maintaining a pulp mill is a capital intensive effort. Integrated forest products companies may only fund businesses within their portfolios that return the cost of capital. I expect we will see a “sweating of assets” as mills are run as long as possible without capital to maintain or incrementally improve operations. For independent operators, financial markets have already made it difficult to obtain capital for sustaining operations.

Another factor that will influence the market pulp industry in the short term is exchange rates. The US dollar has weakened against global currencies. This has made US producers more cost competitive. European buyers and sellers are now doing business in Euros rather than US dollars. This has buffered them from exchange rate fluctuations. However, the rest of the world has not been as fortunate. South American mills have seen their cost advantage erode somewhat. Canadian suppliers continue to suffer with less competitive cost structures.
There are other issues that affect Canadian producers, and their ability to continue to compete. The newest mills in Canada are in the 30–40 year old range. These mills are equipped with recovery boilers that are integral to pulp production. Recovery boilers burn lignin from black liquor and create steam used in the pulping process as well as to generate electricity. This process is vital for chemical recovery. The typical useful life of a recovery boiler is 40 years. The cost to re-life a boiler is approximately $100 million, and the cost to replace a boiler is in the $250 million range. As these boilers reach the end of their economic life, manufacturers are faced with a decision. Re-life or replace the boiler, which in effect commits the company to staying in the industry for another 20–40 years; or spend the $30 million–$100 million that it will cost to shut down the mill. This is a difficult and costly decision.

As companies approach this point in their pulp mills’ life, management will likely attempt to create other alternatives. One such alternative would be to sell the mill. However, a buyer will quickly determine what the near term capital outlay expectation will be and figure it into the purchase price. That would lead to the next alternative, which would be to give the pulp mill away. One such transaction has recently taken place in Ontario, where Neenah Paper has transferred the ownership of a shutdown pulp mill to Buchanan Lumber. Buchanan is attempting to negotiate lower wages with the mills’ union, and if successful, will start up the mill. If unsuccessful, ownership reverts back to Neenah Paper. The union has also stated that it would be interested in assuming ownership of the mill should Buchanan not take over.
A third alternative for management to avoid the re-life/shutdown decision is to roll the assets into a registered income trust fund. Canfor has recently announced their intent to do this with their three pulp mills located in Prince George. This is a way for a manufacturer to generate cash from the assets, but not walk away from the ultimate environmental responsibilities of the mills.

Over the longer term, a differentiation strategy is a must if a company owns and operates an existing plant. I would expect a number of mills in North America to move away from paper to markets such as clothing, food grade fibers, filters, absorbent products, insulation, fiber cement, and so on. There are two paths to differentiation. One is to find new products that existing customers will value. An example is for a company to understand their customers’ end use, and then create products that make it easier or less costly to make. Another example is to find new uses for existing cellulose fibers products, which entails finding new customers.

Pulp producers in commodity paper grade products will likely only be able to survive in the long term if they have scale advantages. To be a cost leader will be difficult, most likely impossible if located in North America. Over capacity can be expected to reduce the longer term selling price of paper grade pulps to $500/admt. A mill built in South America might produce 1 million admt of pulp per year and would cost $1 billion. In order to provide the investor a 12% return, profit needs to be $120 million per year, or $120/admt. If we assume transportation costs range $80 - $100/admt, that leaves $300/admt to cover all costs. Manufacturing costs per admt would have to be in the
range of $250 - $280. Benchmark manufacturing costs in North America today are in the $350 - $400 range. The longer term alternatives for this industry are to develop significant scale economy; differentiate into new markets; or die.
5.0 Internal Characteristics Analysis

5.1 Value Chain Analysis

Figure 3  Pulpmill Flowchart

Source: Figure by Author

The supply chain for Cellulose Fibers is similar to other forest products firms. Raw material can come into the mill as whole logs, sawmill residual or as chips. Whole logs are run through a debarker to remove all the bark from the tree. The bark is collected and burned as fuel in the power boilers. The debarked whole logs are then chipped into uniform chips to facilitate the cooking process.
Pulping is a process of cooking wood chips at a certain temperature, under certain pressure and in the presence of chemicals. The wood portion consists of fibers held together by a natural glue called lignin. The objective of this process is to remove the lignin from the chip so it transforms from wood to individual fibers. Cooking transforms the chips into pulp, a watery slurry of limp fibers, somewhat resembling a large batch of oatmeal. After cooking, the “pulp” is washed to remove chemicals and any remaining lignin. To minimize environmental impact and maximize the efficiency of the operation, the cooking chemicals are diverted to a recovery cycle where they are reconstituted and used again.

Bleaching is a multiphase process. Each mill has small variations on this process, but the end result will be to turn the brown fiber into a white fiber (90 – 95 brightness). The pulp is exposed to a bleaching agent for a set amount of time, and then goes through a neutralizing stage, then a bleaching stage. The process continues over and over. All of Weyerhaeuser bleaching processes are free of elemental chlorine. The pulp is washed between bleaching stages. The purpose of the multiple phases is to achieve a certain level of whiteness without degrading the desirable properties of the fibers. The slurry is now pumped to either a storage tank or to a headbox, where it is formed into a pulp sheet.

The headbox contains about 99% water and 1% pulp fibers. Its job is to spray this very watery mixture onto a moving, porous screen that is moving at about 300 – 500 ft/minute and is drawing the moisture out of the slurry. The sheet (about 25% fibers and 75%
water) goes through a series of rollers to extract still more water, then it proceeds into a dryer. A formed sheet comes out the other end.

The pulp is now either formed into a 15 or 20 ton roll of pulp and moved to a rewinder for cutting into rolls or it goes directly from the dryer to a layboy. The rewinder is used for cutting the jumbo into smaller, customer specific rolls. Absorbent product producers who fiberize the pulp with a hammermill use rolls at their plants. A layboy chops the sheet into uniform rectangular sheets, which are used in stacks (bales) by paper producers.27

5.2 Value Chain

Figure 4 Value Chain Model

Source: Figure by Author

The value chain as described above in Figure 4 is slightly different than Porters' generic model. Although iterative, the value chain begins with Research & Development. As Sales & Marketing and Technical Support work with customers to find new products, ideas are sent to R&D for development and testing. Successful new products that reach commercialization are then offered to customers for sale. Once orders are taken or supply agreements are reached, raw materials are purchased.

Due to the complexity of the pulping process, mills run around the clock. It takes on average 36+ hours from the time the fiber enters the beginning of the process until it reaches a finished state. It is very costly and inefficient to shut the mill for any period of time. As a result, the primary focus of the Sales group is to sell out each of the mills. To do this, they closely couple customers with mills. This creates havoc in the system when a mill experiences reliability issues, as shipments are missed and customers suffer. To compensate, buffers are built into the system. On average, 10% - 15% of annual production is in inventory at any given time.

The final stage in the value chain is technical support. This is not only "after the sales service", but occurs throughout the value delivery model. The support is all encompassing, from chemistry and fiber morphology to machine setup and run ability.

5.3 Cost Drivers Through the Value Chain:
Each step in the value chain has costs associated with it. To prepare a cost reduction plan requires a list of the various cost drivers. Under each step below, the key cost drivers are listed.

Research & Development: This would include development and refinement of new products as well as improvements to existing processes.

- Number of scientists.
- Number of new ideas.
- Number of products being developed.
• Technical complexity of products under development.

Sales & Marketing: This is primarily a sales function, as minimal marketing activity occurs (the pulp market is a business to business market versus retail, therefore no advertising or promotion takes place).

• Number of sales regions.
• Size of the sales force.
• Amount of travel.
• Method of sales force compensation.

Purchasing: This includes purchasing of raw materials (fiber, chemicals), operating supplies, as well as repair materials, parts and supplies.

• Bargaining power of buyers.
• Governmental regulations.
• Supplier location.

Raw Material Inventories:

• Storage facilities (size).
• Spoilage.

Cooking & Bleaching/Differentiation Activities/Finishing: This is basically the manufacturing process. Costs for the manufacturing process are analyzed by natural
expense: fiber, chemicals, maintenance, labor, energy, depreciation, taxes and insurance, and others.

- Plant scale.
- Type of facilities (process technology).
- Maintenance status.
- Uptime/capacity utilization.

Finished Goods Inventories/Transportation: Significant money is spent in this value chain segment. An integrated planning and control model will help eliminate waste in this segment.

- Location.
- Effective de-coupling of supply and demand.
- Use of nominal routes.
- Predictability of demand.

Technical Support: The costs for this segment tend to be blended into the Sales and Marketing area. It may become prudent to segregate these costs in the future if this technical support is a key to the differentiation strategy.

- Number of technical experts.
- Technical expertise of the customer.

Firm Infrastructure/Financial Management/Human Resource Management/Sales & Operations Planning Management:
- Increase efficiency by leveraging scale using common processes.
- Number of employees.
6.0 Sustainability Analysis

6.1 Core Competencies – Sustainable Competitive Advantage

Current core competencies include technical support and research and development. Future competencies would include reliable delivery. Strategic assets would include intellectual property of the various newly developed products.

Cellulose Fibers core competencies are not product based, as pulp is basically a commodity product. The core competencies are the Research and Development group of scientists who lead the development of new products and the technical services group who provide coaching and direction to the customer in areas ranging from chemistry and fiber morphology to machine setup and run ability. Weyerhaeuser currently commands a premium price on its differentiated and specialty products.

An element that is becoming a core competency is reliable delivery. Weyerhaeuser is currently implementing a set of processes that will smooth out the information flow back in its supply chains. This integrated planning and control model removes variability from both supply and demand, ensuring on time delivery of quality products to customers. Although only in place a short period of time, customers are already commenting on the improvements they have seen.

These core competencies are replicable in other companies, so they are not a sustainable source of competitive advantage over time. Weyerhaeuser will have a sustainable
competitive advantage through intellectual properties by patenting its new products and/or the manufacturing processes to make them. Certain IP are already in place, and the trend must continue. Weyerhaeuser must increase the number of new product ideas that enter the NPD funnel, and accelerate development to get more new products to market in the future.
7.0 Current Strategy

The Cellulose Fibers Business strategy is to create value by executing along three interdependent dimensions:

- **Market and product development**
  - Grow existing attractive positions in targeted markets, products and customers.
  - Explore and develop new markets.
  - Develop, invest and commercialize new products in market spaces with higher growth and margin potential.

- **Customer focus and engagement**
  - Strengthen revenue and profit by developing new/improved direct customer relationships and market positions.
  - Enhance position by creating strategic partnerships with selected customers.

- **Operational effectiveness**
  - Implement “Class A” supply chain management
    - Sales & Operational Planning
    - Integrated Planning & Execution Process System
  - Substantially improve costs throughout the supply chain consistent with customer/product mix.
  - Align entire organization to execute these three dimensions.\(^{28}\)

\(^{28}\) Cellulose Fibers “Navigating Through A Sea of Change” February 2006 business meeting documents
Specifically, the Cellulose Fibers Business of Weyerhaeuser employs a differentiation strategy. The business is separated into 3 Strategic Business Units: Papergrade, Absorbents, and Specialty. Each SBU is further segregated into non-differentiated products, differentiated products, and new products.

Figure 5  Strategic Business Units (SBUs)

The strategic direction, as indicated by the arrows in the diagram, is to move from Papergrade to Absorbents to Specialty, and to move within the SBU from non-differentiated products to differentiated to new products. The definition of new products is "all differentiated products commercial less than 5 years plus all pre-commercial..."
products”. Differentiated products are “products that are not considered commodity due to unique product attributes”. Non-differentiated products are all others (commodities).

Figure 6 Volume Breakdown by SBU

![Volume Breakdown by SBU](image)

Source: Weyerhaeuser internal documents

Figure 6 depicts the volumes of product that are currently manufactured in the business by grouping. Non-differentiated (commodity) absorbent and paper grades comprise 80% of current output. Differentiated products therefore make up the other 20%. The bulk of production is papergrade, whose fiber qualities do not lend themselves to differentiated products today. The second largest component is non-differentiated absorbents which are constrained by demand more than fiber qualities. In traditional commodity markets demand must be created for differentiated products. Such a large component of output still in commodity products highlights the need for continued cost control.
## 8.0 Financial Performance Analysis

### 8.1 Ratio analysis

![Weyerhaeuser Company Ratio Pyramid](image)

Figure 7  Weyerhaeuser Company Ratio Pyramid

<table>
<thead>
<tr>
<th>Ratio</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Asset Leverage</td>
<td>2.66</td>
<td>2.73</td>
<td>4.26</td>
<td>4.02</td>
<td>3.24</td>
<td>2.88</td>
</tr>
<tr>
<td>Return on Equity</td>
<td>12.3</td>
<td>5.29</td>
<td>3.64</td>
<td>3.9</td>
<td>13.9</td>
<td>7.48</td>
</tr>
<tr>
<td>Debt to Equity</td>
<td>1.66</td>
<td>1.73</td>
<td>3.26</td>
<td>3.02</td>
<td>2.24</td>
<td>1.88</td>
</tr>
<tr>
<td>Operating Profit Margin</td>
<td>10.2</td>
<td>5.39</td>
<td>4.69</td>
<td>9.88</td>
<td>6.86</td>
<td></td>
</tr>
<tr>
<td>Capital Asset Turnover</td>
<td>2.9</td>
<td>2.43</td>
<td>1.3</td>
<td>1.39</td>
<td>1.53</td>
<td></td>
</tr>
<tr>
<td>Gross Profit Margin</td>
<td>24.6</td>
<td>21.7</td>
<td>21.5</td>
<td>24.9</td>
<td>23.1</td>
<td></td>
</tr>
<tr>
<td>Other Costs Margin</td>
<td>9.91</td>
<td>10.5</td>
<td>9.22</td>
<td>9.09</td>
<td>7.47</td>
<td>10.6</td>
</tr>
<tr>
<td>Selling Costs Margin</td>
<td>2.37</td>
<td>2.61</td>
<td>2.43</td>
<td>2.15</td>
<td>2.73</td>
<td></td>
</tr>
<tr>
<td>R&amp;D Costs Margin</td>
<td>0.36</td>
<td>0.29</td>
<td>0.26</td>
<td>0.24</td>
<td>0.27</td>
<td></td>
</tr>
<tr>
<td>USA Costs Margin</td>
<td>3.92</td>
<td>4.66</td>
<td>4.57</td>
<td>4.78</td>
<td>4.21</td>
<td>4.43</td>
</tr>
<tr>
<td>Amortization Margin</td>
<td>5.38</td>
<td>6.97</td>
<td>6.55</td>
<td>6.58</td>
<td>6.77</td>
<td>5.85</td>
</tr>
<tr>
<td>Receivables Days</td>
<td>39.5</td>
<td>39.0</td>
<td>36.5</td>
<td>33.9</td>
<td>36.4</td>
<td>37</td>
</tr>
<tr>
<td>Payables Days</td>
<td>39.5</td>
<td>38.8</td>
<td>33.2</td>
<td>36.4</td>
<td>37.7</td>
<td></td>
</tr>
<tr>
<td>Inventory Days</td>
<td>92.1</td>
<td>95.4</td>
<td>82.2</td>
<td>84.4</td>
<td>86.8</td>
<td></td>
</tr>
<tr>
<td>Quick Ratio</td>
<td>0.86</td>
<td>0.91</td>
<td>0.74</td>
<td>0.87</td>
<td>1.09</td>
<td>1.19</td>
</tr>
</tbody>
</table>

Figure by Author, data from Weyerhaeuser Annual Reports
Figure 8  Cellulose Fibers Business Ratio Pyramid

Weyerhaeuser Company Limited
Cellulose Fibers
Ratio Pyramid

Return on Equity
2000 2001 2002 2003 2004 2005
19.3 4.06 0.95 2.03 7.67 -0.8

ROA
2000 2001 2002 2003 2004 2005
18.4 4.10 0.96 2.05 7.72 -0.8

Operating Profit Margin
Gross Profit Margin
2000 2001 2002 2003 2004 2005
20.7 16.5 13.7 10.6 8.1 1.1
Net Profit Margin
2000 2001 2002 2003 2004 2005
1.63 1.27 0.99 0.76 0.52

Other Costs Margin
2000 2001 2002 2003 2004 2005
39.9 19.9 14.6 15.7 19.9 13.3

Capital Asset Turnover
2000 2001 2002 2003 2004 2005
1.03 0.81 0.79 0.75 0.78 0.79

Total Asset Turnover
2000 2001 2002 2003 2004 2005
1.03 0.81 0.65 0.64 0.81 0.75

Inventory Days
2000 2001 2002 2003 2004 2005
50.1 50.0 51.3 61.2 55.9 46.9

Payables Days
2000 2001 2002 2003 2004 2005
50.1 56.7 49.0 71.2 37.2 36.9

Receivables Days
2000 2001 2002 2003 2004 2005
40.3 36.9 45.2 39.6 40.9

Current Ratio
2000 2001 2002 2003 2004 2005
2.2 1.75 2.28 1.62 2.87 2.89

Quick Ratio
2000 2001 2002 2003 2004 2005
1.12 0.77 1.12 0.78 1.41 1.39

Figure by Author, data from Weyerhaeuser internal documents
Weyerhaeuser had a strong balance sheet in 2000, took on over $6 billion in debt in 2002 for the acquisition of Willamette, and has been working at paying down debt since. This can be seen in a number of ratios (Weyerhaeuser Ration Pyramid). The Debt/Equity ration jumps from 1.7 in 2000 to 3.3 in 2002. The company has been able to reduce that number down to 1.9 in 2005. The asset leverage ratio climbs from 2.7 in 2000 to 4.3 in 2002, and has since returned to 2.9 in 2005. Also, the interest coverage ratio was at 4.0 in 2000, dropped to 1.4 in 2002, and has climbed back to 2.4 in 2005. The cyclic effects of the industry can also be seen in the ratios. Return on Equity (ROE) drops from 12% in 2000 to 3.6% in 2002, then returns to 14% in 2004. ROE for 2005 is 7.5%. Return on Net Assets (RONA) was 10% in 2000 and 2004, hovered around 5% in 2001, 2002 and 2003, and just below 7% in 2005.

Weyerhaeuser businesses are very capital intensive. The capital asset turnover ratio ranges between 1.8 in 2000 and 1.2 in 2003. In 2005, it is 1.5. Being capital intensive means running the mills at full capacity in order to manage costs. This can be seen in the inventory days number that ranges between 84 and 98, and doesn’t significantly change with the cycle. Gross margins were 25% and 24% at the top of the cycle, and 21% in the trough. In 2005, the margins were 23%, significantly affected by the hurricane season in the southern United Stated, which drove up energy and chemical costs substantially. Operating profit margin is also negatively affected by mill closure announcements as the company attempts to take capacity out of the system. This can be seen in the Other Costs Margin ratio shooting up to 10.6% in 2005 from 7.5% in 2004.
For the Cellulose Fibers Business, the cyclicality of the industry can be seen in both ROE, which fluctuates from 18% in 2000 to 1% in 2002 and back to 7.7% in 2004. RONA results are identical. Capital asset turnover rate is 1 at the top of the cycle, drops to 0.8 or slightly less at the bottom of the cycle, then back to 1. Inventory days have declined slightly from a high of 62 in 2001 to approximately 56 days. The business is not very cash effective, as payable days have declined to 36 days, while receivables have held constant at around 40 days.

Capital asset turnover dropped only slightly from 2004 to 2005. We can assume that there were not significant changes in capital assets; therefore sales were slightly lower in 2005 than 2004.

The issue for the business can be found in the margin ratios. Operating Profit Margin dropped from 9.2% in 2004 to negative 1.1% in 2005. Drilling down, we see that Gross Profit Margin dropped 6.5% in that period. Other Costs Margin increased by 2.6% in 2005, primarily a function of increased amortization due to the announcement of a mill closure to take place in 2006, and increased General & Administrative costs allocation to the businesses of 1.5%. It is this drop in gross profit margin that we will investigate further.
9.0 Input Costs – Recent Trends

Increases in Cost of Goods Sold substantially affected Cellulose Fibers Business results in 2005. The strengthening of the Canadian dollar caused the cost to manufacture for Canadian operations to increase substantially. Costs of fiber, chemicals, maintenance, energy and transportation were all affected in a negative way. The destructive forces of the 2005 hurricane season (particularly hurricanes Katrina and Rita) had far reaching effects. Also affecting the oil price is the Middle East conflict.

Figure 9  Cost as a Percentage of Sales

The chart above shows both Cost of Goods Sold and Sales, General & Administrative costs for the years 2000 through 2005 as a percent of sales. Cost of Goods Sold was 93% of sales in both 2002 and 2003, and then dropped to 87% in 2004. In 2005 it increased 8% to 95% of sales. SG&A costs were 5% of sales in 2005, leaving zero profit for the business.
The distribution of expenses has not changed substantially between 2003 and 2005. Fiber costs continue to be the largest expense at 27% of total cost to manufacture. Transportation costs (freight out) are the next largest component at 15%, followed by Wages at 14% and Chemicals at 11%. They are then followed by Maintenance and Depreciation at 9%, Energy at 7%, Other costs at 6%, and Property Taxes and Insurance at 1%.

Other than Fiber, there is no one category that either makes or breaks the business on manufacturing cost. Rather, all require specific attention on an ongoing basis.
Figure 11 shows the increases by cost category the business experienced between 2004 and 2005. Foreign exchange refers to how the Canadian exchange rate increased the cost to produce an air dry metric ton (admt) in Canada when expressed in US dollars. Production refers to the quantity of tons of pulp produced from one year to the other. All others refer to the amount per admt spent in each cost category in relation to the amount spent in the previous year.

9.1 Exchange:

Weyerhaeuser expresses its financial statements in US dollars. The Canadian economy has been as strong as the American economy over the past few years. This is in part due to oil production in Northern Alberta. The Canadian economy performed well in 2005.
The US dollar depreciated both against the Euro and the Canadian dollar. The Canadian dollar was worth $0.77 US dollars at the beginning of 2004. At the beginning of 2005, the loonie was worth $0.83, and at the end of 2005 $0.86. Weyerhaeuser has 2 market pulp manufacturing facilities operating in Canada; Kamloops B.C. and Grande Prairie, AB. For those facilities, a 1 penny change in exchange rate is worth approximately $4.5 million per year. In other words, if the Canadian dollar was worth $0.77 average the previous year, and averaged $0.78 in the current year, cost to manufacture pulp expressed in US dollars for these two mills would be $4.5 million more. Exchange rates forecasts from Weyerhaeuser internal economists have the Canadian Dollar moving to $0.98 by the end of 2008.

9.2 Productivity:
Productivity (the amount of pulp produced in the current year vs. the amount produced in the previous year) dipped slightly in 2005 compared to 2004. There were no asset changes in 2005, but capital installations interrupted production for a period of time in 2005, resulting in less production for the system overall.

9.3 Fiber:
While it could be argued that fiber markets are localized and not related to each other, the commonality is the harvesting and transportation all require diesel fuel. In the months following Hurricane Rita, diesel fuel prices rose substantially due to refinery capacity interruptions caused by the hurricane.

53
9.4 Chemicals:
One of the major chemicals used in the pulping process is caustic, or Sodium Hydroxide.

Figure 12 Caustic Selling Price

Source: Figure by author, data from Oxychem website

The above chart shows caustic price increases for 2004 and 2005. These prices are those received by the supplier, so in addition the business paid a freight component that was subject to fuel surcharges for increased diesel prices.

9.5 Energy:
Pulpmills are large energy consumers. Natural gas supply has been deregulated for some time. Pricing is volatile based on economic factors and weather trends. The 2005 hurricanes not only interrupted gasoline and diesel production, but also natural gas.

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production. Natural gas and #6 fuel oil are consumed in large boilers in pulpmills to produce steam. The steam is used both in the manufacture of pulp and the production of electricity. Many mills have assets available to produce their own electricity, but usually only a portion of what they consume. The table below shows examples of cost increases experienced during 2005 at some of the mills.

<table>
<thead>
<tr>
<th>Natural Gas</th>
<th>2004</th>
<th>2005</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columbus</td>
<td>6.86</td>
<td>9.07</td>
<td>32%</td>
</tr>
<tr>
<td>Grande Prairie</td>
<td>6.28</td>
<td>7.43</td>
<td>18%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electricity</th>
<th>2004</th>
<th>2005</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columbus</td>
<td>33.69</td>
<td>39.98</td>
<td>19%</td>
</tr>
<tr>
<td>New Bern</td>
<td>64.08</td>
<td>72.04</td>
<td>12%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fuel Oil</th>
<th>2004</th>
<th>2005</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port Wentworth</td>
<td>0.946</td>
<td>1.629</td>
<td>72%</td>
</tr>
<tr>
<td>New Bern</td>
<td>27.19</td>
<td>37.95</td>
<td>40%</td>
</tr>
</tbody>
</table>

Source: Table by Author, data from Weyerhaeuser internal documents

9.6 Other Costs:
The Other Costs buckets tend to contain costs that range from operational cleanup costs (hydroblasting, which is typically contracted) to operating supplies (wires and felts used on the machines for supporting and drying a sheet of pulp). This should be characterized as a miscellaneous grouping.

9.7 Depreciation:
During 2005 the business made two strategic decisions. One was to close down an aging sulfite pulpmill located in Cosmopolis, Washington. The other was to build a new
recovery boiler ($175 million asset) in Grande Prairie, Alberta. Both of these decisions triggered additional depreciation expenses compared to 2004.

9.8 **Transportation (Freight Out):**
Pulp is a bulk material, and shipping is costly. Trucks, trains and ships all are used to transport pulp. All are powered by diesel fuel. All were affected by price increases and passed on their additional costs through fuel surcharges.
10.0 Solution analysis – Strategic Alternatives

If the Cellulose Fibers Business were to compete on cost alone, it would have to build a scale mill. The asset base of the business is currently about $2.5 billion. Building a scale mill would increase the output by 40%, as well as increasing the asset base by 40%. Being such a small business within Weyerhaeuser (the Cellulose Fibers Business contributed 6% of revenues in 2005) it is unlikely that the Company would consider building a greenfield plant. Even if differentiation as a strategy is the correct direction, cost must still be controlled.

Currency exchange rates will continue to fluctuate. A weakening US dollar allows the mills located in the US to better compete worldwide. The mills located in Canada see the opposite effect. Their costs, when expressed in US dollars, escalate. One strategy is to hedge. This occurs currently within Weyerhaeuser, but the gains/losses on these hedges are not reflected in the Business manufacturing costs. With the annual spend for the two mills located in Canada in excess of $450 million annually it would take a substantial hedge to protect Weyerhaeuser.

Another strategy to protect against fluctuating currency exchange rates would be to find a customer for Canadian made pulp in Canada, and transact in Canadian dollars. This is a simple but effective way of eliminating exchange as a factor. A third strategy would be exit manufacturing in Canada by selling or closing down the mills. Weyerhaeuser recently announce that it had reached an agreement to sell one of it’s pulpmills in Canada.
along with its Paper Business to Domtar. Weyerhaeuser will continue to be exposed to currency exchange fluctuations, but only to half the extent than prior to the divestiture.

The Business has experienced decreased productivity in each of the past two years as a direct result of two poorly executed capital project installations. Weyerhaeuser Engineering Services acted as the main contractor on both of the installations. These poor installations resulted in months of reduced productivity after startup for the mills involved, and endless hours of troubleshooting to find and fix problems. This performance must improve. Capital investment for productivity improvements in an over supplied market must also be questioned. Over investment leads to over capacity, this leads to low rents.

The biggest lever for reducing costs is improved operational effectiveness. Waste reduction in the productivity context means time. Manufacturing excellence translates to increasing mill uptime to maximize productivity. This is achieved through preventive, predictive maintenance (PPM) practices versus breakdown maintenance (only fix it when it breaks). A component of PPM is Cause for Loss, a process of understanding productivity losses and action steps to avoid repetition. These must be in place and well understood on the operating floor. Another data set that can be used to inform operators of the financial implications of their actions is a daily profit and loss that is shared throughout the mill. It is usually an eye opener for most mill employees when they understand that financially it takes one hour of production to offset one minute of
downtime. Facts and data such as this must be shared with the operating floor to instill a sense of urgency.

The forces of supply and demand will determine fiber prices. Waste reduction here means finding ways of utilizing unwanted, discarded, or lower priced fibers. One example is finding ways to utilize pin chips from sawmills that are currently burned as sawdust or hog fuel. Another is to maximize digester throughput and yield. These types of strategies will help reduce fiber costs.

There are pockets of excellence in the Business when it comes to chemical costs. It is important that this excellence be shared amongst the mills. Operating personnel from low cost mills must share their experience with the rest of the organization. This can be done through mill visits and one on one discussion, or workshop type activities. Another strategy to reduce chemical cost is to maximize recovery of byproducts of the pulping process. Tall oil, soap and turpentine all can be captured and sold, with the revenues used to offset chemical costs. This form of waste reduction can be very lucrative.

Another waste reduction activity that pertains to chemicals has to do with operating efficiency and giving the customer what they are paying for. At mills where both Absorbent and Papergrade products are produced, it is imperative that additional bleaching chemicals are turned off when not required. If a Papergrade product requires bleaching to an 89 brightness specification, and an Absorbents product does not require that high a bleaching brightness, the chemicals must be reduced or turned off when not
needed. All too often the adjustment is not made, and product is produced to a higher specification than is required.

Energy costs can also be controlled and reduced by paying attention to details. Large steam producing boilers are run with multiple fuels. Maximizing burning of the lowest cost fuel can save millions of dollars annually. Mills also must maximize their production of electricity. Selling excess electricity can offset, reduce, or eliminate energy costs in areas where permitted. Investing in energy producing assets may be a strategy worth investigating further should capital become available.

Maintenance costs, although not one where large increases were experienced in 2005 is an area worth investigating. Maintenance costs comprise approximately 10% of the cost to manufacture. This maintenance cost is variable by mill, depending on age of the equipment, amount of sustaining capital invested over the years, and the way the assets have been operated and maintained in the past. Depending on the configuration of the assets, mills will take planned maintenance outages throughout the year where they take a portion of the mill out of operation for a short period of time to perform maintenance activities. Typically the mill is completely shut down once per year for annual maintenance for a period ranging from 7 to 20 days. During this time, pressure vessels are inspected and required maintenance is undertaken. As much as 40% of the annual maintenance budget could be spent during this annual maintenance outage. One opportunity for reducing costs is to challenge the assumptions that drive the once per year shut decision. There are legislative and insurance requirements that must be taken into
If the time between annual shuts could be extended 3 or 6 months, it could provide cost savings provided mill uptime did not suffer for lack of maintenance.

Transportation costs may be reduced by finding customers closer to the manufacturing facilities. Another tactic could be to change pricing policies and let the customer bear the risk of freight cost changes. This may be difficult to implement unless the entire industry was willing to make the change. A third way to reduce transportation costs is as a result of supply chain benefits. By buffering the variability of supply and demand, the Business will enjoy more reliable delivery. There will be less expediting (pre-empting planned activities to satisfy emergent issues) as there would be fewer emergencies. Use of nominal routes (assigned modes and carriers based on best cost and service parameters to meet customer requirements) will allow better negotiations and lower contracted rates. Purposeful warehousing by using pipeline management and buffer replenishment processes would also reduce warehousing costs.
11.0 Recommendations

The market pulp industry is very fragmented. No competitor has more that 6% of market share. Competitors have weak bargaining positions with both suppliers and buyers. Costs escalate while customers have expectations of reduced prices. In 2005 the devastation from hurricanes in the southern United States emphasized the North American pulp manufacturers' dependence of fossil fuels, primarily diesel fuel, fuel oil and natural gas. Weyerhaeuser' cost to produce market pulp increased over 11% from the prior year. The Cellulose Fibers Business is small compared to other Weyerhaeuser businesses. As with most businesses, capital is a scarce resource within Weyerhaeuser. As stated in Section 4, it is likely that the market pulp industry will continue in a state of over capacity for the foreseeable future.

The previous section identified five alternatives: 1) build a scale mill; 2) hedge Canadian dollars; 3) sell Canadian production in Canada using Canadian dollars; 4) use capital for productivity improvements; 5) improve operational effectiveness.

Alternatives 1, 2 and 4 all require capital and should be discarded as viable options in the short term. Option 3 could be used to reduce exchange rate risk, however this alternative addresses only on of the cost factors to a limited degree. This leaves us with improving operational effectiveness as a viable option for developing a cost reduction strategy. The Cellulose Fibers Business strategy of differentiation should allow it to compete
successfully in the market pulp industry into the future if a strategy for cost reduction can be put into place.

11.1 Near Term No/Low Capital Solutions:

The Cellulose Fibers Business must prove to Weyerhaeuser upper management in a 1 to 2 year timeframe that it is capable of earning cost of capital to remain in the portfolio and qualify for reinvestment. A three step approach should be employed to reduce costs. First, upper management should challenge local mill teams to reduce costs and increase uptime to certain mutually agreed upon targets (specific for each mill). These can be annual measurements to fit with current reporting requirements. The mills should be given autonomy to set the targets, as well as the action plans to achieve them. The operational effectiveness alternatives outlined in the previous section could serve as a starting point for brainstorming of ideas. The action plans, or cost reduction plans, should be shared with upper management as well as all other mills to facilitate transferring of good ideas. The action plan should include the cost area targeted, the action to be taken, who is responsible, and when it is to be completed. Progress towards the goals and action plan status should be reviewed monthly.

A second step is to share best practices amongst the mills. This step begins with a monthly cost report showing the cost components for each mill. It should be in graphical form to facilitate easy identification of trends. The graphs for all mills should be distributed amongst the mills, as well as upper management. If there are large
discrepancies in a cost component from mill to mill, communication can occur to understand if there are best practices that can be shared. This would eventually lead to better operating strategies amongst all of the mills.

The third step relates to the integrated planning and control model being implemented. Improved communications between demand and supply leads to better planning and execution. Reducing variability in the supply chain leads to less expediting, which equates to reduced transportation and warehousing costs. Respecting the time fences in the master scheduling processes also reduces the variability. Transportation costs can be further reduced by utilizing nominal routes.

11.2 Longer Term Capital Solutions

In the longer term, capital could be used to modify manufacturing processes that could lead to lower costs. Weyerhaeuser Cellulose Fibers will be faced with 3 recovery boiler decisions in the next 5 to 10 years. Should one or more of those boilers be replaced, it makes sense to consider incremental capital to install equipment to generate electricity from the available black liquor, even if it exceeds the mills needs (sell electricity on the open market). It also makes sense to consider incremental capital that would marginally increase productivity by removing bottlenecks from the mill; especially if not all 3 mills are granted new boilers. The increased productivity would be offset by the loss of production from the mill(s) that would be shut down if a boiler replacement was not approved. Capital could also be utilized to increase other byproduct revenues, such as tall oil or soap recovery.
Survival of the Cellulose Fibers business hinges on its strategy of differentiation and its ability to reduce costs and increase profitability. Earning the cost of capital through the market cycle should gain the confidence of senior management to invest capital in the longer term. If that level of profitability cannot be met, it will be difficult to justify ongoing investment, and could mean being dropped from the Weyerhaeuser portfolio.
12.0 Summary

During 2005, Weyerhaeuser’ Cellulose Fibers Business experienced an 11% increase in its cost to manufacture and deliver market pulp. The business RONA dropped from 7.8% in 2004 to -0.8% in 2005. To determine if Weyerhaeuser can reverse this result, we examined the industry, the business, and its strategy.

We defined the market pulp industry as a $25 billion global industry. It is a fragmented industry, with no competitor holding more than 6% market share. We examined the 5 forces of competitiveness and found the market pulp industry to be a difficult place to compete. The bargaining power of customers and suppliers are high, and fierce rivalry among firms exists.

We studied the Cellulose Fibers business to understand how it competes in this industry. This analysis showed that the Cellulose Fibers business has a value chain that supports their differentiation strategy. They have core competencies in research and development and technical services, and are becoming competent in reliable delivery. Their sustainable competitive advantage will become intellectual property through patenting new products.

We examined the cost drivers of the value chain and found the main reasons for the cost escalation experienced in 2005. The devastation caused by the active hurricane season in the southern United States emphasized the business’ reliance on fossil fuels, primarily fuel oil, diesel oil, and natural gas. These costs may never return to historical levels.
This analysis suggested that a differentiation strategy with a focus on cost would be the best strategy for Weyerhaeuser Company Limited Cellulose Fibers Business. Capital for investment in a scale mill required to compete on cost is not likely to come from the corporation. What capital does come available should be used for Recovery Boiler replacements (if the asset continues to fit the strategy at decision point time) and new product development. Use of capital to increase productivity should only be employed if the market can support the additional capacity.

The Business and the mills must therefore focus on operational effectiveness and paying attention to the basics in order to achieve manufacturing excellence. They must push for world class uptime, and employ maintenance strategies to support that. With such high fixed costs, the mills must be producing products that generate revenue as many minutes of the day as possible. This is not restricted to pulp, but includes by products such as tall oil, soap, turpentine, electricity, and any other by product that may have value. The elimination of waste must be an ongoing daily pursuit.

The Integrated Planning and Control model used to balance supply with demand and reduce variability in the supply chain will benefit the company going forward. The reduction of variability will reduce waste and take costs out of both the manufacturing and delivery systems. The improved planning processes should also improve mill performance by increasing uptime with the elimination of emergencies.
For Cellulose Fibers to remain in the Weyerhaeuser portfolio, let alone a successful competitor in the market pulp industry, it must execute its differentiation strategy with the lowest possible manufacturing and delivery costs. This analysis has shown that the effective reduction of costs provides the best opportunity for success for Cellulose Fibers given the conditions currently experienced within the industry. The short term and long term recommendations provided in this paper that focus on cost reduction provide guidance on how to make this effort as effective as possible.
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