The Adaptive Management Framework™ for Strategic Planning at Monsanto

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ABSTRACT

This structured project attempts to consider an alternative approach to strategic business planning, namely the "Adaptive Management Framework™ . " This strategic planning framework endeavors to address the challenges of an unstable global marketplace.

The Adaptive Management Framework™ looks to respond to an uncertain, complex world by creating a business planning model that: 1) simplifies the marketplace through extensive segmentation; 2) supplements forecasting with flexibility; and 3) provides a cohesive mechanism whereby a firm can continually muster a quick response to opportunities that surface from industries that are in transition. In essence, the Adaptive Management Framework™ seeks to link customer based strategic positioning with robust, responsive execution processes.

Thesis Supervisor: Arnoldo C. Hax
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Chapter 1

Introduction

In today's business climate, the rate of change within a marketplace is phenomenal. Where once a company could take a number of years to carefully target a new market opportunity, spend time developing its long range business strategy, enter the market, and then execute, in today's fast pace climate companies must be capable of reacting in a fraction of the time. This quickening in pace has been driven by change in the nature of the world's marketplace as well as factor conditions affecting competition. First and foremost is that the world has shrunk. Today's large companies must face the reality of a global market with its risk of international competition and its opportunities for expanded demand. New competitors, that were previously well below a company's immediate horizon, can enter the local marketplace with little warning of approach. Instead of once knowing those businesses within the local market, now a company can be faced with competitive product offerings from businesses operating from abroad...virtual strangers in the neighborhood! While this presents significant new risks to a company, it also opens up new opportunities for the company for the very same reasons. No longer limited to the local, domestic marketplace, a business today has the opportunity to quickly move into foreign markets which have the potential to greatly augment demand. Understanding whether to utilize a global product strategy or a localized product approach demands an understanding of the consumers as well as the existing participants in the new environment. Just gaining such an initial understanding

is not sufficient as a new entrant must have the ability to project a local presence in the new arena in order to continually monitor the rapidly changing conditions at ground zero level. Complexity and pace begins to increase on an exponential scale as do infrastructural demands.

What has changed in the last two decades that has caused the world to shrink and the pace of business to quicken? Primarily it has been the advent of communication technology that has permitted two things to occur. First, it has allowed consumers in virtually every country to witness product offerings in other markets external to their own. This in itself provides for market pull on products thus allowing for demand growth. In concert with this phenomena, world wide communications greatly assists a company to rapidly project a business presence outside its domestic base of operations. Coupled with rapid transit, electronic media allows a company to investigate and enter a new marketplace in a fraction of the time today that was previously required. In addition to providing for rapid market access and increased demand, communication technology has also altered basic factor conditions within countries. Foremost is that the workforce has become better educated and much more mobile. Product also flows more rapidly across country borders today as a result of enhanced communications. Electronic surveillance of demand and pricing coupled with greatly facilitated logistics through electronic media provide for inter-country movement of goods and services. Today, an order can be placed electronically from the United States with a firm in Korea which can marshal the goods from locations around the world and literally ship the product to the

customer within 24 hours! The world has shrunk! Many natural barriers to entry have fallen and what were once considered long-term sustainable advantages have disappeared.

How does a firm in this rapid, ever changing, global marketplace develop its strategic business plan? It would certainly seem logical that, as the marketplace has changed so drastically, so too must the approaches change that a company employs in its strategic planning process. This leads to the premise of this thesis: **In order for a company to be successful in today's business environment, it must utilize flexible strategic planning tools that permit adaptability and rapid response to an unstable business climate.** These tools must include a strategic planning business model which allows the firm to determine its course of action within a product market as well as flexible business processes that can react to a changing environment. Historical strategic planning models are no longer sufficient tools as they are too inflexible, narrowly focused, and often do not link a firm's long-term planning process into their near term business processes. This disconnect between a strategic plan and implementation within the functional processes (e.g., marketing, operations, product development) normally results in the functions attempting to respond to rapidly changing environmental conditions without the discipline of feedback mechanisms to make adjustments to the enterprise's strategic plan. The result is a strategic plan that becomes a "dusty after-thought" instead of the foundational tool that sets and continually refines the course of action for the business. Without this, not only do the functions become disconnected from the strategic plan but, there is a real risk that the functions ultimately become disconnected from each other.

This thesis is part of a structured thesis project under the tutelage of Professor Arnoldo Hax. The structured project attempts to consider an alternative approach to strategic business planning, namely the Adaptive Management Framework™. This strategic planning framework endeavors to address the challenges of an unstable marketplace, namely:

- Changing market structure....industry is no longer the central focus,
- Differences in global, regional, local demand and competition,
- Ever growing customer expectations,
- Loss of barriers to entry and an increase in barriers to exit,
- Growing strength of world-wide distribution channels,
- Homogenization of brands, and
- Transformation of human resources in the aftermath of restructuring.

The Adaptive Management Framework™ looks to respond to an uncertain, complex world by creating a business planning model that: 1) simplifies the market place through extensive segmentation; 2) supplements forecasting with flexibility; and 3) provides a cohesive mechanism whereby a firm can continually muster a quick response to opportunities that surface from industries that are in transition. In essence, the Adaptive Management Framework™ seeks to link customer based strategic positioning with robust, responsive execution processes. These execution processes include the firm's ability to be innovative, to properly target their customers, and to drive efficiencies across their total operations.

As part of Professor Hax's structured project, this thesis specifically attempts to apply the Adaptive Management Framework™ to the Monsanto Company. With its headquarters in St. Louis, Missouri, Monsanto had been an industry leader in the chemicals and agricultural markets since its inception in 1901. In the late 1970s, faced with a sharp increase in the cost and supply volatility of petrochemical raw materials as well as a growing number of overseas competitors, Monsanto choose to diversify by entering the emerging biotechnology marketplace. To fuel its growth, a number of small, entrepreneurial companies were acquired, all with particular strengths and in many cases, proprietary technologies in the biotechnology field. Over the next decade, the company would invest in excess of $1B in order to build its capability and establish proprietary product technologies. In 1994, CEO Robert Shapiro established a vision for Monsanto that would transform the company from its chemicals business heritage into a life science company engaged in supplying products that would sustain and enhance the quality of human life in the 21st century. In October, 1996 Monsanto announced a major company reorganization which included spinning off its chemical divisions and formally establishing its life science enterprises.

Within this new business scope, Monsanto has identified the nutritional foods and nutraceutical market as a targeted area of future growth. The value proposition is to develop food products and special ingredients that provide healthy, medicinal qualities to consumers, by leveraging their technical capabilities in biotechnology, agriculture, and pharmaceuticals. Within the overall nutritional foods/nutraceutical industry, Monsanto

has identified the cardiovascular market as a likely segment for entry. The focus of this thesis is to apply the Adaptive Management Framework™ to Monsanto's possible participation in the cardiovascular health market. How should the company initially position itself and its products and services to compete in the cardiovascular market? What does the value chain look like and who are Monsanto's likely competitors and complementors? Are the strategic execution processes at Monsanto adequately linked and able to respond to this new, volatile market? These are a few of the key questions that we endeavor to address within the context of the Adaptive Management Framework™. In order to do so, a combination of investigative tools were employed built around the concepts depicted in Figure 1.1 below.

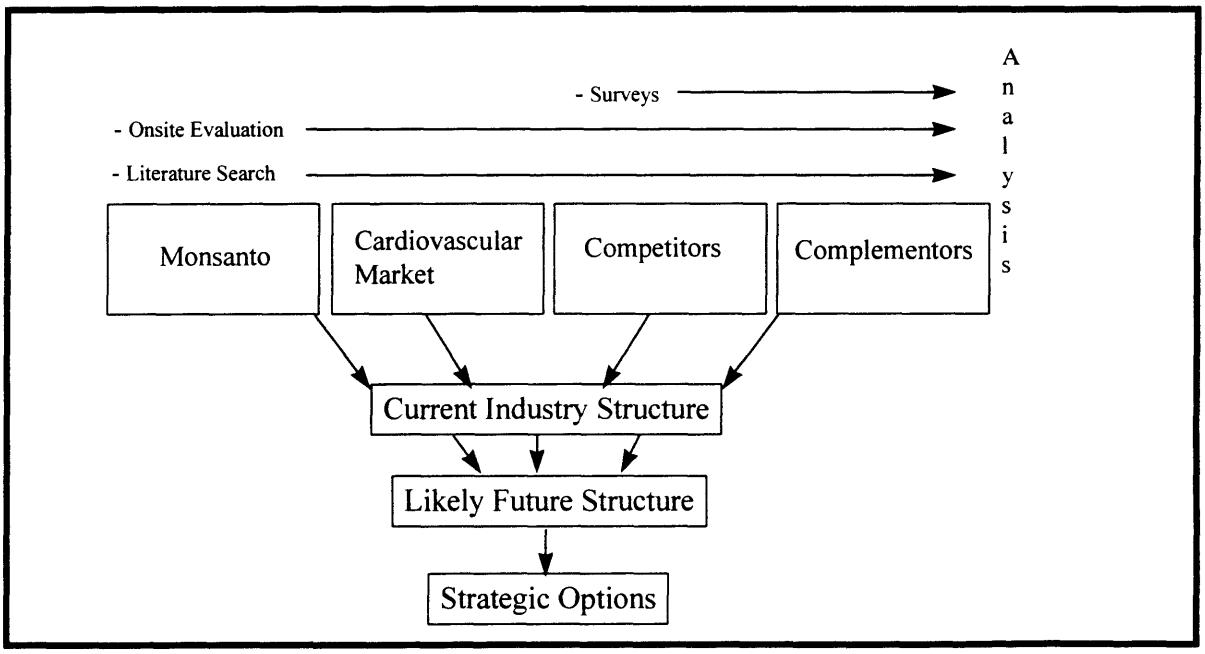


Figure 1.1 - *Approach*

The thesis is structured as follows:

Chapter 2 ..... Takes a historical perspective on strategic planning and how the Adaptive Management Framework™ enhances a firm's ability to effectively position its businesses.

Chapter 3 ... Provides the reader with an in-depth look at the Monsanto Company; its history, its recent decision to become a life science company, and its unique competencies that should be enablers for success in the cardiovascular market.

Chapter 4 ... Segments the cardiovascular market in order to provide a clear perspective on the customers, their needs, and expected delivery mechanisms.

Chapter 5 ... Identifies probable sources of emerging competition and takes a closer look at five companies who are expected to participate in the nutraceutical market for cardiovascular health.

Chapter 6 ... Considers the concept of complementors and the opportunities for Monsanto to leverage key relationships.

Chapter 7 ... Defines Monsanto's options to position their cardiovascular products and services. It also provides commentary as to their strategic execution processes. The narrative attempts to summarize the application of the Adaptive Management Framework™ to this targeted, emerging business.

Appendices... There are 10 appendices attached to this thesis. These appendices provide additional data that is referenced throughout the chapters. Of particular note is Appendix 10 which contains a proposal for a set of application tools that could be used in

evaluating a firm's business within the context of the Adaptive Management Framework™.

It is appropriate to point out that the data contained herein was drawn totally from public sources. Monsanto did not provide any detailed information as to their evaluation of the cardiovascular market nor their business plans for participation. As a result, any conclusions reached in this thesis represents the opinion of the authors or other referenced sources.

Chapter 2

Strategic Planning

2.0 Overview

The foremost direction-setting question senior managers at Monsanto or any other company need to ask is "What is our business and how should we position ourselves to be competitive?" Developing a carefully reasoned answer to this question pushes managers to consider what the organization's business strategy should be and to develop a clearer vision of where the organization needs to be headed over the next 5 to 10 years.

In this chapter, we will discuss historical perspectives to Strategic Planning. We will then consider the Adaptive Management Framework™ as a new, alternative approach to strategic positioning of a firm's business.

Strategic planning and business policy is a fast-developing field of study. It looks at business as a whole and attempts to explain why some firms develop and thrive while others stagnate and go bankrupt. Strategic planning typically focuses on analyzing the problems and opportunities faced by people in top management. Unlike many decisions made at lower levels in a corporation, strategic decisions usually deal with the long-run future of the entire organization. The stakes can be very high. For instance, the strategic decision made after World War II by Sears, Roebuck and Company to expand from catalog sales into retail stores and insurance has given Sears many years of successful

profits. A similar decision made independently during the 1960s by the top management of General Motors, Ford, and Chrysler to emphasize the production of large, powerful automobiles over small, fuel-efficient ones resulted in their low profits and even the threat of bankruptcy in the early 1980s. And in the 1990's there are companies like Microsoft and Intel that made good strategic planning decisions in the 1980's that are providing tremendous results today for their businesses. Companies cannot afford to rest on their past successes as there are numerous competitors out there waiting to enter the market with new perspectives on how to position their products and services to capture customer share. Good strategic business planning must be a continuous process that is ever evolving.

Top mangers at Monsanto and other companies must manage their firm's business from a strategic perspective or face possible dire consequences. They cannot make decisions based on long-standing policies, standard operating principles or what has worked in the past. Rather, companies must look to the future to plan organization-wide objectives, initiate strategy, and set a direction for their business that is dynamic and responsive to future customer needs. Those setting the "strategic course" for a business must be willing to ask certain key strategic planning questions that include:

1. Where is the business relative to the market now?
2. Where will the market be in one year, two years, five years, ten years?
3. Where do we expect to be in 5-10 years relative to where the market will be?
4. Are the answers acceptable?

5. If the answers are not acceptable, what specific actions should the corporation undertake?

6. Are there opportunities to significantly affect the direction of the market in the future?

7. How do we get there? How will we compete?

2.1 Historical Models and Developments

Most business schools offer a strategic planning or business policy course. Although these courses typically served as a capstone or final integrative class in a business administration program, over the years they have taken on some characteristics of a separate discipline.

In the 1950s the Ford Foundation and the Carnegie Corporation sponsored investigations into business schools' curriculum. The resulting Gordon and Howell report, sponsored by the Ford Foundation, recommended a broad business education and a course in business policy to "give students an opportunity to pull together what they have learned in the separate business fields and utilize this knowledge in the analysis of complex business problems." By the late 1960s most business schools included such a business policy course in their curriculum. But since that time the typical policy course has evolved to one that emphasizes the total organization and strategic planning, with an increased interest in business' political, social, economic, and ethics environment as well as nonprofit organizations. This increasing concern with the effect of environmental

issues on the management of the total organization has led leaders in the field to replace the term *business policy* with the more comprehensive term, *strategic planning.* Strategic planning is that set of managerial decisions and actions that determine the long-run performance of a enterprise. It includes strategy formulation, strategy implementation, and evaluation and control and is executed at three levels. These levels include setting strategy for: the corporation; at a firm level for a business within the firm, and finally for functions within the enterprise. In order to be successful an entity must formulate effective, integrative strategy across all three levels.

The study of strategic planning therefore emphasizes the monitoring and evaluation of opportunities and constraints in light of a entity's strengths and weaknesses. It becomes increasingly specific as one steps towards customers served. In contrast, the study of *business policy,* with its integrative orientation, tends to only look inward by focusing on the efficient utilization of assets and thus emphasizes the formulation of general guidelines that will better accomplish a firm's mission and objectives. We see then, that strategic planning incorporates the multi-tiered concerns of the entire organization and includes the perspective of business policy with environmental and strategic dynamics of all the marketplaces that the entity will participate in.[1]

During the 1970's, the United States saw a rapid decline in its worldwide competitiveness. This lack of competitiveness was due in large part to a departure from the strategic planning principles laid out during the previous decades. Had the U.S. not gotten lazy and continued to implement a strong strategic planning and business policy

approach to managing their corporations, it is doubtful that US firms would have lost such a large margin during this period, especially to the Japanese. The 1980's and 1990's brought about a revival for strategic planning and business policy in the United States. This rejuvenation occurred in response to the loss of competitiveness that the U.S. experienced in the international business scene in the 1970's. Since the 1970's, the U.S. has seen an incredible amount of research and study going into the area of strategic planning. From this field of research, two professors from rival business schools have continued to make significant contributions. These notable strategists are Michael Porter of Harvard University and Arnoldo Hax of The Massachusetts Institute of Technology (MIT). Michael Porter is notable with his concept of "Competitive Strategy: Techniques for Analyzing Industries and Competitors", where he defines a framework to assess the attractiveness of an industry and discusses generic strategies for effectively positioning a firm within that industry.[2] Arnoldo Hax has received wide acceptance for his book, "The Strategy Concept and Process", where he promotes the idea of integrated essential frameworks that address the concept of strategy and the strategy formulation processes. Professor Hax's framework comprehensively addresses strategy from the aforementioned three tiered approach:

1. The tasks pertaining to the development of *business strategy*.
2. The tasks required for the formulation of *corporate strategy*. and
3. The tasks associated with the development of *functional strategy*.[3]

While most of Porter's and Hax's work is still absolutely relevant today, there seems to be increasing recognition given to the need for new approaches to strategic planning at

the business level. Typically in the past, emphasis was placed on competitively posturing a firm's business from the "product's perspective". This meant that significant resources were spent to uniquely position a product through differentiation or cost.

Differentiation requires a firm to engineer a product with unique characteristics and thus cause it to standout from the competition's offerings. From the cost side, firms attempt to achieve lowest cost in order to permit pricing that will provide advantage.

This "product perspective" has clearly dominated the manner in which academia and industry has historically approached business strategy. So where does this bring us today? Well, people from all business segments are realizing that traditional strategic planning doesn't apply in a increasingly global and dynamic marketplace. Andrew Grove, CEO, Intel has recently written a book, "Only the Paranoid Survive", where he states that the old Michael Porter model of strategy no longer applies and that things such as 10X forces and technology shifts are what matters in effectively understanding strategic planning. Even Michael Porter himself has realized that his "Competitive Strategy Approach" is now deficient in addressing all of the issues that corporations have

to be concerned with. In his recent Harvard Business Review article, "What is Strategy",[4] Michael Porter now says that for firms to have a *sustainable competitive advantage* in an ever changing global marketplace, firms must possess and understand the following:

- An unique competitive position for the company,
- Activities tailored to strategy,
- Clear trade-offs and choices vis-à-vis competitors,
- That competitive advantage arises from fit across activities,
- That sustainability comes from the activity system, not the parts, and
- Operational effectiveness.

2.2 Alternative Approach Via the Adaptive Management Framework™

Arnoldo Hax, working in concert with Dean Wilde of Dean & Company, a Washington D.C. based consulting firm, have also reassessed the issue of strategic planning at the business level. Their new proposition is called the Adaptive Management Framework™. Hax and Wilde suggest that industries today face a whole new set of challenges that will force them to reassess what strategy is and how they will need to apply it at the business level to be successful. They see the top ten challenges for industry today as:

1. Changes in market structure: industry is no longer the central focus of strategic analysis.

2. Differences in global, regional, and local competition and demand: however, you need to have a single world-class level of performance.

3. Customer's requirements are escalating: perpetually insatiable and demanding.

4. Growing importance of distribution channels: customer proximity provides information and control.

5. Lowering of entry barriers and raising of exit barriers: the emergence of excess supply.

6. Transformation of human resources: empowerment as a necessity, not just to make people happy.

7. Homogenization of brands: increasing pressure of generics.

8. Ecology is a strategic issue: opportunity as well as a threat.

9. The challenge of leadership: prevailing skepticism.

10. The burden of restructuring: creating a climate of fear and distrust.

Monsanto and other companies must respond to the changing business environment by being equipped to handle three common denominators: 1) complexity, 2) uncertainty, and 3) change. According to Arnoldo Hax and Dean Wilde, when addressing the issue of *complexity*, corporations must simplify their operations and business strategy via segmentation within a unified framework. As far as *uncertainty* goes, businesses must understand that it cannot be forecasted and they must have robust processes that are flexible to respond to unforeseen events and circumstances. And lastly, when facing *change*, companies have to be prepared to respond to windows of opportunity and the different challenges emerging from the various stages of industries in transition.

The answer to all of these common denominators is the Adaptive Management Framework™. The Adaptive Management Framework™ is illustrated in Figure 2.2.1. In their opinion the Framework links customer-based strategic business positioning with execution. Hax and Wilde feel that there are three aspects to the Adaptive Management process built around the critical business model. Those key aspects are:

1) **Method:** Here the firm needs to segment the market, measure, focus, learn and improve all processes. They need to identify key business drivers at a granular level, determine intrinsic 80/20 properties, identify variability, and provide critical information/communications to appropriate individuals and management so they can clearly understand performance drivers and take corrective action.

2) **Common Unified Framework:** Companies need to deeply link business strategy to execution and to communicate across the different cultures that exist within the firm, i.e., operator culture, engineering culture and executive culture.

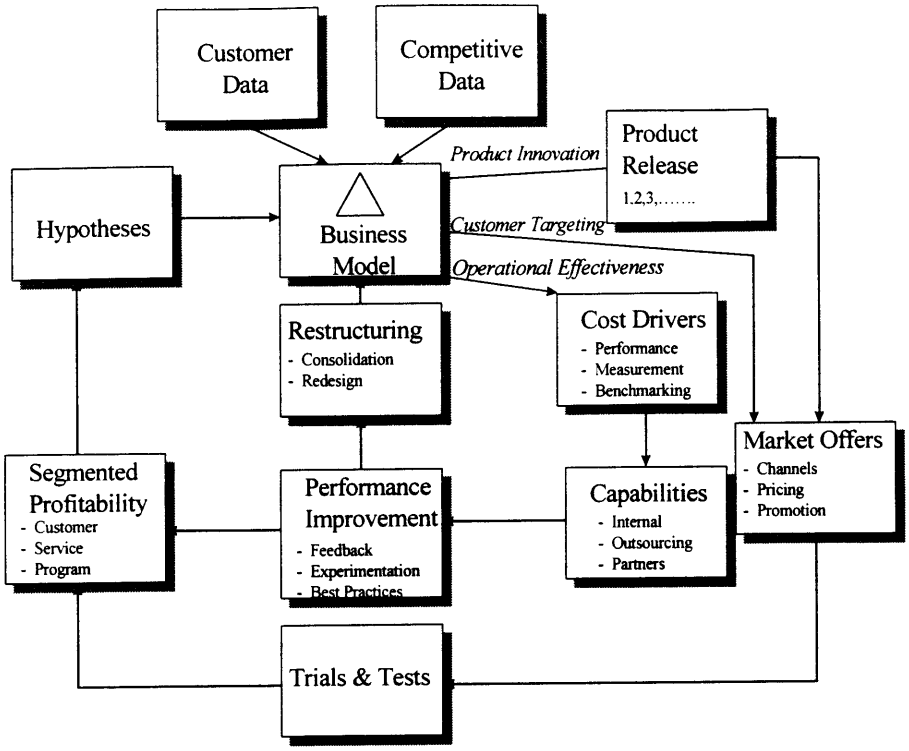


Figure 2.2.1 - *The Adaptive Management Framework™: Linking Customer Based Strategic Positioning with Execution.*

3) **Three Key Processes:** Firms must employ three key processes in a manner that supports their targeted business posture. These processes include:

- *Operational Effectiveness* - In industries where significant economies of scale are emerging or strong learning curve effects are allowing firms with the most production experience to undercut rivals' prices, large market share becomes such a distinct advantage that all firms are tempted to adopt volume-building strategies. A "race for growth" dominates the industry. Firms, driving operational effectiveness across all facets of their business, are better able to act proactively rather than constantly reacting to competitive forces in the market.

- *Customer Targeting* - When firms are successful in segmenting their market they can effectively target their products and services to those customers that will provide the greatest business returns. To do so, a firm must have a comprehensive understanding of the customers in the market and be able to differentiate them based on long-term attractiveness.
- *Innovation* - Product innovation can broaden an industry's customer base, rejuvenate industry growth, and widen the degree of product differentiation amongst rivals. Successful new product introductions strengthen a company's position, usually at the expense of companies who stick with their old products or are slow to follow with their own versions of the new product. Beyond products, firms must be able to drive innovation across their business functions particularly with regard to developing unique approaches to marketing and manufacturing.[5]

As indicated, all of these key processes must be applied across a firm's internal value chain and are not just tied to one specific function.

At the heart of the Adaptive Management Framework™ is the *business model* (Figure 2.2.2). In the business model there are three key strategic positions that a firm should consider as it develops its business strategy. Those three positions are identified as: 1) *Best Product*, 2) *Total Customer Solution*, and 3) *Proprietary Standard*. The concept is that a firm can actually target its strategic position on the business model given the nature

of the industry and the strength of the firm's ability to sustain competitive advantage. This advantage must take a different form at each of the three key strategic positions.

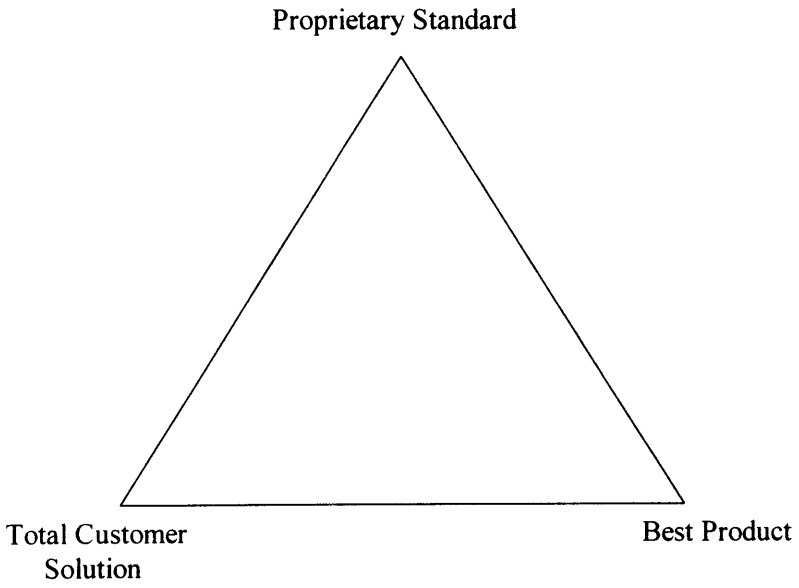


Figure 2.2.2 - *Business Model: Customer Based Strategic Positioning—Three Options*

Before expanding on each of the three strategic positions, it would be helpful again to contrast this multi-competitive positioning structure with what has typically been a more singular model. As alluded to earlier, quite often firms expected to gain sustainable advantage only by achieving the lowest cost and or most differentiated products. The concept was that by doing so, a firm would enjoy some period of time when it could impact the market through pricing. In this short duration, before demand would shift or the firm's competitors could effectively react, the firm could enjoy a season of profitability that if properly employed could be reinvested into the next series of cost enhancements or product traits. Thus, the cycle moves along built upon the strategic

premise that the lowest cost, most differentiated product provides the avenue to sustainable advantage. Seems reasonable however, today in some markets technology has closed many product differentiation gaps and leveled the price playing field, thereby allowing faster reaction time amongst competitive firms. Globalization has facilitated the entrance of international firms into what were once locally dominated markets. These international firms, armed with comparative advantage through factor conditions such as cheap labor, greatly challenge a firm's ability to sustain competitive advantage solely through "Best Product" economics. That is not to say that this model of positioning is not still relevant in select industries. What is being proposed is that in today's global marketplace there are additional strategic positioning opportunities that may enhance a firm's ability to achieve market success. Let's turn now and consider the business model strategic positions proposed in the Adaptive Management Framework™.

The three strategic positions include the historical concept of "Best Product" as well as two additional opportunities for a firm to consider in developing its strategic business plan. These two additional positions include a competitive position integrally linked to the customer's economics, herein referred to as "Total Customer Solution" and a third position, "Proprietary Standard", which allows the firm to develop a strategic "lock-up" of the total business system in which it competes. Two points are worth noting at this juncture. First, the concept of the Adaptive Management Framework™ is that a firm has the ability to and must choose where it will position itself given the unique constraints of the market in which it participates. Secondly, a firm's targeted position, even once

achieved, will require constant nurturing of the environment in order for it to be sustainable. In some cases when driven by strong actions of its competitors, a firm may even want to consider moving to another position on the business model continuum.

The "Total Customer Solution" is a strategic position whereby the firm competes based on its ability to provide the broadest, most impactful array of products and services to its customers. The distinguishing feature of the position is that the firm focuses on how best to satisfy the customers broader product needs as opposed to offering a single or very limited number of "Best Products". In order to be successful in this realm a firm must narrowly segment its customer base and then develop an intimate understanding of their requirements. In this capacity, the firm then endeavors to bundle a broad array of products and services, which taken collectively, provide greater attraction for the customer. Individually the products may not represent a "Best Product" position but as a bundle, they have the greatest impact to the customer's overall economics. As a firm works to enhance the customer's overall profitability through uniquely bundled solutions, the firm's overall financial performance itself is enhanced as a portion of the customer's added margin shifts back upstream to the firm.

Good examples of firms operating from a "Total Customer Solution" position are EDS and perhaps AT&T within the data telecommunications industry. Both companies have shown great strength in their ability to provide a broad scope of products and services to their customers in order to solve a wide array of data and telecommunications needs. The experience base that those enterprises have developed allows them to assemble

solutions to customer problems that may not even have been understood by the customer. Hence, their ability to significantly impact the customer's economics and thereby share in that gain. When one considers that today AT&T can bundle long distance services, local services, cable, cellular communications, and on-line networking services it becomes apparent that properly packaging such an array of products and services can lead to long-term sustainable advantage. Customer share and not necessarily product share becomes the targeted measure of success. Another straight forward example of a firm that has positioned itself as a "Total Customer Solution" is Lowes Companies. As a firm that participates in the home improvement retailing industry, Lowes Companies made a significant departure from the traditional model of a building materials retailer. Their store concept is that the customer, be it a tradesperson or homeowner, can come into the store and find products and services to satisfy virtually every need that they might have. This product mix ranges from lumber, to kitchens, to carpeting, to gardening all of which is under one roof. Beyond this broad product array, Lowes' sales personnel offer "do-it-yourself" classes in the store, arrange for contractors, and are quick to provide expert advice to those customers willing to tackle projects on their own.

The third strategic positioning alternative is the "Proprietary Standard". In this option a firm is not solely focused on product economic (Best Product) nor customer economic (Total Customer Solution) but rather on the total system economics that are contained within a market segment. The ideas of a dominate design, strong linkages with a firm's business complementors as well as leveraged positions up and down the value chain are

central themes to achieving a "Proprietary Standard". It is from this posture that a firm is seen as a dominating force within its market sector, typically achieving the status of market share leader.

As with the other two positioning alternatives, achieving a "Proprietary Standard" is an evolutionary process. First a firm often develops a product or service that has the features of a dominant design. Frequently protected through the use of patents, this dominant design provides the firm with a clear, unchallenged "first mover" advantage in attracting a broad array of customers. As the firm leverages the product in the marketplace through strategic pricing and marketing they begin to develop brand conscientiousness and customer lock-in. Simultaneously, the firm works to establish strong linkages with its suppliers, distributors, and even business complementors to achieve the greatest leverage within the value chain and thereby indirectly locking-out their competitors. At this juncture the firm now commands a dominant position across the business system and has become a "Proprietary Standard". Customers driven by strong brand recognition seek their product, the best suppliers are attracted to the firm as the market share leader, and complementors look for opportunities to develop linked product offerings thereby expanding overall demand. The primary focus of a firm in this position is not necessarily having the lowest product cost nor broadest array of goods for a particular customer base. Rather the focus is developing the standard for the industry and thereby locking-in a leadership position within the system's economics.

Clear examples of firms that have achieved a "Proprietary Standard" strategic posture are Microsoft and Intel within the computer industry. Starting with early dominant designs these two firms have leveraged their positions through marketing and strategic linkages to the extent where they now dominate the significant portion of their respective industries.

As indicated earlier the Adaptive Management Framework™ stresses the linkages of a firm's strategic positioning objective to the key adaptive processes; operational effectiveness, customer targeting, and innovation (Figure 2.2.3). A firm must be able to focus its resources on developing process strength in those areas which are critical to achieving its targeted strategic position. As the "Best Product" position focuses on product economics, a firm targeting this posture would drive operational effectiveness and innovation processes. This would facilitate best cost and product differentiation. For a "Total Customer Solution" position, the customer targeting process becomes paramount as the firm must be able to clearly segment its customer base and target appropriate bundles of goods and services. Finally, a "Proprietary Standard" demands strong innovation processes as well as customer (complementor) targeting in order to have a major impact on the overall business system.

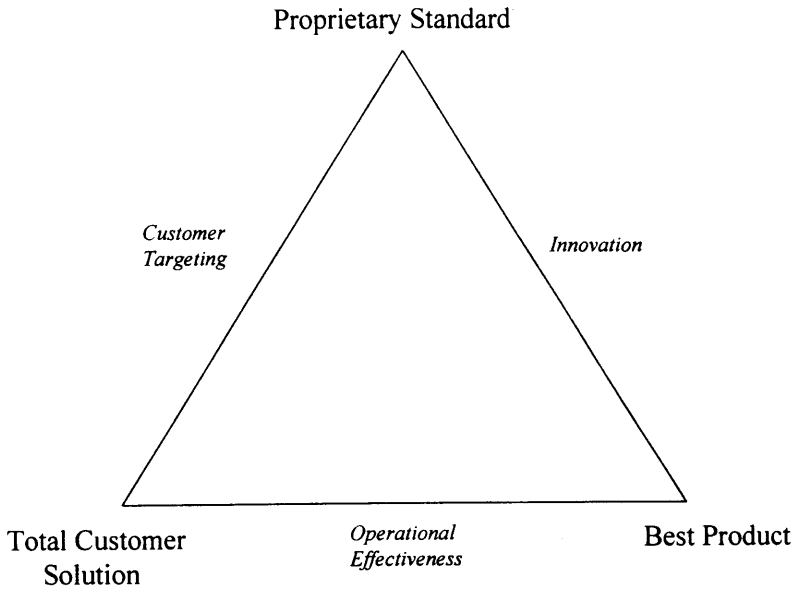


Figure 2.2.3 - *Business Model: Customer Based Strategic Positioning & Key Processes*

A company's strategic positioning objective is important as it delineates the firm's strategic intent to stake out a particular business position considering the cardiovascular market, the strategic intent of Monsanto may be to develop a proprietary standard position for their nutraceutical/nutritional products on a national or global scale. An alternative strategic position may be to dominate a market niche by providing the *best products*. Or, there may be opportunities to bundle products and services in such a manner to achieve success by providing a total solution to their targeted customers.

2.3 Chapter Conclusions

Today's organizations are experiencing a seemingly endless diversification in technology, products, markets and services. Changes in the values of consumers have further added to the complexity of the managerial decision-making process. Strategic business planning is a required competency that must be resident within a firm. It is a primary ingredient

of the executive management function and its application is critical to effectively positioning a business within an uncertain, ever increasing, and complex environment. The historical promise that "Best Product" positioning via differentiation and low cost is single, most effective approach to competing is no longer valid. What is evident is that there are alternatives for a firm to consider in determining how to posture their businesses. Those alternatives are captured in the Adaptive Management Framework™ and include Total Customer Solution and Proprietary Standard positions.

Strategic business planning is a continuous process and we feel that the three adaptive management processes (operational effectiveness, customer targeting & innovation) are critical factors for success. The processes intend to reinforce the linkage between strategy and execution. The tasks of strategy formulation and execution are seldomly done by the same people. Therefore, assuring their alignment is crucial. Support for the adaptive processes requires better segmentation, iterative market trials, granularity, and de-averaging of information which is seldomly available in most corporations. Firm's should utilize the Adaptive Management Framework™ to 1) understand the targeted business, 2) target a strategic business posture, and then 3) align the key adaptive processes in support of their selected position.

Chapter 3

Monsanto Company

The intent of this chapter is to provide an understanding of the Monsanto company; its heritage, its new direction as a life science company, and its unique competencies that will be enablers for success in the cardiovascular market.

3.1 Overview

Monsanto is a global, multi-business company which is valued at $24B, with $9B in annual sales. Until the late 1970's, its focus was in the chemical business. In the last 15 years the company has been redefining their mission to become a life science business. With a strong base in biotechnology, Monsanto seems to have the required core competencies for competing in the 21st century, especially in terms of innovation for new products and new applications in their targeted businesses of agriculture, healthcare and the food industry.

3.2 Monsanto's History

The Monsanto Company was founded in St. Louis in 1901 by John F. Queeny, a chemicals salesman, with an investment of $5,000 to begin producing saccharin, a synthetic sweetener. In the following decades, Monsanto moved into chemical raw materials production and by the 1950s became a multinational, integrated chemical manufacturer. The company became one of the world's largest high-volume, low-margin

commodity chemical producers with little proprietary product technology. During the late 1970's, most commodity chemical producers, facing strong and unprecedented competition from overseas and new environmental regulations in the U.S., began to move toward higher margin, patent-protected specialty products. During this time, Monsanto experienced great volatility in profits because the energy crisis sharply increased the costs of the petrochemical raw materials upon which many of its products were based. By late 1979, quarterly earnings had dropped a disastrous 88%.

Facing this environment, Monsanto decided in the late 1970's to enter into the biotechnology industry, a commitment made by CEO John Hanley who had a vision of Monsanto becoming a world force in biotechnology. In the period 1981-1991, Monsanto invested approximately $1B on its biotechnology development efforts. Richard Mahoney became CEO in 1985 and devoted his efforts to continue the transformation of Monsanto from a largely cyclical, commodity chemical company to a technology-based life sciences and high performance chemical company. Underperforming and nonstrategic businesses were sold and important acquisitions were made which included Searle, NutraSweet, Kelco and the Ortho Lawn-and-Garden companies. Mahoney committed Monsanto to achieving leadership in biotechnology and championed its early application to agriculture.

In order to support the diversification effort, Monsanto established an internal venture capital firm, Innoven, which heavily invested in a portfolio of small entrepreneurial companies focused on agribusiness, life sciences, electronic chemicals, process control and

instrumentation as well as biotechnology (specifically Genentech, Genex, and Collagen). By co-investing and sharing information with other venture capitalists, Monsanto learned a great deal about the markets. Concurrently, Monsanto began building up a large production capability in silicon, in anticipation of the explosion of the semiconductor market.

Robert Shapiro became CEO in 1994, having previously worked as head of the Agricultural Division, and continued the commitment to biotechnology. As CEO, Shapiro has brought a total focus to Monsanto as a life sciences enterprise, which led to the divestiture of the chemical business as announced in October, 1996.

The initial $5000 equity company grew and by 1995 became the third largest US chemical company and the 145th largest industrial company (according to Fortune 500 list). Monsanto developed, produced and marketed high-value agricultural products such as: herbicides and seed; industrial chemicals (including man-made fibers and plastics); pharmaceuticals and food products (including low-calorie sweeteners and other food ingredients). Today, the company has restructured itself by shedding many of its original activities to emerge as a biotechnology based, life science company positioned for the 21st century.

3.3 Brief History of The Biotechnology Industry

As stated before, we will briefly describe the biotechnology industry which is one of the

key enablers that will allow Monsanto to compete in the 21st century in the life science industry.

In biotechnology "germplasm" is the foundation of the new science. It refers to the heredity material of any living organism, or group of organisms, that determines their characteristics. Regardless of its form (animals, vegetation, etc.) germplasm is a combination of genes which forms the basic architecture of a living entity. Biotechnology in agriculture began 80 years ago with the observation of naturally occurring genetic mutation in plants induced by bacteria. The rapid pace of new discoveries and claims of young new corporations has contributed to the investment excitement surrounding the biotechnology field. The new techniques of gene transfer have been used to produce new plant and animal genotypes. Experimentation and discoveries in the early 1970's moved the science out of its academic cloister and into a technology that soon gave rise to a new industry. Expectations for large profits produced a large number of small biotechnology start-up companies which were often unions of university-trained scientists and venture capitalists. An unique aspect of this new technology has been its near total dependence on university research.

One way to approach entry to biotechnology is through investment in the major areas of research and development. As shown in the following figure, the major areas of research are in pharmaceuticals, animal agriculture, plant agriculture, food ingredients, chemicals and energy, microbial application to the environment and electronics.

Monsanto has direct activities in 4 of these 7 major areas of research.

Research and Development Areas	Companies Engaged	Companies Specializing
Pharmaceutical	133	70
Animal Agriculture	59	5
Plant Agriculture	53	16
Specialty Chemical and Food	40	8
Commodity Chemical and Energy	28	3
Microbial Application to the Environment	21	6
Electronics	7	2

Source: The evolution and development of Biotechnology, 1994
US Department Agriculture

Figure 3.1 - *Major Biotech Areas of Research & Development Among US Biotech Firms*

The potential end use of the products that have been developed are in: animal agriculture where there have been improvements in animal health care (pharmaceuticals), and in plant genetics which is concerned with the genetic manipulation of plant cells in order to induce a plant to develop specific characteristics. In plant genetics, researchers have been interested in creating resistance to specific diseases, chemicals (e.g. herbicides), or environmental (e.g. frost) conditions. Monsanto for example has been trying to develop crop plants that are resistant to herbicide products. Recently, researchers have been looking at ways to genetically engineer plants to produce proteins which are resistant to its "Round-Up" herbicide so that "Round-Up" can be used to destroy weeds

without damaging the plants. In these applications, the seed is of primary importance since it is the carrier of essential genetic information. In the food industry there are also many potential applications. For instance, engineered microbes can convert wastes or low-value products into those of higher value (i.e., whey, derived from cheese production, can be converted into marketable lactose). In the pharmaceutical area biomedical research has long suggested that a number of proteins may have potential therapeutic effects. For instance, research in the 1960's suggested that interferon might have beneficial effects in fighting certain cancers and viral diseases.

As we can briefly see, biotechnology is changing the product development processes in a number of important industries, including chemicals, food, agriculture, and pharmaceuticals. Its impact has been felt not only through the development of new products but also by greatly reducing the product development cycle. It will undoubtedly play a critical role in developing products for the cardiovascular health market. Monsanto is uniquely positioned in respect to their strong biotechnology base.

3.4 Monsanto's Corporate Vision of the Business

Monsanto could be properly classified as a biotechnology company since the mid 1980's (having started such efforts in the late 1970's). However, it is very important to determine if the market identifies it as such through its continuous appraisal of the company in the stock market. The divestiture of the chemical sectors came because there were some significant differences perceived with the chemical way of doing business and

the high tech business of developing biological software. Nevertheless, it remains a fundamental question as to whether such a complete divestiture was reasonable since there are strong links between the chemical and the biotechnological businesses. We would expect that Monsanto would endeavor to retain these core competencies that were embedded in the chemical business in spite of the recent divestiture.

One of the main differences between both businesses can be observed in their R&D processes. In the chemical industry the entire development process takes approximately 9 - 11 years. In the biotechnology industry, a new product could be ready to commercialize right after having been bought from an academic lab, (where the largest companies in this field often go shopping to increase the number of new genes in their libraries). In this manner, the entire process could take 4 to 6 years.

In spite of the fact that Monsanto has presence in four major industries, we will use the current integrative nature of their corporate vision to look at the life science industry while emphasizing the biotechnology skills across all the businesses of the company. This integration and leveraging of their biotechnology skills was clearly the objective of the recent corporate restructuring which was taken in an effort to boost the internal connectivity and creativity (innovation) between the company's operations.

The current corporate vision of the business, which no longer includes the chemical division, can be summarized in Figure 3.4.

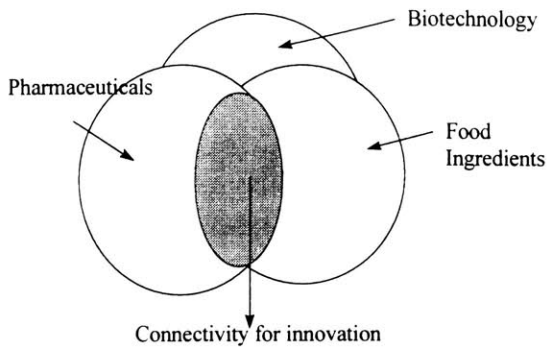


Figure 3.4. - *Monsanto's Corporate Vision of the Life Sciences Business*

By restructuring as a life science company, Monsanto has changed its structure in order to create connectivity which is similar to the concept employed by companies such as Siemens, ABB and especially, the software industry (which is similar in its concept to the biotechnology industry).

It is evident that Monsanto's corporate belief and also that of other former pure chemical companies, such as Dow Chemicals, (partnered with Lilly Venture to acquire a controlling seat in the biotech company Mycogen Corporation), is that biotechnology is a core competence that must be acquired in order to remain viable and successful. Often the source of value of such acquisitions has been an extensive library of a specific kind of gene, particularly in agricultural biotechnology. From our perspective, these acquisitions have also proven strategic as blocking movements as they have delayed the emergence of

new competitors.

3.5 Business Segmentation

Up to December, 1996, Monsanto had defined its business units in terms of specific worldwide markets served in the industries in which it competed. The businesses were segmented in terms of; 1) industry (agriculture, chemicals, food ingredients and pharmaceuticals) and then, 2) according to the kind of customers or markets served, technology employed, competitors and raw materials used.

This segmentation is undergoing important changes as the company has decided to take steps to create an effective structure to serve the markets of the life science industry. The most evident issue, as is noted in the changes of Monsanto's general organizational chart, is that some of the previously segmented business units will disappear or merge and new ones will be created. The following chart contains a quick description of the company's segmentation up to December 1996:

MONSANTO'S BUSINESS SGMENTATION	
BUSINESS UNIT	**RATIONALE FOR SEGMENTATION**
Agricultural	
Ceregen	Unique competitors, technology, and different suppliers
Crop Protection	Unique competitors, technology
Produce	Different customers and competitors
Protiva	Unique competitors, technology, and different suppliers
Solaris	Different customers and competitors
Chemicals	

Fibers	Unique competitors, technology and customers
Growth Enterprises	Unique competitors, technology, customers and suppliers
Performance Materials	Different customers, technology and competitors
Saflex	Different customers, technology and competitors
Specialty Products	Unique competitors, technology and customers
Food	
Benevia	Different customers
NutraSweet-Kelco	Different customers
Pharmaceuticals	
Searle	Unique competitors, technology and customers

Figure 3.5 - *Monsanto's Business Segmentation*

3.6 Horizontal Integration

The corporate vision of the business is to be a leader in the life science industry. As could be seen in the scope of the biotechnology research effort, (figure 3.1), there are direct links between agriculture, chemicals, pharmaceuticals and food ingredients in terms of product development (connectivity through technology) and, secondly, connectivity through the knowledge of the markets, distribution channels and end customers in those industries. There is a clear synergism in the industries selected for building the portfolio of Monsanto's SBUs. This synergism should extend into the cardiovascular market as opportunities for sustainable advantage.

3.7 Vertical Integration

In terms of the vertical integration effort at Monsanto, the most notable fact is their acquisition of seed companies and healthcare services. By acquiring seed companies, Monsanto is now able to directly reach the end customer farmers. In the case of Monsanto, they are using Federal Express service to deliver the seeds directly to the farm. This may again prove to be a valuable model for the company as it considers its entry into the nutraceutical business. The company also states that through its business portfolio it will have the flexibility to face and implement rapid changes. This flexibility is the one of the core competencies that Monsanto is trying to develop.

Appendix 2 is a summary of the main acquisitions, divestitures and withdrawals that have occurred in the last 5 years.

3.8 Corporate Restructuring (1995-1997)

In 1995, there were some significant internal changes that took place at Monsanto. During February 1995, Monsanto reorganized into 15 strategic business units within four business areas; agriculture, industrial chemicals, pharmaceuticals (Searle) and food ingredients (The NutraSweet Company). This structure replaced the previous group structure which divided the business broadly into the four major industries in which the company was involved (Agriculture, Chemical Sciences, Engineered Materials and Products, and Corporate). With regard to its culture, Monsanto's two main weaknesses, as identified by its critics in 1987, were that its corporate culture was very hierarchical

and that the company lacked entrepreneurship. The goal behind the restructuring was to create autonomous business units in order to enjoy greater economies of scale across the whole company and also, to reap the benefits of flexibility that result from smaller and more entrepreneurial organizations.

By the end of 1996 Monsanto had further restructured to 13 SBUs. Those 13 SBUs were divided into 4 major areas: Agricultural, Chemicals, Pharmaceuticals, and Food Ingredients. According to the company there are two ways to create value in a multi-business enterprise: 1) to run each business superbly, and 2) to make sure that each business gains value from being part of the overall entity. By adopting the new structure the company assigned greater accountability to the individual businesses for strategy, operations and performance. The company also expects strong interaction among the businesses in order to save costs by avoiding duplication, to take advantage of scale (as in purchasing), to draw on each other's skills and experience, to serve common customers more effectively, and to create new business opportunities. Finally, by organizing the company into smaller units, each business will be closer to their customers and therefore able to respond more quickly to market conditions.

Through restructuring, the company was looking for the right combination of autonomy and interconnection through innovative structures, processes and incentives. The corporate staff was dramatically reduced and corporate services, (such as human resources and public relations) were provided to the SBUs by a smaller and more

responsive organization which was named Monsanto Business Systems. Each SBU negotiates for support services with that unit and has the option to outsource the service.

Figure 3.8 provides an overview of the Monsanto SBUs, by industry, as of December, 1996 (note: while the Chemical business divestiture had been announced by this time that actual spin-off had not occurred).

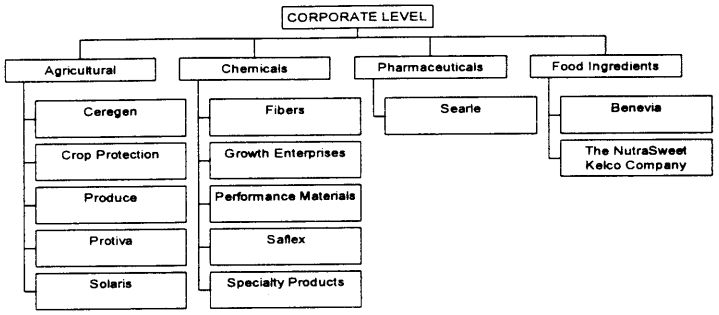


Figure 3.8 - *Monsanto's SBUs (December 1996)*

Appendix 3 contains Monsanto's major end-use markets classified by the four industries in which it competed in through December 1996. The charts in Appendix 3 detail and summarize the following information: Major end-use market, SBU, brief description of the SBU, major markets targeted, end-use products & applications, major products (and brands), major competition, major plants, and major raw materials required. In addition, Appendix 3 also contains information on Monsanto's major "pipeline" development projects by major business sector. Again it is important to reflect on the strengths

provided by the company's current activities in its pharmaceutical, agriculture, chemical and food businesses as they may pertain to Monsanto's future participation in nutraceutical segment of the cardiovascular marketplace.

3.9 Monsanto's Organizational Structure

Monsanto's organizational structure has been evolving in the last two years and will undergo another major restructuring in 1997 in support of the company's new direction as a life science company. The company is trying to create an organization which is able to move fast with great connectivity so that every area is able to learn from the experience of the others. To this purpose, corporate management is trying to focus the SBUs management solely on their respective businesses. To help, it has created a set of supporting groups interrelated with the business, which are providers of services and oversight to the operating units in terms of financial control, human resources, management control, research and development connectivity and diffusion. Figure 3.9.1 depicts Monsanto's organizational chart at the end of 1996.

While there are many good lessons available from other companies that have followed While there are many good lessons available from other companies that have followed similar approaches in creating a "big and small organization", Monsanto has instituted some unique and perhaps, questionable features. They have created three corporate teams that support the SBUs; 1) the international managing directors, 2) the stewardship similar approaches in creating a "big and small organization", Monsanto has instituted

some unique and perhaps, questionable features. They have created three corporate teams that support the SBUs; 1) the international managing directors, 2) the stewardship

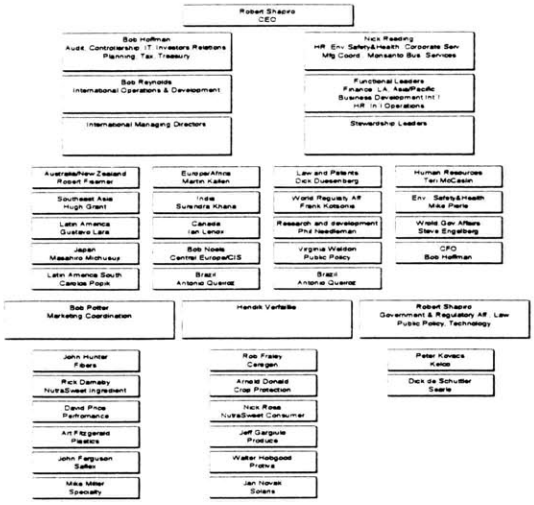


Figure 3.9.1 - *Monsanto's Updated Organizational Structure*

leaders (law and patents, R&D, public policy, etc.) and, 3) four other single corporate positions in charge of different affairs. It seems that there are signs of potential duplication of activities here.

3.10 Strategic Posture of Monsanto

In general terms the chemical business experienced poor financial performance during the last five years. Monsanto's operating income as percentage of sales was around 8% in 1995 and they were far away from the targeted 20% in ROE. These two factors were important reasons for the chemical divestiture decision at the end of 1996.

Even the market place was confused as to Monsanto's strategic focus. According to JP Morgan's Company Report on Monsanto, dated March 1, 1996, **"Monsanto has no directly comparable peers, given Monsanto's greater reliance on agriculture and its investments in biotechnology".**

Monsanto has had significant seasonality in earnings because of the concentration of the more profitable Agricultural segment sales in the first half of the year. This seasonality probably will increase as Agricultural operating profits become a larger percentage of the total (See Figures 3.10.1 and 3.10.2).

Corporate Financial Performance Objectives

Segment Data

	Forecast			Real		
Agricultural Products	1998	1997	1996	1995	1994	1993
Net Sales	3,411	3,046	2,719	$ 2,472	$ 2,224	$ 1,967
Growth %	*12.0%*	*12.0%*	*10.0%*	*11.2%*	*13.1%*	
Percentage of Assets	*95.5%*	*95.5%*	*95.5%*	*95.5%*	*91.4%*	*90.8%*
Operating Contribution[1]	794	677	575	$ 523	$ 501	$ 408
Growth %	*17.3%*	*17.6%*	*10.0%*	*4.4%*	*22.8%*	
Percentage of sales	*23.3%*	*22.2%*	*21.2%*	*21.2%*	*22.5%*	*20.7%*
Operating Income (Loss)	671	599	535	$ 486	$ 476	$ 400
Growth %	*12.0%*	*12.0%*	*10.0%*	*2.1%*	*19.0%*	
Percentage of sales	*19.7%*	*19.7%*	*19.7%*	*19.7%*	*21.4%*	*20.3%*
Percentage of Assets	*18.8%*	*18.8%*	*18.8%*	*18.8%*	*19.6%*	*18.5%*
Total Assets	3,572	3,190	2,848	$ 2,589	$ 2,434	$ 2,166
Chemicals						
Net Sales	4,394	4,145	3,910	3,689	3,715	3,684
Growth %	*6.0%*	*6.0%*	*6.0%*	*-0.7%*	*0.8%*	
Percentage of Assets	*136.7%*	*136.7%*	*136.7%*	*136.7%*	*119.8%*	*117.1%*
Operating Contribution[1]	468	421	378	357	338	290
Growth %	*11.0%*	*11.3%*	*6.0%*	*5.6%*	*16.6%*	
Percentage of sales	*10.6%*	*10.2%*	*9.7%*	*9.7%*	*9.1%*	*7.9%*
Operating Income (Loss)	384	362	341	322	304	331
Growth %	*6.0%*	*6.0%*	*6.0%*	*5.9%*	*-8.2%*	
Percentage of sales	*8.7%*	*8.7%*	*8.7%*	*8.7%*	*8.2%*	*9.0%*
Percentage of Assets	*11.9%*	*11.9%*	*11.9%*	*11.9%*	*9.8%*	*10.5%*
Total Assets	3,215	3,033	2,861	2,699	3,101	3,146
Pharmaceuticals						
Net Sales	2,535	2,224	1,951	1,711	1,520	1,387
Growth %	*14.0%*	*14.0%*	*14.0%*	*12.6%*	*9.6%*	
Percentage of Assets	*66.8%*	*66.8%*	*66.8%*	*66.8%*	*74.6%*	*67.9%*
Operating Contribution[1]	242	194	162	142	51	(22)
Growth %	*24.9%*	*19.7%*	*14.0%*	*178.4%*	*-331.8%*	
Percentage of sales	*9.5%*	*8.7%*	*8.3%*	*8.3%*	*3.4%*	*-1.6%*
Operating Income (Loss)	223	179	149	131	54	(34)
Growth %	*24.9%*	*19.7%*	*14.0%*	*142.6%*	*-258.8%*	
Percentage of sales	*8.8%*	*8.0%*	*7.7%*	*7.7%*	*3.6%*	*-2.5%*
Percentage of Assets	*5.9%*	*5.4%*	*5.1%*	*5.1%*	*2.7%*	*-1.7%*
Total Assets	3,794	3,328	2,920	2,561	2,037	2,044

Figure 3.10.1 - Corporate Financial Objectives—Segment Data

Corporate Financial Performance Objectives

Segment Data

	1998	1997	1996	1995	1994	1993
Food Ingredients						
Net Sales	1,962	1,635	1,363	1,090	813	864
Growth %	*20.0%*	*20.0%*	*25.0%*	*34.1%*	*-5.9%*	
Percentage of Assets	*50.0%*	*50.0%*	*50.0%*	*50.0%*	*81.1%*	*85.5%*
Operating Contribution[1]	404	321	255	204	173	187
Growth %	*25.7%*	*26.0%*	*25.0%*	*17.9%*	*-7.5%*	
Percentage of sales	*20.6%*	*19.7%*	*18.7%*	*18.7%*	*21.3%*	*21.6%*
Operating Income (Loss)	248	172	136	109	157	166
Growth %	*44.6%*	*26.0%*	*25.0%*	*-30.6%*	*-5.4%*	
Percentage of sales	*12.7%*	*10.5%*	*10.0%*	*10.0%*	*19.3%*	*19.2%*
Percentage of Assets	*6.3%*	*5.2%*	*5.0%*	*5.0%*	*15.7%*	*16.4%*
Total Assets	3,928	3,273	2,728	2,182	1,003	1,011
Corporate						
Net Sales						
Operating Contribution[1]	(71.46)	(67.42)	(63.60)	(60)	(63)	(52)
Operating Income (Loss)	(75.03)	(70.79)	(66.78)	(63)	(68)	(53)
Total				$ 8,962	$ 8,272	$ 7,902
Net Sales	12,302	11,049	9,943	8,962	8,272	7,901
Growth %	*11.3%*	*11.1%*	*10.9%*	*8.3%*	*4.7%*	
Percentage of Assets	*89.3%*	*89.3%*	*89.3%*	*89.3%*	*96.5%*	*94.4%*
Operating Contribution[1]	1,836	1,545	1,307	1,166	1,000	811
Growth %	*18.8%*	*18.2%*	*12.1%*	*16.6%*	*23.3%*	
Percentage of sales	*14.9%*	*14.0%*	*13.1%*	*13.0%*	*12.1%*	*10.3%*
Operating Income (Loss)	1,450	1,240	1,095	985	923	810
Growth %	*16.9%*	*13.2%*	*11.2%*	*6.7%*	*14.0%*	
Percentage of sales	*11.8%*	*11.2%*	*11.0%*	*11.0%*	*11.2%*	*10.3%*
Percentage of Assets	*10.0%*	*9.7%*	*9.6%*	*9.8%*	*10.8%*	*9.7%*
Total Assets	14508.8	12823.5	11355.9	10,031	8,575	8,367

[1] Operating contribution is a measure of a segment's cash-based operating profitability. It excludes goodwill amortization and the effects of restructuring actions and unusual items from operating income.

Figure 3.10.2 - *Corporate Financial Objectives—Segment Data*

Monsanto generated considerable cash flow from operations in the past five years. It has also generated cash from asset sales, most notably, $1.3B from the 1992 sale of Fisher Controls and $600M from the 1995 sale of the styrenics plastic business. Cash was used for two major acquisitions, the $1.075B purchase of Kelco in 1995 and the $400M acquisition of Ortho in 1993. Cash was also used to fund capital expenditures and share repurchases. The estimated proceeds from the divestiture of its chemical business are approximately $3.2B. [6] These proceeds will most likely be used to strengthen the company's position in the life science industry through acquisitions and partnerships with biotechnology and food companies.

The agriculture products are the star products of the company with return on sales of 20%. However, a concern is that a high percentage of the sales correspond to the product "Roundup" whose patent will expire in a couple of years. Therefore, there is high pressure on the product pipeline in order to replace the expected loss of revenues caused by generic brands that are expected to enter the market.

The performance of Food Ingredients has suffered due to the decrease in the price of its main product, "Aspartame". There are also strong pressures in the development pipeline for new products that will insulate this division's future earnings. Forecasts of return on sales are set at 11% for 1998. Additional attention should be given to the need to strengthen the marketing capabilities in this division due to the potentially higher branding position of the products in this industry.

The Pharmaceutical business has a similar performance to the Food business and its return on assets is lower than the Chemical business. This SBU is under very strong pressure to innovate new products in order to improve its results and the efficient use of its assets.

Appendix 4 provides additional data as to Monsanto's performance in direct contrast to its peers. As can be seen therein,[7] for the period 1985- 1997, the company had a lower than average performance when compared to its peers. Monsanto has shown a rising trend in profitability, reaching a 8 - 9% return on sales and 13% EBIT as a percentage of sales for the last two years. However, its profitability measures are lower or similar to peers. In terms of return on investment, Monsanto has performed right at the average of its peers. Regarding liquidity, Monsanto has shown a better than average performance and its cost of capital has decreased but remains higher than its peers. Monsanto outperformed its peers in terms of R&D expenditures as a % of sales for the whole period.

It is interesting to note that in 1996, the market analysts, still compared Monsanto to major chemical companies. This represents an important challenge for Monsanto. The company must clearly signal that they are no longer a low margin, commodity chemical business but are now moving towards a new life science business. This is where the company will build its core competencies for the future.

Following the announcement of the spin-off of its chemical businesses, the market began to show signs of having a better understanding about Monsanto's businesses as is evidenced by strong increases in the price of its shares.

3.11 Environmental Scan for Monsanto

In order to better understand the overall company, it is worthwhile considering a broad view of the global environment in which Monsanto may choose to participate in. A number of these arenas and opportunities are directly applicable to its participation in the cardiovascular business.

Global Growth Opportunities				
Countries/World Areas	**1995 Real GDP**	**Real projected GDP growth 1996-97**	**1997 population**	**Monsanto Growth Opportunity**
Canada, US, EU, Australia and Japan	$ 17.5 tr	2% - 2.7%	817.4 m	Presence established: targeted growth expected near term
Mexico, Brazil, Argentina, India, China and Indonesia	$ 2.1 tr	9% China, 7% Indonesia, 6% India, 2.5% Latin America	2718.3 m	Presence not as established; near term growth potential high
Developing Asian, non EU European and Latin America	$ 1.6 tr	2% - 8%	345.7 m	Presence not as established; medium growth potential near term

Near Term Opportunity for Cardiovascular

Middle East, Pakistan, Africa and Philippines	$ 700 bn	3.5% - 5.5%	559.6 m	Presence not as established; growth potential long term

Figure 3.11.1 - *Monsanto's Global Growth Opportunities*[8]

From Monsanto's corporate international analysis, there are four areas of growth: 1) presence established, targeted near term (Canada, US, EU, Australia and Japan); 2) presence not established, near term potentially high (Mexico, Brazil, Argentina, India, China and Indonesia); 3) presence not established, medium growth potential near term (developing Asian, non EU European and Latin America) and; 4) presence not established, growth potential long term (Middle East, Pakistan, Africa and Philippines). This classification sets Monsanto's agenda for its international expansion (currently, international represents 43% of sales). The international environment seems to be favorable for Monsanto's overall businesses, however Canada, US, EU, Australia, and Japan are clearly the leading markets for the emerging cardiovascular business.

Figure 3.10.2 depicts a list of key opportunities and threats for Monsanto as pertaining to its new direction as a life science company.

Environmental Scan: Monsanto	
Key opportunities	
Economic Overview	Creation of Economic blocks in EU, NAFTA , South America and the opening of China should provide opportunities for using the size of the company to compete in terms of cost, quality, and pricing
Primary Industrial Sectors	In biotechnology, pharmaceuticals and chemicals a higher emphasis in R&D effort should be done to increase the launching of new products, as the patents of the current start products are almost exhausted
Technological Trends	Opportunity for becoming leaders in R&D in biotech technologies
Supply of Human Resources	Availability of skilled management and wide offer of scientific skills through universities and scientific research centers - network
Political Factors	Unified Europe will bring stability to the zone. Opening of China would soften the treatment toward foreign investors in that country. In Latin America, there is a stable political environment.
Key Threats	
Economic Overview	Margins could continue falling with the increase in competition, as it has happened in the food ingredient division with Aspartame, and with the near end of Patents for Round Up. End-User-branded products should be increased
Primary Industrial Sectors	Very hard competition in growing markets. Chemical industry seems to be a mature industry and Monsanto has been underperforming in this industry when compared to main competitors
Technological Trends	Increasing investment in biotechnology by chemical companies. Small companies could profit from research from staff of scientists from universities.
Supply of Human Resources	Unions in Europe could be a problem, intense competition for talented people
Political Factors	Political Uncertainty in Eastern Europe and possible pressure in China against foreign competitors
Social Factors	Increased concern over environment

Figure 3.8.2 - *Environmental Scan for Monsanto, updated to the end of 1996.*

3.12 Summary of Monsanto's Strengths

Figure 3.12 summarizes Monsanto's internal scrutiny regarding its current and desired strengths. The current competencies, particularly items #1-#3, will provide advantage to Monsanto as it considers its approach to the cardiovascular market. The list of required strengths are also applicable to the new targeted business.

Summary of the Corporate Internal Scrutiny: Strengths and Weaknesses
Current Corporate Strengths
1. Application of R&D for innovation: new products to current and new applications
2. Advanced R&D capabilities
3. International Management Expertise
4. Proactive environmental policies
5. Vertical integration toward customers
6. Post retirement and Health Care employee benefits
7. Employee savings and stock option plans
Required Corporate Strengths
1. Increase knowledge of end-use-customer products
2. Increase synergism between SBU's
3. Attain cost leadership in all SBU's
4. Increase transnational infrastructure
5. Increase marketing capabilities
6. Increase presence in current and in newly opening international markets
7. Become the environmental leader

Figure 3.12 - *Monsanto's Strengths*

3.13 New Life Science Business and Strategic Direction

At the beginning of 1997 the company entered a new stage in its life. Their decision to become a life sciences company followed the announcement to spin off the chemical division. The life science business will require a redesign of the company, in terms of reorienting the existing assets, acquiring new assets (especially in the human resources

dimension) and redefining its business areas. Figure 3.13.1 illustrates a possible new company structure.

This chart clearly expresses the direction taken by the company in terms of their philosophy for competing in this business in the 21st century. The creation or redefinition of business areas, (Agriculture, Food & Consumer, Pharma, Nutrition, Health & Wellness and Sustainable Development Teams) considers a complete set of dimensions that could provide a life science total customer solution and also can manage an increasing number and variety of business within it. The concepts embedded in this structure provide the company with high flexibility when defining what businesses the company will be in, especially in an industry where the type of products and services will evolve dramatically.

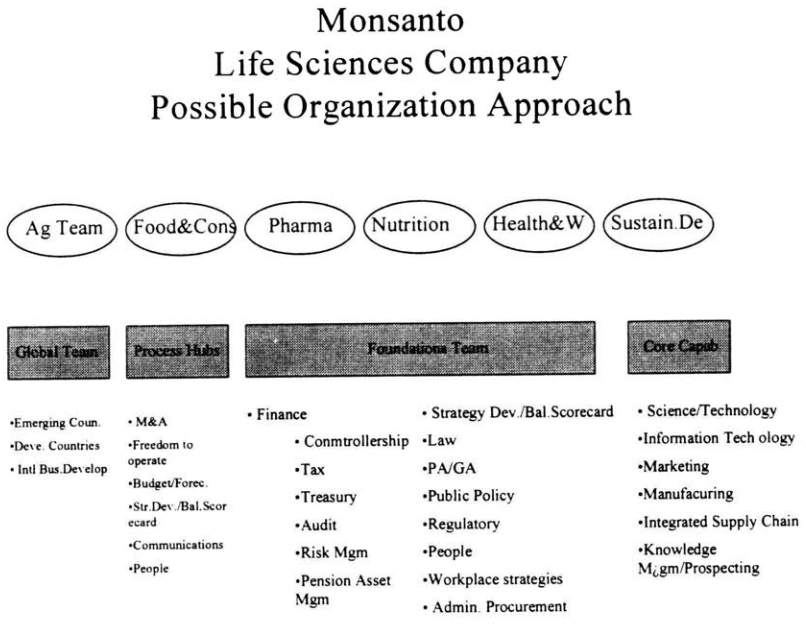


Figure 3.13.1 - *Monsanto Life Sciences*

The new business areas are supported by the same previously shown stewardship functions however new functions are being added to facilitate the coordination and the learning process within the company. For instance, among these supporting areas, the Global Team and Core Capabilities areas have been added. The Global Team will have responsibility for coordination of the efforts in the global markets which are served and there will also be specific responsibility for coordinating all international business development. In the Core Capabilities area, there will be responsibilities related to the management of the global functions and management/sharing of knowledge, including IT, science and technology, marketing and manufacturing. This area will be responsible for managing the complex network of alliances and partnerships emerging for research and technology development in biotechnology. We will revisit this new organizational design in Chapter 7 when discussing the business model and the strategic positioning of Monsanto in the cardiovascular segment of the life science industry.

3.14 Monsanto's Biotechnology Capabilities

One of the clear sources of competitive advantage, that Monsanto should be able to leverage for the cardiovascular business, is its strengths in biotechnology, particularly within the scope of its agricultural business.

Monsanto is driven by the belief that the company's future rests on its ability to be as strong in biotechnology as they have been in their Roundup and NutraSweet products.

They are competing with research departments of large multinational companies on a global basis, and therefore, they will require sufficient creativity and commitment in order to achieve a similar leadership position in biotechnology.

Monsanto appears to be 4 to 5 years ahead of its key competitors in developing agricultural biotechnology for commercialization. The key issues here are mainly how to create proper institutional and pricing structures to profit from these technologies. For instance, the pricing structures must be reasonable and consistent with the standards in the different countries in which Monsanto operates. The challenge is to lock in its competitive advantage in biotechnology research and applications.

Agricultural research on farm products had been done by the US government and land grant universities in the past. However, in the last 10 years private research outpaced public research, driven by plant breeding and livestock improvement efforts, (two linchpins of the biotechnology revolution). Instead of developing the technology from scratch, alliances between chemical, seed, and biotechnology companies have flourished in the private sector, as seen in the following table:

Biotechnology investment varies by company ($ in million)				
Company	1995 sales	Biotech Research	Seed Research	Biotech Partners
Monsanto	8962	50	100	Asgrow, Calgene, DeKalb, Northrup King, Pioneer,

				Agracetus, Ecogen, Mycogen
Dow Elanco	n/a	n/a	n/a	Mycogen
Pioneer Hi Breed	1532	33	110	Human Genome Sciences, Monsanto, Mycogen
DeKalb Genetics	319	6	38	DuPont, Monsanto, AgrEvo, BASF
Zeneca Vanderhave	462	7	13	none
Novartis seed Div.	900	20	10% seed sales	Monsanto (Northrup King), Mycogen (Ciba Seeds)
Asgrow Seed	170	6	19	AgrEvo, BASF, Ag Products, DuPont, Monsanto
Mycogen	106	60	15	Ciba Seeds, DowElanco, Pioneer, Cargill
Source: Adapted from Des Moines Register, March 31 1996. Casewriter estimates upon industry sources and research.				

Figure 3.14.1 - *Biotechnology Investment & Structure (Agricultural)*

In these alliances, the chemical companies provide capital and marketing expertise, seed companies provide sound seed varieties, and biotechnology companies have expertise in genetic research but unproven expertise in commercialization of agricultural products. The following chart depicts Monsanto's relationships in this industry.

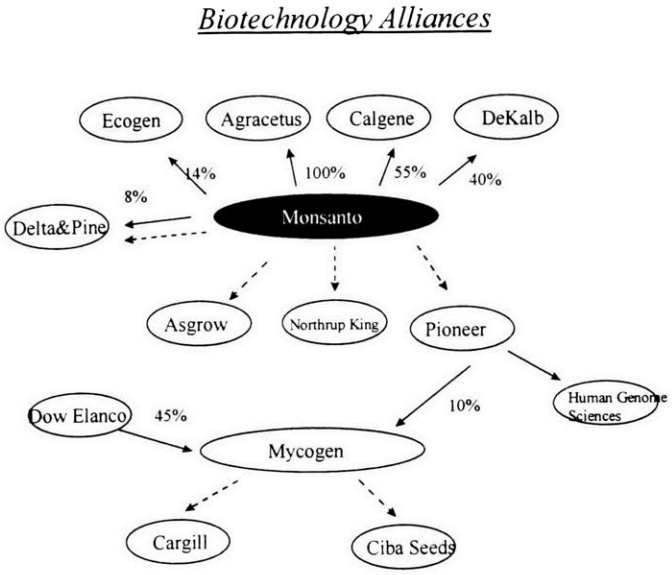


Figure 3.14.2 - *Monsanto's Biotechnology Alliances in Agriculture*

The biotechnology alliances provide Monsanto with the required network to sustain knowledge leadership in this industry, which is its core competitiveness. As discussed in section 3.13, the company is attempting to develop a proper internal structure which is able to manage the knowledge of this global operation.

3.15 Chapter Conclusions

From its inception, the Monsanto Company has evolved from being a global player in the chemicals industry to a leadership role in the agriculture and food ingredients markets. It has achieved that leadership role through its relentless pursuit of biotechnology capabilities. Most recently the company announced that it will utilize its strength to emerge as a dominant force as a life science company.

The source of value in the new Monsanto is the strong synergism of the different businesses in terms of product development and closeness of its distribution channels. In this sense the company is in a strong position to improve its current products, create new products, and broaden its current portfolio of customers within its markets. In addition, the company intends to increase its foreign sales which today represents 40% of revenues.

It is quite apparent that Monsanto has the core competencies and capabilities to effectively compete in the life science industry. In evidence of this is seen in its business model for the crop protection industry (Appendix 5) and their agriculture biotechnology innovation process inclusive of the type of alliances and partnerships that they have developed to achieve and retain a leadership position. This leadership position seems to be very close to a "Proprietary Standard" position. This business model, from within the company, could be a benchmark for the business model to be applied in its emerging nutrition and nutraceuticals businesses within the cardiovascular market..

Chapter 4

Cardiovascular Market

This chapter analyzes the US cardiovascular market with regard to the nature of the customers needs, its size in terms of market value, the health risk factors that define the market in terms of segmentation and the number of potential customers and finally, the type of products that can satisfy the customers needs.

4.1 Overview

Approximately 60 million people in the US suffer from cardiovascular diseases (CVD). The major incidence of disease is related to high blood pressure (50 million of people), coronary heart disease (11 million) and stroke (3 million). The breakdown of deaths from cardiovascular diseases shows that 51% of them are caused by coronary heart disease and 16% by stroke. In terms of the cost embedded in such statistics, the size of the problem in this market is approximately $259B per year. The direct costs, (health treatments), are approximately $159B and it is important to point out that only 15% of the population that should be treated is currently under treatment. The indirect costs of CVD are approximately $100B (loss of productivity due to morbidity and mortality). Within such figures, coronary heart disease causes approximately $91B and stroke causes $41B.

The approach used in analyzing this market is through the identification of the major risk factors for CVD. Such factors can be classified in 1) major risk factors and 2) contributing factors. Major risk factors are those associated with a significant increase in the risk of CVD. Contributing risk factors are those associated with increased risk of CVD. When analyzing the risk factors for stroke, we classify risk factors as 1) controllable risk factors (those who are modifiable, therefore, can be treated) and 2) risk factors that can not be changed.

The initial segmentation of this market was done by defining primary and secondary segments. Primary segments are basically end-consumers of products for CVD, such as cholesterol lowering drugs or related nutraceuticals. Secondary segments are those institutions or entities that can directly influence the consumption or purchase decision of the end consumers, such as service providers (HMO, employers, educators, etc.) and policy makers (government, health care institutions, etc.). The next step in the segmentation analysis is to further divide the primary segment. The criteria for this further segmentation is focused on modifiable risk factors. They are the market drivers in terms of identifying who will want and need the products and services. In other words, what are the needs that have to be satisfied; what products or services satisfy those needs; what segment of the market is currently more sensitive to the CVD problem; and what type of marketing campaign has to be developed. In that sense, this further segmentation is focused on identifying the incidence within the population of each of the risk factors (age, gender, race, etc.).

The section about cardiovascular products within this chapter addresses the type of products and their required characteristics, based on the requirements for the prevention and rehabilitation of CVD. Prevention and rehabilitation involve a balanced set of activities which in terms of defining the offer in this market, represent the guide for developing the products (drugs, nutraceuticals, enhanced/healthy foods, etc.) and services (mainly health services and information). There is empirical evidence that shows that there is an increasing share of nutritionally improved foods in US supermarkets.[9] This type of food is increasing in volume and they are also commanding a premium in terms of their relative price when compared to the "regular" products. This is a sign that the consumers are willing to pay more for their healthy characteristics which may highlight an increasing customer awareness about the links between good health and diet. This is a very important point for companies like Monsanto when planning the entry modes into the emerging nutraceuticals industry.

The American Heart Association (AHA) is by far the leading expert group for understanding the cardiovascular market. It has taken a systematic approach to this market which involves; defining the risk factors, segmenting the market according to those factors providing information and guidelines (dietary and physical plans for the US population), and creating and promoting products through partnerships with pharmaceutical and food enterprises.

In terms of the difficulties and challenges facing the players in the CVD market, the main issue is how to extract value in the market or, in other words, what will the business model look like. It will be seen that the current stage in the market is a series of independent private actions in product and service development from different, and generally independent players. There is an opportunity to approach the market as an integrator by bundling and customizing products and services (mainly information and medical advice). This is a logical deduction from the segmentation and cardiovascular product analysis which was built upon the major risk factors and the advice about prevention and rehabilitation treatments provided in the guidelines given by the AHA. This opinion is also supported by the market competitive analysis included at the end of this chapter.

4.2 The Cardiovascular Diseases : Size of the Problem in the US

According to 1992 estimates from the American Heart Association, approximately 59 million Americans have one or more forms of CVD. The following is the list and population statistics of such diseases:

Disease	Population
• High Blood Pressure	50.0 million
• Coronary Heart Disease	11.2 million
• Stroke	3.1 million
• Rheumatic Heart Disease	1.4 million

Figure 4.2.1 - *Population Statistics for CVD (1992)*

CVD caused around 1 million deaths in 1992 (43% of all deaths) in the US, compared to 521,000 by cancer; 86,300 by accidents and 33,500 by AIDS. The following data shows the breakdown of deaths from CVD for the US in 1993:

Disease	%
• Coronary Heart Disease	51.2%
• Stroke	15.7%
• Diseases of arteries	4.5%
• Arrhytmias	4.5%
• Congestive Heart Failure	4.4%
• High Blood Pressure	3.8%
• Valvular Heart Diseases	1.6%
• Congenital Heart Defects	.8%
• Rheumatic Heart Disease	.6%
• Other	13.1%

Figure 4.2.2 - *Breakdown of CVD Related Deaths*

Figure 4.2.3 shows the total cost in the US attributed to CVD for 1997. The estimates consider the direct costs incurred by the patients and the healthcare system as well as the indirect cost to companies and the country due to productivity loss.

Estimated Direct and Indirect Cost of Cardiovascular Diseases and Stroke
United States 1997, $ billions

	Heart Disease*	Coronary Heart Disease	Stroke	Hyper. Disease	Congestive Heart Failure	Total CVD**
Direct cost						
Hospital Nursing Home	60.6	35.7	21.5	6.7	13.5	111.5
Physician/Other Professionals	12.1	6.8	1.9	6.8	1.2	23.7
Drugs	5.7	2.7	0.3	7	0.9	13.8
Home Health/Other						
Medical Durable	4.3	1.3	2.4	1.3	1.8	9.5

Total Expenditures	91.7	47.5	26.2	21.8	17.5	158.5
Indirect Cost						
Lost Productivity Morbidity	15.3	6.4	5	4.7	NA	24.6
Lost Productivity Mortality ***	60.2	37	9.7	3.5	1.3	75
Grand Total	167.2	90.9	40.9	30	18.8	259.1

* This category includes coronary heart disease, congestive heart failure and part of Hypertensive disease as well as other "heart" diseases

** Total may not add up due to rounding and overlap. This category includes other diseases not shown here.

*** Lost future carryings of persons who will die in 1997 discounted at 6 percent

NA not available

10

Figure 4.2.3 - *Cost of CVD in the US (1997)*

According to the figures shown above, the total cost from cardiovascular diseases and stroke for the US in 1997 is estimated at $259B which includes health expenditures (direct costs including the physicians, hospital and nursing home services, the cost of medications, home health and other medical durable) and the loss of productivity caused from morbidity and mortality (indirect costs). It is interesting to note that the direct cost incurred by patients is around $159B (including $14B for drugs). It is also important to point out that only 15% of the population under high risk of CVD is being treated by physicians according to US national health statistics.

The following shows a further breakdown of estimated 1997 U.S. costs by type of CVD:

Disease	Population
• Total Heart Disease *	$167.2
• Coronary Heart Disease	$ 90.9
• Stroke	$ 40.9
• Hypertensive Disease	$ 30.0
• Congestive Heart Disease	$ 18.8
• Total Cost of CVD	$ 259.1

* Includes Coronary Heart Disease, Congestive Heart Failure and part of Hypertensive Diseases and others.

Figure 4.2.4 - *Cost by Type of CVD (US 1997)*

4.3 Risk Factors for Heart Disease

According to clinical and statistical studies there are several factors that increase the risk of heart attack and stroke. These risk factors are classified according to the following criteria: 1) major risk factors and 2) contributing risk factors.

Major risk factors are those associated with a significant increase in the risk of CVD. The major risk factors for heart attack that cannot be changed are: 1) heredity (inherited traits), 2) being male , and 3) increasing age. The major risk factors that result from modifiable lifestyle habits are: 1) cigarette/tobacco smoke, 2) high blood cholesterol, 3) high blood pressure, and 4) physical inactivity.

There are also contributing risk factors which are associated with increased risk of CVD. For heart attack, these factors include diabetes and obesity. Stress may also be a contributing factor. Figure 4.3.1 summarizes the risk factors for CVD.

CVD Risk Factor	Class	Treatable	Comments
1) Heredity	Major	No	Children w/CVD parents & African Americans are higher risk
2) Gender	Major	No	Men are at higher risk than women
3) Age	Major	No	80% of deaths from heart attacks are age 65 >
4) Smoking	Major	Yes	Risk of heart attack for smoker is 2X
5) Exposure to smoke	Major	Yes	30% increased likelihood of death from CVD
6) High Cholesterol	Major	Yes	Levels above 240mg/dl cause a 2X risk
7) High Blood Pressure	Major	Yes	Increases the risk of CVD several times
8) Physical Inactivity	Major	Yes	Physical inactivity is a risk factor
9) Diabetes	Contributing	Yes	80% of diabetics die of CVD
10) Obesity	Contributing	Yes	Obesity is a risk factor
11) Stress	Contributing	Yes	Typically cause increase in other risk factors

Figure 4.3.1 - *Risk factors for CVD*

4.4 Geographic Incidence of Heart Diseases - The highest incidence of heart disease is in the south-eastern states of the US, as it can be seen in the following maps contained in figure 4.4.1.

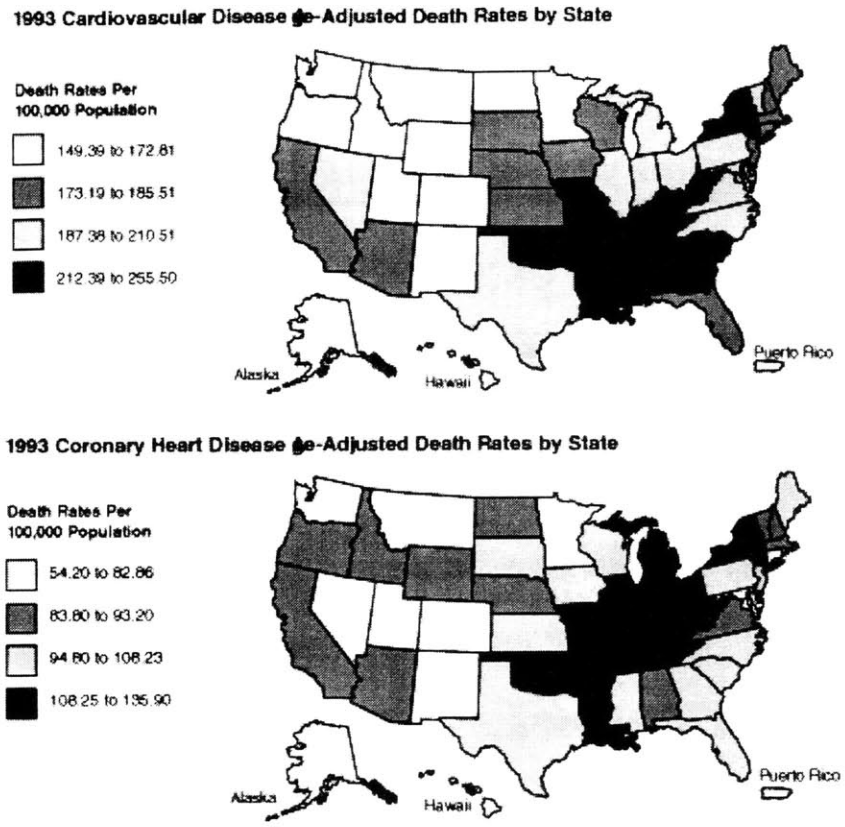


Figure 4.4.1 - *Geographic Incidence of CVD*

The states with the lowest death rates of CDV are New Mexico, Alaska, Utah, Hawaii and Minnesota.

4.5 Stroke

Stroke is a form of CVD that affects the arteries of the central nervous system. A stroke (or "brain attack") occurs when a blood vessel bringing oxygen and nutrients to the brain bursts or is clogged by a blood clot. Because of this rupture or blockage, part of the brain doesn't get the flow of blood it needs. Deprived of oxygen, nerve cells in the affected

area of the brain can't function and die within minutes. When this occurs, the part of the body controlled by these cells can't function either. The devastating effects of stroke are typically permanent. There are four main types of stroke: two caused by clots (ischemic strokes) and two by hemorrhage. Cerebral thrombosis and cerebral embolism are by far the most common, accounting for about 70–80% of all strokes. They're caused by clots that plug an artery. Cerebral and subarachnoid hemorrhages are caused by ruptured blood vessels. They have a much higher fatality rate than strokes caused by clots. Cerebral thrombosis is the most common type of stroke. It occurs when a blood clot (thrombus) forms and blocks blood flow in an artery bringing blood to part of the brain. Blood clots usually form in arteries damaged by atherosclerosis.

4.6 Risk Factors for Stroke

When stroke occurs, there can be severe losses in mental and bodily functions as well as death. The best way to prevent a stroke from occurring is to reduce the risk factors for stroke. Some factors that increase the risk of stroke are hereditary. Others are a function of natural processes while others result from a person's lifestyle. Factors resulting from heredity or natural processes can't be changed, but environmental factors can be modified with a doctor's help. Risk factors for stroke parallel those for CVD.

4.7 Geographic Incidence of Stroke

Strokes are more common in the Southeastern United States (the so-called "Stroke Belt") than in other areas. The stroke belt states are Alabama, Arkansas, Georgia, Indiana,

Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee and Virginia, as can be seen in the next graph from the American Heart Association.

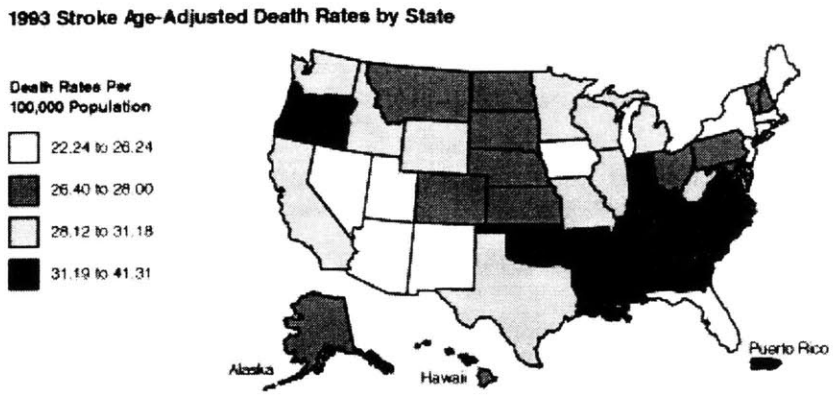


Figure 4.7.1 - *Geographic Incidence of Stroke*

4.8 Segmentation

4.8.1 Overview

In this section we segment the market in terms of customers and end-consumers, with respect to the role of the customers in the system value chain and the previously mentioned end-consumers risk factors.

The following table contains a segmentation in terms of the primary segment to be reached through communication campaigns for products and services for CVD in the US market. It also shows the secondary segments, which can influence the use of such products and services and even can become primary segments in the case of the employers, for example, if they use such products and services as part of their medical benefits to their employers.

PRIMARY SEGMENTS				SECONDARY SEGMENTS	
I	II	III	IV	V	VI
Cardiac& Stroke Patients	Adults	Youth	Cardiac & Stroke Patients	Service Providers	Policy Makers
*In conventional Programs	High Risk	High Risk	* Who lack access to Programs	Healthcare	Healthcare
	Medium Risk	Medium Risk	Patient Support Network:	Employer	Media
	Low Risk	Low Risk	Healthcare providers	Educators	Corporate
			Third party/managed care	Community	Community
			Policy Makers	Childcare	Government
			Families and Caregivers		
			Employers		
			Community leaders and planners		

Figure 4.3.1 *CVD Segmentation*

Primary segments are those segments which define the target of product and service development and marketing campaigns. The primary segments define the focus of the R&D and innovation effort, which represents a considerable amount of resources invested in the market. The secondary segments are basically segments that are required to raise the total market level of awareness regarding the cardiovascular market problem in terms of its cost and also the benefits of the possible solutions, i.e. what is the value delivered to them from the proposed solutions (products and services offered to the market). This is an important issue especially when looking at the detail of the $259B that CVD costs the US as a whole. The case could be made that some of the secondary segments can become primary segments if, for instance, the delivery system passes through an employer's health care benefits system to their employees in order to help to reduce the current cost of CVD in terms of loss of productivity ($100B in 1993). However, a more precise definition identifies the end-consumers as primary segments and this definition will be used in this thesis.

4.8.2 Further Segmentation of End Consumer

The following section defines the segmentation for the end-consumers (Primary Segments, I - IV) and is based upon the AHA research about CVD incidence in the US population. This segmentation is basically the classification of the relevant treatable risk factors for the end-consumers in the CVD market in the US. Those risk factors included: 1) smoking, 2) cholesterol, 3) physical inactivity, 3) overweight and 4) diabetes mellitus.

4.8.2.1 Cigarette/Tobacco Smokers Segmentation

In 1990, about 417,000 Americans died of smoking-related illnesses and nearly one-fifth of deaths from CVD are attributable to smoking. It's also estimated that about 37,000-40,000 nonsmokers die each year from CVD as a result of exposure to environmental tobacco smoke. Smoking-related illnesses cost the United States about $50B annually in medical care.

Every day 3,000 American young people become smokers, according to estimates by the Centers for Disease Control and Prevention. Seventy five percent of adult smokers started before age 18 and 90% began before they were 21.

Current estimates for the United States are that 26.0 million men (28.2%) and 23.1 million women (23.1%) are smokers, putting them at increased risk of heart attack. In addition, an estimated 2.2 million adolescents ages 12 – 17 are smokers. The latest estimates of incidence by gender are that:

- 28.0% of white men and 24.7% of white women smoke;
- 33.9% of black men and 21.8% of black women smoke;
- 24.3% of Hispanic men and 15.2% of Hispanic women smoke.
- Among Asian/Pacific Islanders, 20.4% of men and 7.5% of women smoke.
- Among American Indian/Alaska Natives, 53.7% of men and 33.1% of women smoke.

Appendix 6 provides an extensive breakdown of smoking statistics in the US over the last 30 years.

4.8.2.2 Cholesterol Segmentation

Statistical evidence points to the fact that around 97.2 million American adults (52.1%) having blood cholesterol levels of 200 milligrams per deciliter (mg/dL) and higher, and about 38.3 million American adults (20.5%) have levels of 240 mg/dL or above.

Among non-hispanic whites age 20 and older (the highest number of persons with high level of cholesterol over 240 mg/dL in the US, (around 38 million people), 53.6% of men and 53.0% of women have blood cholesterol levels over 200 mg/dL. Twenty percent of men and 22.5% of women have blood cholesterol levels of 240 mg/dL or more. Among non-Hispanic blacks age 20 and older, 47.1% of men and 50.7% of women have blood cholesterol levels over 200 mg/dL. Approximately 16% of men and 19.2% of women have blood cholesterol levels of 240 mg/dL or more.

About 36.5% of American youth age 19 and under (27.4 million young people) have blood cholesterol levels of 170 mg/dL or higher (this is comparable to a level of 200 mg/dL in adults). More specifically, 27% of white males (8.4 million), 37.1% of black males (2.2 million), 31.5% of white females (9.1 million) and 45.7% of black females (2.6

million) are in this group. Thirteen million boys and 14.4 million girls age 19 and under have blood cholesterol levels of 170 mg/dL or higher.

Appendix 7 contains a complete description of cholesterol segmentation in the US.

4.8.2.3 Physical Inactivity Segmentation

Only about 22% of American adults report regular sustained physical activity of any intensity lasting 30 minutes or more, five times a week. About 25% of Americans age 18 or older report no leisure-time physical activity. According to the 1994 Behavioral Risk Factor Surveillance Survey (BRFSS) around 60% or more of adults do not achieve the recommended amount of physical activity, and in half of the states, 73% or more of adults were not active enough.

About 50% of young Americans, age 12 - 21, do not have vigorous and regular physical activities and additionally, physical activity declines dramatically during adolescence. Even worst, daily enrollment in physical education classes in US high schools has declined from 42% in 1991 to 25% in 1995.

In the segment of adults aged 65 - 74, 33.2% of men and 36.6% of women reported no leisure time physical activity (1992 BRFSS). For people age 75 and over, the figures were 38.2% and 50.5% respectively.

The relative risk of coronary heart disease (heart attack) associated with physical inactivity ranges from 1.5 to 2.4%, an increase in risk comparable with that observed for high cholesterol, high blood pressure or cigarette smoking. Less active, less fit people have a 30 - 50% greater risk of developing high blood pressure. As many as 250,000 deaths per year in the United States, about 12% of total deaths, are attributed to a lack of regular physical activity.

4.8.2.4 Overweight Segmentation

According to recent health statistics, nearly 62 million American adults (28.1 million men and 33.9 million women) are 20% or more above their desirable weight, an increase of 36% over 1960. Thirty three percent of overweight men and 41% of overweight women are not physically active during their leisure time.

The prevalence of being overweight among American adolescents, age 12 to 19, is 21% (20% for males and 22% for females), which represents an increase of six percentage points from the previous reporting period. In this change the greatest increase in prevalence was in blacks among all sex and age groups. Among Mexican-Americans, 39.5% of males and 47.9% of females are overweight.

Appendix 8 provides a dental segmentation of the incidence of overweight persons in the US.

4.8.2.5 Diabetes Segmentation

In 1993, 55,390 Americans died of diabetes. For 1993, 43.5% of total deaths were males and 56.5% were females. About 7.8 million Americans have diabetes (3.6 million males and 4.2 million females) and around 625,000 new cases are diagnosed every year. In 1993 the death rates were 12.2 for white males, 26.3 for black males, 10.0 for white females and 26.9 for black females.

4.9 Cardiovascular Products

We will briefly consider the current products in the cardiovascular market in order to point to the modifiable risk factors of CVD previously mentioned in terms of defining the type of offer for this market. We will also approach the type of products needed in this market in terms of the prevention and rehabilitation issues for the main bulk of CVD, as they were defined in the beginning of the chapter. As a reminder, the modifiable risk factors for CVD are: 1) cigarette/tobacco smoke, 2) high blood cholesterol, 3) high blood pressure , 4) physical inactivity. We will focus on the major volume of CVD: coronary heart disease (51.2% of total) and stroke (15.7% of total) which together account for 66.9% of the total incidences.

4.9.1 Preventive Health Care and Treatment in the Cardiovascular Market

According to the AHA, the basic, preventive healthcare services should be a part of an integral, equitable and comprehensive healthcare plan. As we saw previously,

atherosclerosis begins in young adulthood and is the underlying reasons for most heart disease. Additionally, it may be decades before clinical disease shows up. Large epidemiological studies have pointed to the aforementioned risk factors and also to the strategies to reduce these risks. In the past three decades great strides have been made in preventing and treating heart disease. Unfortunately, since about half of all deaths from heart disease are sudden and unexpected, there's little opportunity for treatment. For people, at risk of sudden death, prevention is the only hope.

In 1993 an estimated 485,000 coronary artery bypass procedures were performed on 309,000 patients. If all heart attack-prone people were treated surgically, the cost would be prohibitive. This is even more true for heart transplants. Technological treatments for heart disease such as angioplasty, thrombolytic therapy, antiarrhythmic drugs and pacemakers are treatments but not cures. More importantly, such procedures can do nothing about slowing atherosclerosis.

The decline in death rates from CVD in the United States is due largely to the public's adopting a more healthful lifestyle. This underscores why it is important for the medical profession to advocate prevention strategies. More and more evidence shows that atherosclerotic plaques in arteries can be reversed even in people with advanced disease. As our understanding of the causes of heart disease and stroke improves, the day will come when we can direct preventive measures at the disease process itself. The opportunity to reduce the major causes of sickness and death from heart disease and

stroke is at hand. Placing greater emphasis on products and services makes sense because in the long run prevention costs less than expensive interventions.

4.9.2 Cardiovascular Rehabilitation

The principles of cardiovascular rehabilitation apply to patients who have congenital or acquired heart disease. Often these patients have been hospitalized for heart attack or surgery. These principles include: counseling the patient about his or her understanding of the disease process and its management , beginning an exercise program; helping the patient alter risk factors such as high blood pressure, smoking, high blood cholesterol and physical inactivity; and supplying information on physical limitations.

When supervised by a physician, cardiac rehabilitation is applicable to patients with congestive heart failure, angina pectoris, myocardial infarction, coronary artery bypass surgery, balloon angioplasty or a pacemaker. It also applies to patients with congenital heart disease who may or may not have had surgery. Although an exercise program is normally included, rehabilitation usually is tailored to each patient's needs.

In summary, regarding prevention and rehabilitation in CVD, the major risk factors suggest that the best approach to the market is for a company to bundle products to solve the problem within the different segments across the market. This strategy is for pharmaceutical products, healthy food and nutraceuticals, for education as well as for changes of life style (including providing accurate and timely information to the target

markets through proper delivery systems, whether directly, through advertising or the creation of new services to consumers, or through some of the secondary segments mentioned earlier in this chapter.

4.10 Type of Products and Services Required for the CVD Market

The following table contains the current cardiovascular products that are already launched or are being developed by Monsanto's pharmaceutical division. It is a clear picture of the focus of Monsanto's activity in this market until 1995. It is also a sign that the company will have to make changes in the focus of its R&D effort in order to get aligned with the new trends from the life science industry according to the aforementioned nature of the problem and the segmentation of this market. In this sense, the company, in its effort to get into the healthy food and nutrition industry (including nutraceuticals) is developing products that lower the level of fat and blood cholesterol, such as a vegetable oil that is currently in its development pipeline. Monsanto is also developing relationships with smaller biotechnology companies which have these type of products in their pipelines.

Product Pipeline Data	Primary Uses/Benefits	Stage of Development
Covera-HS	Advanced treatment for hypertension and angina; provides full 24-hour effectiveness against rise in blood pressure and heart rate	New drug application (NDA) approved by U.S. FDA[1] in Feb. 1996; launch in 1996
Xemilofiban	Prevents/inhibits blood clots associated with bypass surgery or angioplasty	Phase II clinical trials

Tissue Factor Pathway Inhibitor (TFPI)	Prevents blood clotting during microvascular surgery; also being evaluated to treat sepsis	Phase II clinical trials for microvascular surgery; Phase I clinical trials for sepsis
Orbofiban	Backup for Xemilofiban with slightly improved profile	Phase I clinical trials
Epoxymexrenone	Treatment of hypertension and congestive heart failure (next-generation *Spironolactone*) with improved profile	Preclinical
Spironolactone	Treatment of hypertension and congestive heart failure	Establishing effectiveness for treatment of congestive heart failure

Figure 4.4.3.1 *Monsanto's Current Cardiovascular Products (Pharmaceuticals)*

In general terms, the development of cardiovascular products in the market has been led by the pharmaceutical industry. For instance, drugs for lowering cholesterol, a tool for treating stroke and heart disease in high risk patients, is an established market valued at over $ 3.5B. However, in the last couple of years the market has seen the emergence of new types of products within the healthy food and nutraceutical industry which fit the general guidelines given in terms of the required steps for preventing CVD.

4.10.1 Cholesterol Lowering Drugs

Drug therapy is appropriate for patients who, after maximum dietary therapy, still need further treatment for elevated blood cholesterol levels. The guidelines from the AHA are that those persons having a high level of cholesterol and/or a heart disease background, meet the criteria for drug treatment. This is particularly true for elderly

patients. The presence of other CVD risk factors influences the use of cholesterol lowering drugs.

In the market today, the drugs of first choice for elevated LDL-cholesterol are the bile acid sequestrates and nicotinic acid (niacin). These drugs have been shown to reduce the risk for coronary heart disease in controlled clinical trials but both can have negative side effects and require considerable patient education. Another class of drugs for lowering LDL-cholesterol is the HMG CoA reductase inhibitors or Statins, (e.g. lovastatin, pravastatin and simvastatin). These drugs are very effective for reducing LDL-cholesterol levels and have few immediate short-term side effects. Their long-term side effects have not been evaluated in clinical trials. Other available drugs are gemfibrozil, probucol and clofibrate. If necessary (a patient does not respond adequately to single drug therapy) combined drug therapy is also used to further lower LDL-cholesterol levels.

4.10.2 Nutrition

According to the AHA, the best prevention prescribed by US physicians today for CVD is a proper diet. That is the reason that the AHA has made special efforts to develop a dietary plan for the US population. It is important to point out that, at this time, there are no such guidelines for a nutraceutical dietary plan.

"In fact, researchers are now predicting that, in the not-too-distant future, doctors may actually forego synthetically based drugs and instead prescribe onions in your diet to

control cholesterol, chili peppers to fight emphysema, carrots to prevent cancer, cranberries to ward off infections, and beans to regulate diabetes. This new respect for the innate powers of food is actually nothing new at all. Pharmacopoeias of ancient Egypt, Babylonia, Greece, and China were based on food. It was Hippocrates, the father of modern medicine, who proclaimed, "Let your food be your medicine and let your medicine be your food." The importance of a good diet is nothing new. What is new is the affirmation that the incidence of most chronic diseases has a dietary link and that a good diet can help prevent as well as treat disease. Despite the fact that, due to biochemical individuality, some may need to enhance their food intake with isolated nutrients, no supplement can take the place of a basic, well-rounded diet." [11]

The dietary guidelines (AHA) for healthy American adults basically provides a checklist of the daily intakes that an average adult should get in order to maintain acceptable levels of modifiable risks factors (e.g. cholesterol blood levels and blood pressure). Those guidelines provide insight to product needs. Specifically the guidelines suggest that:

- Total fat intake should be no more than 30 % of daily calories.
- Saturated fatty acid intake should be 8-10 % of total calories.
- Polyunsaturated fatty acid intake should be up to 10 % of total calories.
- Monounsaturated fatty acids make up to 15 % of total calories.
- Cholesterol intake should be less than 300 milligrams per day.
- Sodium intake should be less than 2400 milligrams per day, which is about 6000 Milligrams (6grams) of sodium chloride (salt).

- Carbohydrate intake should make up 55-60 % or more of calories, with emphasis on increasing sources of complex carbohydrates .
- Total calories should be adjusted to achieve and maintain a healthy body weight.

4.10.3 Evidence About Market Trends in Nutritionally Improved Foods

A critical question for entrants in the nutraceutical segment for the cardiovascular market is how to extract value for the products. Will consumers pay a premium for enhanced food products. To this question, the following data comes from the 1995 Frazao and Allshouse report[12] on new food product introductions for the US supermarkets. Utilizing scanner data supplied by the A.C. Nielsen Company, they measured sales in both quantity and dollars for all scannable food products in 3,000 supermarkets with at least $2 million in annual sales. This sample is estimated to cover 84% of all supermarket food sales for supermarkets with at least $2 million in annual sales.

This study suggests that the food industry has been actively responding to consumer demand for foods with improved nutritional profiles. More than 3,000 claims were made about the improved nutrient content of new foods in the first nine months of 1995 almost 3 times the number made in 1988. Anecdotal evidence points to an increased availability of nutritionally improved substitutes for many types of food products at the supermarket.

Based on the definitions used for "nutritionally improved versions," the Frazao & Allshouse analysis confirms that there is a strong growth in the availability of nutritionally improved products in grocery stores. Volume sales of nutritionally improved products grew at a faster pace than regular products between 1989 and 1993 and, contributed 78% of the increased volume sales in that period among the 37 food categories. For 12 food categories, growth among nutritionally improved versions occurred concurrently with growth among regular versions, suggesting that nutritionally improved versions might be attracting new buyers. For 18 food categories, growth among nutritionally improved versions occurred at the expense of growth among regular versions, suggesting that consumers might be switching from regular to nutritionally improved versions.

The Frazao & Allshouse analysis also found that nutritionally improved versions generally cost more than regular versions, that is, there is a premium for these products. Among the 37 food categories, 30 had nutritionally improved versions that cost more than the regular versions. Price premiums associated with nutritionally improved versions typically ranged from 2-94% ($0.02-$1.86), with the exception of canned pasta, which had an unusually large price difference of $3.68. Further, nutritionally improved versions became relatively more expensive in 1993 than in 1989 for nearly 57 percent of the food categories examined.

What this data should show Monsanto and other companies in the food industry is that the American consumer wants nutritionally improved versions of food products and they are willing to pay a premium for those products. This tendency is expected to

extend across the broader category of nutraceuticals. As such, the industry is definitely a growth industry with substantial potential. How Monsanto should exploit this potential and play in the nutritionally improved food market will be addressed in Chapter 7. Figures 4.10.3.1 from the Frazao & Allshouse study, shows the increased volume share of nutritionally improved versions for the food categories considered in the aforementioned nutrition study.

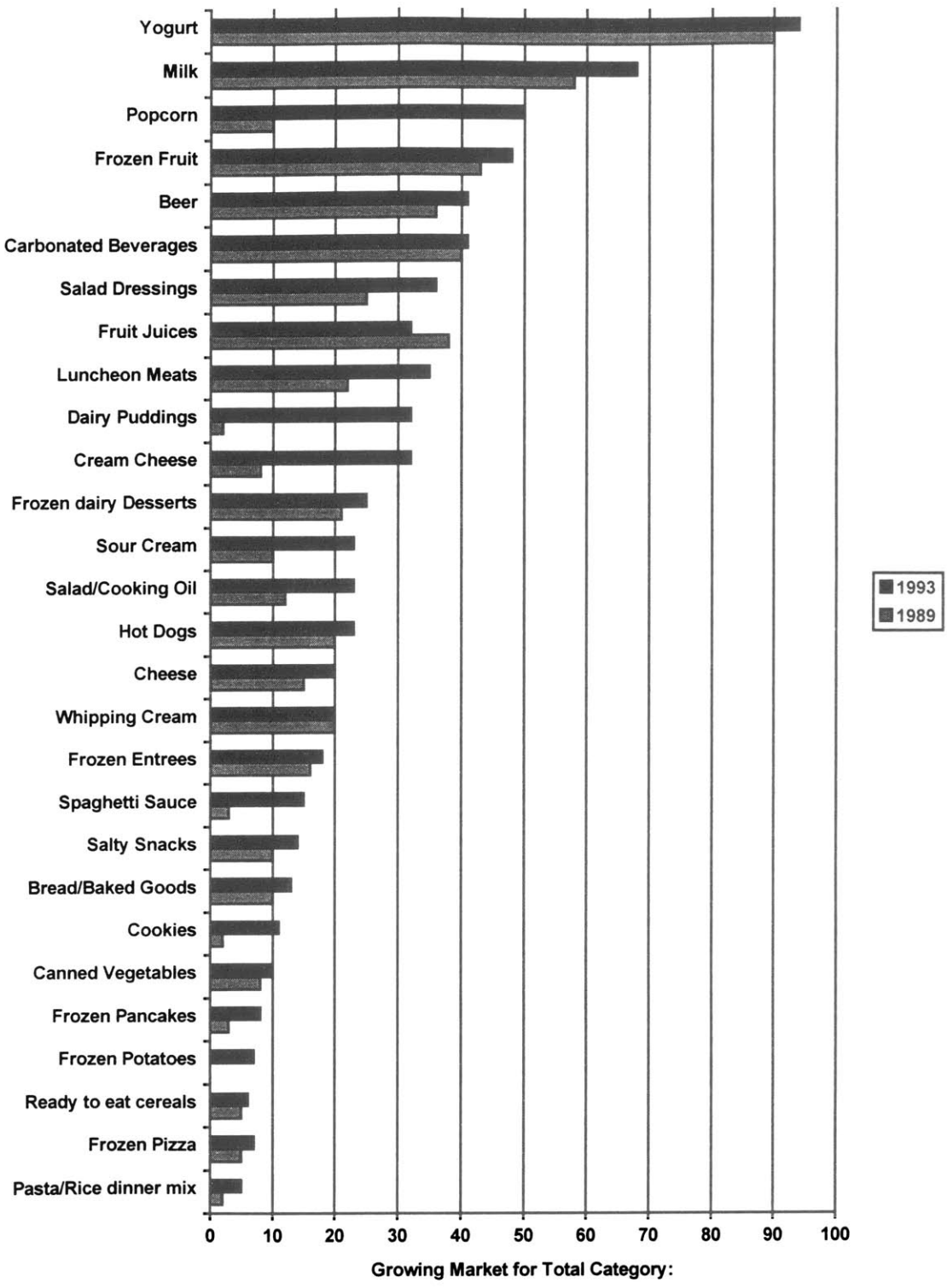


Figure 4.10.3.1 - *Increased Volume Share of Nutritionally Improved Versions*

4.11 Channel and Delivery Mechanisms

In order to be successful in the cardiovascular market, a company will have to be able to access effective distribution channels to the targeted consumers. It is expected that those channels will most likely resemble the channels used today in the food and nutrition industries as opposed to those in the pharmaceutical business. This food distribution system, is shown in figure 4.11.1.

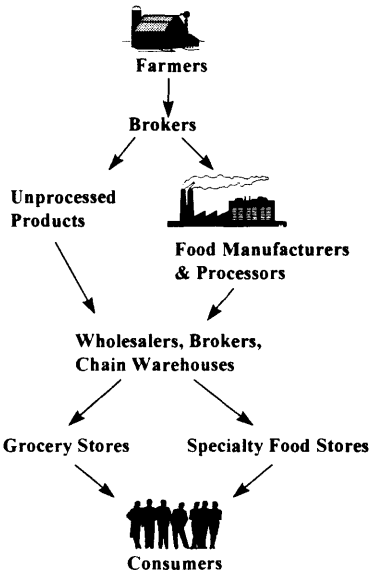


Figure 4.11.1 - The U.S. Food System.

The major sectors of the food industry are: 1) farming, 2) food ingredient and processing companies, 3) wholesaling, and 4) retailing. The three areas that this section will focus on are the food processing and manufacturing companies, wholesaling, and retailing. While farming is a key aspect of the food industry it is not the primary focus of this research and it will not be addressed herein.

4.11.1 Food Processing & Manufacturing Companies

The major function of food processors, such as Kraft and General Mills, is to add utility and value to raw farm products.[13] Food processors interface with both producers and consumers. They buy commodities to be processed from farmers. Although they typically sell to food wholesalers or directly to retailers, they ultimately depend on consumers to purchase and use their products. Some are "further processors" in that they add value to processed foods used as ingredients in their products.[14] Food manufacturing has been defined as "activities that typically use power-driven machines and materials-handling equipment to mechanically or chemically transform raw materials into foods and beverages for human consumption."[15]

Processors provide important functions such as new product and process development, packaging, labeling, branding, storing, transporting, and financing. Processing may result in product differentiation and the derivation of several consumer products from one raw farm commodity. Wheat, for example, is milled into flour, which then is used to make a variety of different baked products and other cereal-based foods. In response to the demands of consumers, processors in recent years have emphasized the development of convenience foods such as "microwavable" foods and refrigerated "fresh" foods, as well as new ingredients, new processing techniques, and new packaging materials and technologies.[16] If new product introductions continue to increase at the

present rate of about 10% annually, there will be about 28,000 new food products introduced by the year 2000.[17]

The food processing industry is becoming more and more concentrated with mergers and acquisitions creating fewer larger and highly diversified firms. Three of the largest mergers of food processors in U.S. history occurred in 1988, including that of the Philip Morris Companies and Kraft to form the largest consumer food company in the United States. Furthermore, competition for a greater share of the food service dollar is moving backwards in the distribution system from the retailers to the processors who are developing and supplying packaged meals, entrees, side dishes, and desserts that require virtually no cooking or cleanup (Campbells Soups, Intelligent Quisine).

Changes in consumer preferences should send signals back to processors to develop innovations that meet the demand for preferred products or product characteristics. The rush to develop specialty products for the cardiovascular market has been a response to the consumer demand for a healthy diet. Consistent with long-term preferences for good health, many consumers want food with less fat and cholesterol and are willing to pay more for it. Consequently, several processors have stopped using animal fats or saturated vegetable fats such as palm and coconut oils. The challenge has been to develop fat-free ingredients that have the functionality and performance of fats in food products. The development of Simplesse, by Monsanto's NutraSweet Kelco Company, and Olestra, by Procter & Gamble, are two examples. Simplesse, which has been approved by the FDA for certain uses, is now being used in a line of fat-free, frozen desserts called Simple

Pleasures. Simplesse is made from milk or egg white proteins and cannot be used in foods that are heated. Olestra, a sucrose polyester made from sugar (sucrose) and fatty acids, can be used in frying and baking.[18] Up to the mid-1990s, some 150 new fat-free food products had been introduced, including everything from Kraft's salad dressings to McDonald's muffins.

4.11.2 Food Wholesaling

Wholesalers move fresh and processed food products from producers or processors to supermarkets, restaurants, and other food service establishments. Their major functions are to purchase, transport, assemble, store, and distribute food to their customers. Wholesalers are experts in buying and selling food and they advise retailers about product availability and prices. The three principal types of wholesalers in the United States are merchant wholesalers, manufacturers' sales offices, and agents and brokers.[19]

Merchant wholesalers purchase and take ownership of food and nonfood items before they sell them. They are classified according to the services they offer, the variety of items they handle, and whether or not they are affiliated with food retailers. Merchant wholesalers may be either full-service or limited-function. Full-service wholesalers supply a number of services that retailers may use, such as inventory control, pricing, financial management and analysis, merchandising and advertising support, private label support, site selection, credit, and financing of new stores. Limited-function wholesalers do not supply these services. Based on the variety of items they handle, merchant

wholesalers are classified as general line, limited line, or specialty wholesalers. Two new classifications that have emerged in recent years include wholesale clubs and national food service distributors.[20]

Wholesale clubs, such as Price Saver and Sam's Wholesale Clubs, are a new type of merchant wholesaler. They originated in the 1970's and expanded rapidly in the 1980's. They are hybrid wholesale-retail establishments that sell food and many other types of products, such as appliances, hardware, and office supplies.

Large processors and manufacturers maintain their own sales force at the wholesale level by staffing manufacturers' sales offices. Selling is done on commission and these offices also are responsible for storing, transporting, and marketing the products. Agents and brokers provide the sales force and marketing services primarily for small food processors, although some large processors also use them. Agents and brokers sell on a commission basis and do not actually handle or take title of the products they represent.

Major changes in food wholesaling are occurring as a result of mergers and acquisitions and the accompanying increase in aggregate concentration. The acquisition of local and regional distributors by large wholesalers is expected to continue. Increasingly, these firms will supply the financial and managerial services needed by independent retailers. Large corporations control most of the assets of the industry. Mergers and acquisitions also have increased consolidation of wholesale clubs and growth in this segment of

wholesaling is expected to expand in the future in terms of markets, services, and products offered.[21]

4.11.3. Food Retailing

The last step in the food marketing chain is the retailer who markets food to individual consumers. Food retailing today includes two main segments: food stores and food service. Food service is the industry that includes the restaurant segment of the food delivery system. As with farming it is not a primary area of interest in this research and therefore will not be addressed.

Food store retailers act as the purchasing agents for consumers. They must remain closely attuned to consumers' preferences. According to Robert 0. Aders of the Food Marketing Institute, "The supermarket is a miracle that happens every day. It is a miracle of quality, convenience, low cost and abundance."[22] Retailers' control store shelf space and their use of product movement information from scanning data to make decisions about what items they will carry, now give them considerable power over producers, processors, and wholesalers. This power was formerly held by processors over retailers through national brand marketing.

Food store retailers buy thousands of food products from wholesalers and sell them in consumer-size quantities. They are responsible for attractively displaying products in the store, monitoring the inventory, storing perishables properly, furnishing information

about food availability and prices to consumers through advertising, and providing a variety of in-store services depending on the type of store. In-store services, which are a form of nonprice competition, range from nutrition advice and recipes to check cashing and bottle redemption. Customers increasingly demand service and choices in the supermarket. Working women and men have little time to shop and cook; they want more prepared food for the microwave; they want pharmacies, post offices, in-store restaurants, and caterers; they want a healthier choice in their food selection; and they want it all under one roof.[23]

Various supermarket formats, which include conventional, extended, specialty, and economy formats, provide consumers with many alternatives for grocery shopping. However, supermarkets are changing and differences among them are becoming less distinct. Conventional supermarkets are being converted into other formats, such as superstores, warehouse stores, health food, or gourmet stores. The extended format, which stresses a broad selection of food and nonfood products and various service departments, includes combination food and drug stores and superstores, the two formats most often developed by chain store retailers. The economy format, which features low prices and less service, includes the hypermarket, super warehouse, warehouse, and limited assortment stores.[24]

The hypermarket, which combines an economy supermarket and a discount department store, is the largest of the supermarkets. So far, European retailers are largely responsible for the growth of this format in the United States. Hypermarkets offer a wide variety of

food products, including specialized food departments, and derive up to 40-50% of their sales from general merchandise items such as housewares, small appliances, toys, sporting goods, automotive, hardware, and lawn and garden departments.

Food stores and food service establishments may either be members of a chain or an independent. A chain is "a food retailer or food service operator owning 11 or more stores or outlets," whereas an independent operator owns "10 or fewer stores or outlets.". Membership in a chain does not depend on dollar volume of the store. Retail outlets are integrated horizontally in chains, and some chains are vertically integrated to include wholesalers and processors. Chain stores may be corporately owned on a national or regional level or privately owned. Food stores that are independently owned and affiliated with a wholesaler are called affiliated independents. Unaffiliated, independently owned food stores are not associated with a wholesaler.[25]

The trend toward fewer food stores is resulting in greater average sales per store and substantial increases in the number of items stocked. New stores are getting bigger, averaging 43,830 square feet in 1986 compared with 29,056 in 1976. Large stores stock more nonfood items and have more flexibility in merchandising and ordering, including direct store delivery of items from the manufacturer. In the future, more stores will use scanner and demographic data to tailor store inventories to the clientele of individual neighborhoods. Other predictions for the future indicate that grocery stores will provide more convenience for shoppers and more one-stop shopping than ever before.

New retailing strategies being developed by supermarkets include marketing to specific ethnic subgroups and an expanded selection of nonfood items and nutritious foods. This will become more prevalent for supermarkets in the future. Food stores in some areas are being organized specifically to enable busy customers to shop and check out quickly. Self-service checkouts permitting customers to scan their own groceries are being tested in some supermarkets. Home delivery, order-ahead service, and drive-through grocery pick-up will spread. Pharmacies, nonprescription drugs, nutraceuticals, and financial services are growth areas for the future.

Throughout history, raw food commodities have typically required a number of initial steps to make them ready for consumption. That has not changed, however, major changes have occurred in how those steps are done and in who does them. As consumers become more affluent, they relegate those steps farther away from themselves and their homes. People desire a food supply that is reliable, affordable, and furnishes healthy products that are satisfying. How well Monsanto meets these consumer's desires will determine how successful they will be in the nutrition and nutraceutical food industry.

4.12 Difficulties and Challenges: How to Extract Value?

The major problem in the cardiovascular nutraceutical market is clearly reflected in the US health statistics. Only approximately 15% of the people that should be receiving medical attention for CVD are being treated and only about 50% of American adults

have checked their blood cholesterol during the past two years. Additionally, the percentage of population meeting the required nutrition levels is just 40%.

The core of the problem seems to be in raising the awareness levels about health related risks within the population and the definition of the proper target market for such communication effort (who wants it and who needs it). This is a matter of investing in communication campaigns and coordination of the key players (co-opetition) in terms of product and service development. Until now the lead role has been taken by the AHA, pharmaceuticals (development of drugs), by some food and biotechnology companies in the development of healthy foods and nutraceuticals (Campbell, Conagra, Monsanto, Medical Foods Inc. and others) and by some universities.

The task for a single company or consortium of companies is challenging because it involves a crucial decision in terms of how to compete in this market. The current structure in the market is a series of independent, private actions for product development. The market has not been approached in a systematic way as it is still in a "Best Product" solution (products higher in fiber and some nutraceuticals that lower cholesterol levels). Even physicians are not aware of emerging nutraceuticals (see chapter 6) and maybe unwilling to prescribe them today.

4.13 Players

Competitors - There is strong competition in terms of pharmaceutical products (lowering cholesterol drugs, for instance) but a lower level of competition in terms of healthy food and nutraceuticals.

New Entries - The emergence of the life science industry will draw players such as Monsanto and Novartis, who will probably bring a set of "Total Customer Solution" products and services. It also may mean strong competition and a drastic change in the market in terms of how to compete. We could imagine that the market will take a new shape in terms of alliances along almost all the activities of the value chain. We expect several alliances in terms of linking the value chains of the key players in this market, from product development (R&D) to the delivery mechanism (channels). In conclusion, new entries are expected to have the most important impact this market in the near future.

Customer - The customers have a low level of awareness in the CVD market and are not colluded. It is not expected that there will ever be collusion in this market because of customer granularity. However, the medical community (intermediate customer) should have a strong position in the emerging life science industry and impact the cardiovascular market, in terms of negotiating power and particularly with regard to delivery mechanisms for new product, services and communication campaigns. In conclusion there will be medium-high power for organized groups of customers (medical

community, industry associations, others) and low power for independent end-customers.

Suppliers - There is high competition in the CVD market for suppliers and it should not significantly change in the near future. We could expect to see some vertical integration and some type of alliances in the future in terms of facilitating the intense R&D activity that will be required. With the high level of competition, there is low power in the supplier force.

Government - The government has the key role in the approval process (FDA), especially for nutraceuticals and for advertising that proclaim the benefits of certain foods. However, there does not seem to be a special heavy restriction in the market from the government side and therefore, does not seem to be a distorting factor in the market's future development.

The CVD market for nutritional foods and nutraceuticals is very attractive. The first movers, who take a systemic approach, can capture the customer loyalty (end-customer, customers as medical community, employers, etc.) and create strong brand awareness. After this stage, the market will evolve to be very competitive and ultimately less attractive.

4.14 Chapter Conclusions

In this chapter, we attempted to provide a description of the cardiovascular health market by: 1) defining the problem scope, 2) segmenting the customers, 3) identifying current product and service offerings, and finally, 4) describing the delivery channels. What follows is a brief summary of those areas.

The cardiovascular market is undergoing deep changes in terms of the nature of the product and services that will be provided to the customers. Approximately 60 million people in the US alone suffer with CVD with major incidences of high blood pressure, coronary heart disease, and stroke. Consumer education and awareness is quite low, as evidenced by the fact that only 15% of these at high risk are actually receiving treatment. It is estimated that CVD cost the US in excess of $250B annually. Based on the shear magnitude of its impact in the US, we expect that the commercial cardiovascular market should be at least $100B, involving products such as medical service in prevention and rehabilitation, drugs, healthy foods and nutraceuticals as well as new forms of delivering information to the customers.

The key to segmentation in the CVD market is the risk factors which were classified as modifiable or not. It is these risk factors that allowed us to classify the potential customer base. Particular emphasis is placed on the modifiable factor as they represent the foremost opportunities for companies to create products and services. Among the

modifiable risk factors, blood pressure, cholesterol, obesity, diabetics, and smoking were clearly prime areas for business consideration by Monsanto.

Against this framework of risk factors, we segmented the customers as primary and secondary segments. Secondary segments are those entities that have the ability to influence the purchase decisions, ergo demand, of the consumers. These entities include such groups as medical associations, healthcare companies, physicians, and government. The primary segments are the end consumers. Those segments were further broken down by the modifiable risk factors with regard to incidence by gender, race, geography, and age. Without repeating all of the detail within the chapter, we can see that high incidence of CVD in the US occurs in males; in African Americans; in the Southern and Mid-Atlantic states; and in older adults. That is not to suggest that the other groups of end consumers should be excluded from consideration as potential customers within the marketplace.

The vast majority of commercial offerings today are from businesses marketing singular product categories. Those products include drugs from the pharmaceutical industry as well as some nutritionally enhanced foods primarily from the food industry. Dominant delivery mechanisms are seen as those channels that exist today in food retailing to the individual consumers.

The main conclusion of this chapter is that the CVD market should not be approached just from a single category of products, (Best Product approach), because of the nature of

the customer needs. Those needs are highly diverse and suggest that there is an important opportunity to build brand loyalty in this market which becomes a key factor for establishing a Proprietary Standard position in the long term. The best approach to satisfy such a diversity of needs and segmentation is through a Total Customer Solution by a company able to bundle medical services, health information, drugs, and nutritional food and nutraceutical products. The secondary segments of customers have strong incentives to create partnerships that can result in comprehensive offerings, due to the inherent opportunity contained within the CVD system.

Chapter 5

Competition

In this chapter, we will endeavor to identify the probable sources of emerging competition in the nutraceutical CVD market. From that broad perspective, we provide a detailed view of five companies that were selected as representatives of the emerging competitive sectors.

5.1 Overview

The nutraceutical industry is not a clearly delineated market at this time. It is starting to take form out of traditionally well defined businesses which include the nutrition industry, the food industry, and the pharmaceutical industry. At the intersection of these three major markets is emerging what portends to be an attractive business, nutraceuticals. Figure 5.1 provides an overview of the industry mapping.

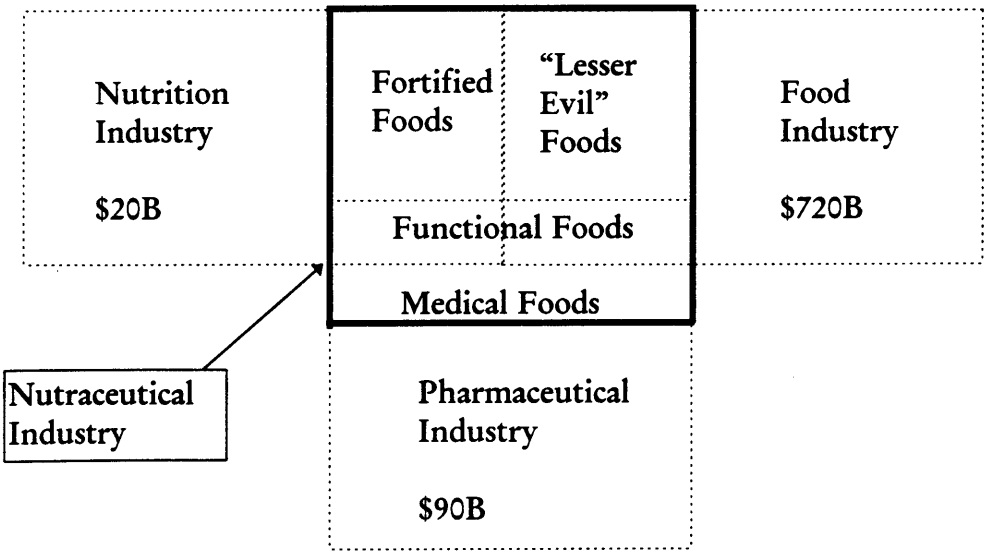


Figure 5.1 - *Nutraceutical Industry*

There is a lot of confusion today within the industry as to the exact definition of nutraceuticals. Some firms narrowly define this segment as only those products which contain medical attributes, emanating out of the pharmaceutical side. Others take a broader approach and include non-pharma enhanced attributes in the category. For the purpose of this paper, we will take the broader approach. As shown, the nutraceutical industry is broadly composed of "fortified foods", "lesser evil foods", "functional foods", and "medical foods". These groups emanate out of overlapping product areas from the nutrition, food, and pharmaceutical industries. It is from within this nutraceutical sector that more direct product applications for the cardiovascular market are expected to come. As there are many descriptions today of nutraceutical foods, it would be appropriate to define some of the terminology:

- Nutraceuticals - food or food ingredients that offer medical and/or health related benefits including prevention and treatment of diseases,
- Functional Foods - foods with added ingredients or extra concentrations of substances designed specifically for health or performance purposes (e.g., sport drinks, enriched grains, prepared food items),
- Lesser Evil Foods - foods that have been altered by removing unwanted substances (e.g., low fat, low calorie, caffeine free, fat substitutes), and
- Medical Foods - foods that are consumed under the guidance of a physician and intended for dietary management of a disease or health condition (egs., dietary drinks, drug enriched food supplements).

The total nutraceutical market was estimated at close to $80B in 1995. Monsanto's current product lines tend to align themselves most closely with "functional" and "lesser evil" food segments. These segments sold in excess of $36B in 1995 and are also expected to grow rapidly in the next five years. Attracted by this growth potential, a number of major companies from within the industries shown in Figure 5.1 are beginning to offer products in the nutraceutical market segment. From the pharmaceutical industry, companies such as Hoechst and Merck are in competitive positions with Monsanto's pharmaceutical business unit, Serle, with specific pharmaceutical product offerings in the cardiovascular market segment. Considering the lesser evil foods, ConAgra, Opta, Nabisco, Proctor & Gamble, and Quaker Oats are all marketing fat replacement products. In addition to these, many other major food companies have product offerings in the lower fat categories such as Kraft, General Mills, and Frito-Lay. The number of serious players grows as you consider the functional food segment. Kellogg's is marketing a "Heartwise" line of products and Campbell Soups has recently launched its "Intelligent Quisine" line of foods. Other non-traditional food type companies are also potential players. Eastman Chemical and DuPont have both developed food preservative products that could provide expanded entry into the business. In addition to these large companies, there are a number of smaller, biotech medical firms developing products that could be categorized as medical foods. Two such businesses are Medical Foods and IVAX/Baker Norton both targeting current products at the diabetic market segments.

5.2 Competitors

The list of potential competitors (and therein, potential complementors) for Monsanto's product offerings in nutraceuticals and even at a finer granularity, cardiovascular, is quite extensive. This is again clearly due to the opportunity to enter the market segment from at least three distinct industry positions, all of which provide unique advantages. In addition to this dynamic, the value chain structure for the basic nutrition and food sectors is changing significantly. What had historically been a long value chain with distinct boundaries is becoming much shorter with many overlapping activities. In the past, there was a low level of vertical integration amongst participants. The value chain for a product segment from raw material to the consumer often entailed five separate companies which normally dealt with each other on an "arms length" transaction basis. Today, major players are beginning to aggressively move backwards and forwards through the chain with companies such as GNC and the Wieder Nutrition Group working to establish capabilities that include activities from product development through customer retail. Additionally, what once were distinct, arms length transactions in the chain have become more continuous and fluid among the separate entities. A prime example of this is the relationship that Proctor & Gamble has established with Wal-Mart. A paperless order system has been created for all Proctor & Gamble products inventoried and sold at Wal-Mart. P&G receives near real-time sales and inventory data via electronic telecommunications that allows them to provide just in time product service to a major retailer. Along with this blurring of functions within the value chain, alliances and new joint ventures are also being formed in order to take advantage of

unique strengths within the major industry segments. A pharmaceutical company with strong expertise at developing and gaining government approval of new medical products may lack the expertise in marketing nutritional or food products directly to consumers. In such a case, forming a business relationship with a strong player in the food industry, which has well established distribution channels and marketing experience, would provide synergies for both parties.

In order to provide a more focused analysis of those companies that are likely to compete with Monsanto in the nutraceutical cardiovascular market, it is necessary to narrow the list to five companies. One way of identifying possible competitors in this market are to consider those companies that are developing relationships with major health associations in the United States (secondary segments). The preeminent association for the cardiovascular health sector is the American Heart Association (AHA). Over the last few years a number of companies from the three industries have made major contributions to the AHA as their product lines and services have begun to develop around cardiovascular health. These companies and their sponsorship include:

- Astra-Merck Inc. - AHA Pharmaceutical Roundtable
- AKPharma Inc. - support of the 1995 Heart Ride Program
- Bristol-Myers Squibb Inc. - support of the Lipid Disorders Training Center and AHA Pharmaceutical Roundtable
- Campbell Soup - support of AHA's website, Cardiovascular Risk Management Program, and numerous scientific conferences

- ConAgra - support of the American Heart Walk
- Genentech Inc. - support of "Answers by Heart", member of the AHA Pharmaceutical Roundtable, support of 1995 Scientific Sessions, and thrombosis research
- Hoechst-Marion Roussel - support of AHA's website and 1995 Scientific Sessions
- Pfizer Inc. - support of Heart at Work and the AHA Pharmaceutical Roundtable
- Proctor & Gamble - support of Health Care Program
- Rhone-Poulenc Rorer, Inc. - support of 1995 Scientific Sessions
- Sanofi-Winthrop Pharmaceuticals - AHA Pharmaceutical Roundtable
- SmithKline Beecham Pharmaceuticals - AHA Pharmaceutical Roundtable
- Wyeth-Ayerst Laboratories - AHA Pharmaceutical Roundtable and support of the 1995 Scientific Sessions

Out of these companies we will choose to examine Campbell Soup, ConAgra, and Proctor & Gamble. In addition to those three enterprises, we will also provide insight into Quaker Oats and Novartis. These five companies represent a good cross section of major players from the nutrition, food, and pharmaceutical industries.

5.2.1 Campbell Soup Company

The Campbell Soup Company originated in Camden, New Jersey in 1869 as a canned food processor. The business was formed by Abram Anderson and Joseph Campbell and was originally known as the Joseph A Campbell Preserve Company. In 1897, Joseph Campbell's nephew, Dr. John T. Dorrance joined the new business and quickly made a

significant contribution with the development of the process and product known today as condensed soup. With its new technology, the company was able to offer customers soups for one third the price of the competition. By 1922, the product line had become so successful that the Campbell Preserve Company changed its name to the Campbell Soup Company. Today, the Campbell Soup Company's most famous brands are among the best known and most recognized branded products in America. Internationally, the company has built its reputation for manufacturing and marketing high quality, branded food products into a well respected presence in many countries around the world.

The Campbells Soup Company holds a leadership position in "wet" soups in the United States. The highly familiar name and familiar red & white can is one of the most recognized products in the country and clearly is the company's number one branded product. Estimates of market penetration have indicated that nearly 90% of American households purchase Campbells soup each year. Beyond their standard soup line, Campbells offers additional soup products which include "Healthy Request", a low fat, cholesterol, and sodium product line. In addition to their soups, Campbells own a number of highly recognized and profitable product lines. In 1948, the company acquired the V8 Vegetable Juice product line which has grown to become a very successful product for Campbells. The company markets the drink as a "healthy choice" beverage. In response to the growing trend in nutrition consciousness, a vitamin fortified variety has recently been introduced. Another strong product area for the company is in spaghetti sauces where it now enjoys a 28% market share through its Prego and Barilla brand sauces. In 1995, Campbells acquired Pace Foods which was the largest acquisition

in the company's history. Pace is the number one brand of Mexican style sauces with a 27% market share in the United States. Other well known product lines within the company include:

Swanson Frozen Foods	Vlasic Pickles	Marie's Salad Dressings
Open Pit Barbecue Sauces	SpaghettiOs	Franco-American Pasta
Godiva Chocolates	Durkee Olives	Pepperidge Farms

All of these lines represent market leadership positions in the US within their respective business sectors. In support of these businesses, Campbells has implemented a unique sales structure. Organized as a separate entity, the Campbell Sales Company is considered the vital link to the consumer. Thirty seven customer teams work with key customer accounts to optimize sales and service to high volume areas. This organization has implemented unique logistics support programs that allows the group to continually monitor demand and match inventory on a daily basis to ensure an unbroken chain of supply from their manufacturing facilities to the store shelf. This capability is considered to be a source of great value to the company.

Internationally, the company is focused on becoming as widely known in other countries as it is in the US. Through detailed market research and customer awareness, Campbells has tailored their products to fit the tastes of consumers around the world....highly global with a great degree of localization. Major international markets now served include:

- Canada - Campbell Soup Company Ltd. of Canada is the company's largest operation outside of the US. In addition to selling the majority of Campbells' US

product line, two unique Canadian products include Habitant Soups and Dietcare Puree (a line of frozen foods for health care institutions).

- Mexico - Campbell's De Mexico operations were established in 1963. Many of the company's products have been modified to appeal to the local tastes within Mexico.
- Pacific Rim - Campbell Australia operations are headquartered in Melbourne and serve Australia as well as New Zealand, Indonesia, and the Philippines. In Asia, Campbell brands are being offered in Taiwan, Singapore, Malaysia, Vietnam, China, and Korea. Headquarters for Asian operations are in Hong Kong. Campbells is aggressively pursuing new joint ventures and businesses in these countries. In Japan, Campbells formed a joint venture in 1993 with the Nakano Vinegar Company to market Campbell's product line. Sales are strong as is brand image throughout Japan.
- Europe - Campbells has strong operations in many countries in Europe including the United Kingdom, Belgium, the Netherlands, and Germany. Most of Campbells' US brands are sold in Europe as well as some distinct local brands.
- Argentina - In 1980, Campbells acquired Swift-Armour which was the leading producer of beef products. The company is the largest beef exporter in Argentina and exports its canned and frozen products to over 50 countries.

Financial performance at Campbells has improved steadily. Sales in 1996 from total operations were over $7.6B with net income of $802M. Return on common equity was 29% and earnings per share increased to $3.22. Last year, Campbells had a year end cash position of $34M with a very low leverage ratio. Figure 5.2 shows financial indicators for the company during the last few years.

Indicators		1996	1995	1994
Sales ($M)		7,678	7,250	6,614
Profits ($M)		802	698	630
Return on Sales		10.45%	9.63%	9.53%
Assets ($M)		6,632	6,315	4,992
Debt/Equity		0.27	0.35	0.28
Return on Equity		0.29	0.28	0.32
Earnings Per Share		$3.22	$2.80	$2.51

Figure 5.2 - *Campbells' Financial Performance*

Financial performance is expected to remain strong as Campbells expands its international operations, leverages its current brand strengths in the US, and looks for new business opportunities.

In January of this year, Campbells Soup introduced a new line of products known as Intelligent Quisine. Intelligent Quisine is marketed as the first and only complete meal plan clinically proven to reduce high blood cholesterol, blood pressure, and blood sugar. Developed in close concert with both the AHA and ADA, the meal line enjoys both associations endorsements. Delivered directly to the home consumer by United Parcel Service, the line offers customers over 40 menu items for their complete daily meal requirements, all for approximately $10 per day.

Campbells has many sources of strength by which it can create a strong position in the emerging nutraceutical industry. Clearly its strong brand image, marketing, and extensive international channels are critical competencies. It has also developed a close association with the AHA as well as the ADA. Its new business line, Intelligent Quisine

is clearly a first mover product offering aimed directly at the cardiovascular market segment.

5.2.2 ConAgra, Inc.

ConAgra was established in 1919 in Grand Island, Nebraska when four flour mills consolidated their businesses into one corporation. Originally known as Nebraska Consolidated Mills, the company relocated to Omaha in 1922 where it has remained headquartered ever since. By the early 1970s, the enterprise had outgrown its name due to the extent of diversification in its products. From its heritage and association with farming, the company choose the name ConAgra (stemming from the Latin "with land") to signify its "continued partnership with the land". Today, ConAgra has built the business into a widely diversified global operation that employs over 96,000 people worldwide. Driven by aggressive marketing and acquisitions, sales in 1996 exceeded $24B which is a growth of four times the level of sales in 1986.

ConAgra is a diversified international food company with sales in 32 countries. They have a wide product offering that operates across the entire food chain. Those products include convenience foods sold through large grocery retailers (flour, spices, beef, poultry, cheese, seafood, and dry goods) to farm supplies (chemicals, fertilizers, seeds, animal feed, and other commodity products). Within this wide array of products, ConAgra has very strong branding. The company owns over 70 brands that are clearly

recognized by consumers in the US and of these 70 brands, 21 achieve annual sales in excess of $100M per product. These strong brands include:

ActII Armour	Banquet	Butterball
Cook's	Healthy Choice	Hebrew National
Hunt's	Hunt's Snack Pack	La Choy
Marie Callender's	Orville Redenbachers	Peter Pan
Swift Premium	Swiss Miss	Van Camp's
Wesson		

ConAgra has recently restructured its operation into five strategic units and in the last two years, divested ten non-core businesses and is in the processes of closing or reconfiguring 20 of its manufacturing facilities. The present structure includes six independent operating companies which include: ConAgra Corporate, ConAgra Agri-Products, ConAgra Diversified Products, ConAgra Grocery Products, ConAgra Refrigerated Foods, and ConAgra Trading & Processing. Of these divisions the food inputs and ingredients segments within the Agri-Products and Trading & Processing companies has grown the fastest in recent years (13% last year) followed by the grocery and diversified product units which experienced a 9.5% growth over 1995. ConAgra's international sales operations are organized within its Trading & Processing company. While its products are recognized and sold around the world through its strong brands, the company's manufacturing operations are highly localized within North America.

ConAgra has performed very well for its investors. The company has recorded 16 consecutive years of record EPS and has had double digit increases in its dividends in each of the last 21 years. This alone puts ConAgra in an exclusive group as less than one half of one percent of all the public companies in the US has done both for at least ten years. Sales have grown steadily in the last five years to a new level of $24.8B in 1996. Profits have followed this strong growth pattern as well. In 1996, before a one time restructuring charge, net income reached $545.2M. Figure 5.3 presents financial data for ConAgra.

Indicators		1996	1995	1994
Sales ($M)		24,822	24,112	23,517
Profits ($M)	*	189	496	437
Return on Sales		0.76%	2.06%	1.86%
Assets ($M)		11,197	10,801	10,722
Debt/Equity		1.07	0.9	0.9
Return on Equity		0.11	0.25	0.21
Earnings Per Share		$0.79	$2.06	$1.81

* - 1996 includes a one time restructuring charge of $356.3M after tax

Figure 5.3 - *ConAgra's Financial Performance*

ConAgra has a strong base of widely recognized branded products. This coupled with extensive international distribution channels provides the company with great direct access to consumers. Beyond this advantage, the company enjoys the ability to operate across the entire food value chain with businesses that start at the farm and end on the customers dining room table. It is this position of strength in the food - agriculture business that will allow ConAgra to make strong inroads into the nutraceutical business. One of its brands in particular, Healthy Choice, is a leading business within the nutritional foods market. The product line was actually conceived in the late 1980s after

then CEO Charles Harper suffered a serious heart attack. Introduced in 1988, the Healthy Choice line were the first frozen dinners that offered consumers heart healthy nutrition through low fat, sodium, cholesterol, and calorie content. The line has grown in sales to over $1B annually encompassing more than 300 products which are distributed through grocery stores and food service programs directly into healthcare, industry, and educational institutions. With strong associations with the AHA and the American Dietetic Association, ConAgra is expanding its nutritional and wellness business around this flagship brand.

5.2.3 Quaker Oats

In 1901 three American mills joined together to create the Quaker Oats Company. These three mills had independently begun to mill high quality oat products in the late 1800s, which were typically sold in large barrels in local retail stores. One of the mills, the Quaker Mill Company, in Ravenna, Ohio had registered the famous trademark of the Quaker. These three operations were clearly the leaders in processing oats within the United States. The Quaker trademark quickly became the symbol of purity and quality. Since the company's inception, the operation has grown steadily, diversifying into a broad, somewhat fragmented conglomerate which included a chemicals division, toy company (Fisher-Price), restaurant operation, agriculture division, as well as foods. By the 1980s, Quaker Oats began to divest of many of the non-food operations. With the revenues from these sales, the company made a number of strategic acquisitions that included; Ardmore Farms, Gatorade (Stokely Van-Camp), Golden Grain Company,

Continental Coffee, Snapple Beverages, and Adria Pasta. These companies added tremendous depth to Quaker Oats' food businesses.

The primary strength of the Quaker Oats Company are the numerous strong brands in the beverage and grocery product markets. More than 80% of the company's retail products hold the number one or two retail positions in their respective market categories and nearly 90% of annual sales come from these major brands. These leading product lines include: hot cereals, pancake mixes, sports beverages, premium ice teas, single service juice drinks, oat based snacks, syrups, pastas, cold cereals, and rice products.

Quaker Oats is primarily a North America based operation. Approximately 80% of the company's sales are generated in the US and Canada. Overseas sales of beverages comprise 6% of annual revenues while international foods contribute 11% of sales. While many of the brands are marketed overseas, Gatorade sports beverage is the leading product sold internationally. Quaker Oats is working hard to expand sales of the drink in new countries such as China, Russia, and other emerging Asia pacific markets. In addition to those opportunities, the company is working to expand its market share in many Latin American countries, particularly with its oat, pastas, and canned fish products.

Sales at Quaker Oats actually declined in 1996 to $5.2B which represented a 13% decrease over 1995. This reduction has been primarily attributed to lower sales in Snapple beverages, cold cereals, and rice cake products. Net income for the period was $136.4M

as compared to $1.17B for 1995 (this included gain from some divestiture). Figure 5.4 shows some statistics for the company based on their fiscal year end in June. Earnings per share have declined from over $5 during a twelve month period in 1995 to around $1.80 in 1996.

Indicators		1995	1994
Sales ($M)		6,365	5,955
Profits ($M)		802	232
Return on Sales		12.60%	3.90%
Assets ($M)		4,620	3,043
Debt/Equity		1	1.75
Return on Equity		0.77	0.64
Earnings Per Share		$5.97	$1.68

Figure 5.4 - *Quaker Oats Financial Performance*

While financial performance at Quaker Oats declined during the last year, the company's brands are still very strong. Their low fat, value added oat and rice products are widely recognized entries into the nutritional food industry. With their strong brands and distribution channels, Quaker Oats could make a significant move into the cardiovascular nutraceutical market.

5.2.4 Procter & Gamble

In April, 1837, William Procter and James Gamble formed a partnership and began producing soap products and candles in the greater Cincinnati, Ohio area. Over the next 150 years, this partnership would become one of the largest international companies in the world. By 1890, the Procter & Gamble Company (P&G) was selling more than 30

different types of soap, including one of its most famous brands, Ivory. Fueled by innovative advertising, including full-color print ads in national magazines, consumer demand for P&G soaps grew quickly. To meet this increasing demand, the company expanded its operations outside Cincinnati, with a plant in Kansas City, Kansas, and then outside the United States, with a plant in Ontario, Canada.

Complimenting its expansion in manufacturing, its research laboratory was as busy as its plants. Innovative new products were rolled out one after another; Ivory Flakes, a soap in flake form for washing clothes and dishes; Chipso, the first soap designed for washing machines; Dreft, the first synthetic household detergent; and the first all-vegetable shortening that changed the way America cooked, Crisco. Perhaps most important, these innovations were being driven by an in-depth understanding of consumer needs, gathered through P&G's pioneering approach to market research. In 1946, P&G introduced Tide, its most important product since Ivory. In the years following Tide's introduction, P&G made its mark in several new businesses. Crest, the first fluoride toothpaste, rose to market leadership on the strength of an unprecedented endorsement by the American Dental Association. The company's pulp-making technology fueled its growth in the toilet tissue and paper towel businesses and P&G literally invented the disposable diaper category with the introduction of Pampers in 1961. The company also strengthened its existing businesses, expanding into new food and beverage categories most notably with the acquisition of Folger's coffee in 1963.

In 1980, as it approached its 150th anniversary, P&G was poised for the most dramatic period of growth in its history. The Company that began as a small Midwestern partnership had grown into one of America's largest multi-national corporation. Two important changes marked this dramatic period. First, the Company emerged as an important new player in health care through the acquisition of Norwich Eaton Pharmaceuticals in 1982 and Richardson-Vicks in 1985. Next, P&G entered the cosmetics and fragrances industry with the acquisitions of Noxell, Max Factor and Ellen Betrix in the late 1980s and early 1990s. These acquisitions also fueled the Company's globalization plans. Richardson-Vicks and Max Factor, in particular, dramatically expanded P&G's international presence. Leveraging its new global strengths, the Company established a worldwide research and development network, with research hubs in the U.S., Europe, Japan, and Latin America, and achieved worldwide leadership positions for many of its brands.

As the company moved into the 1990s it became apparent that its international operations needed to be segmented and managed more effectively. In 1995, P&G restructured its business into four major operations; North America, Latin America, Asia, and Europe/Middle East/Africa. Over 50% of its sales comes from outside of the US. As a result of its restructuring, today P&G is truly an international company of enormous scale. With regards to scope, it has 17 R&D centers located around the world. Its manufacturing facilities are located in over 50 countries and sales of its 300 different brands occur in more than 140 different countries of the world.

Financial performance at P&G has improved at a very impressive rate. Sales in 1996 from total operations were over $35.2B with net income of $3B. Return on common equity was 31% and earnings per share increased to $4.29. Last year, P&G had a year end cash position of over $2B with a very low leverage ratio. Figure 5.5 shows financial indicators for the company during the last few years.

Indicators		1996	1995	1994
Sales ($M)		35,284	33,482	30,385
Profits ($M)		3,046	2,645	2,211
Return on Sales		8.63%	7.90%	7.28%
Assets ($M)		27,730	28,125	25,535
Debt/Equity		0.49	0.59	0.72
Return on Equity		0.31	0.3	0.32
Earnings Per Share		$4.29	$3.71	$3.09

FIGURE 5.5 - *Proctor & Gamble's Financial Performance*

P&G has a strong presence in the health care industry through its pharmaceutical and food businesses. In 1995, the company made a major investment in the health care sector by building a large new research & development center located in Cincinnati. This facility is the hub for all health care R&D, bringing all world wide health care development activity under one roof. Beyond its strong pharmaceutical capabilities, P&G has been making large investments in enhanced food ingredients. P&G has been an innovator and marketer of cooking fats for 85 years, starting with the introduction of Crisco shortening in 1911. Crisco, the nation's first all-vegetable shortening, was soon used for cooking and baking by millions of consumers as a healthier alternative to lard

and other highly-saturated fats. P&G introduced Crisco Oil in the 1960s and in 1987 launched the first nationally marketed canola oil, now known as Crisco Puritan Oil.

Building upon this strength the company launched its Olean brand fat replacer on January 24, 1996, a calorie-free fat replacement ingredient that can fully replace the added fat and cut calories in salted snacks and crackers, without sacrificing taste. This announcement immediately followed the U.S. Food and Drug Administration's (FDA) approval of olestra (Olean is P&G's brand name for olestra). The FDA's approval covers the use of Olean in snack chips and crackers, such as potato chips, tortilla chips, cheese puffs and club crackers.

Proctor & Gamble is a financial powerhouse and its strong financial performance is expected to continue. Through its extensive international presence, leadership position in research & development, and strong brands, Proctor & Gamble will remain as one of the world's leading consumer products companies. Undoubtedly, P&G will leverage their position in the pharmaceutical and food ingredient business to capture a share of the nutraceutical industry including the cardiovascular segment.

5.2.5 Novartis

In April 1996, the shareholders of Sandoz and Ciba agreed to the merger of the two Basel-based Swiss enterprises. This was the largest corporate merger in history. The advantages of this merger of equals was clear. The new company, Novartis, moved into a

worldwide leadership position in life sciences. Novartis holds the number two position in pharmaceuticals, number one in crop protection, and has tremendous development potential in nutrition. The name "Novartis" comes from the Latin term novae artes or new arts and new skills. With an annual investment in research and development of approximately 3.5 billion Swiss francs, it appears that Novartis is committed to developing a world class R&D capability. Novartis' motto is "New Skills in the Science of Life," reflecting their vision to create a market powerhouse in the life sciences industry.

Novartis is a world leader in life sciences, contributing to the health and well-being of people with innovative products and services. To accomplish this, the company makes one of the largest R&D investments in the world and has developed a broad network of alliances with leading academic centers and specialized biotech companies. The company has 100,000 employees and operations in over 100 countries. These operations are segmented into three major business segments: Healthcare, Agribusiness, and Nutrition (Figure 5.6).

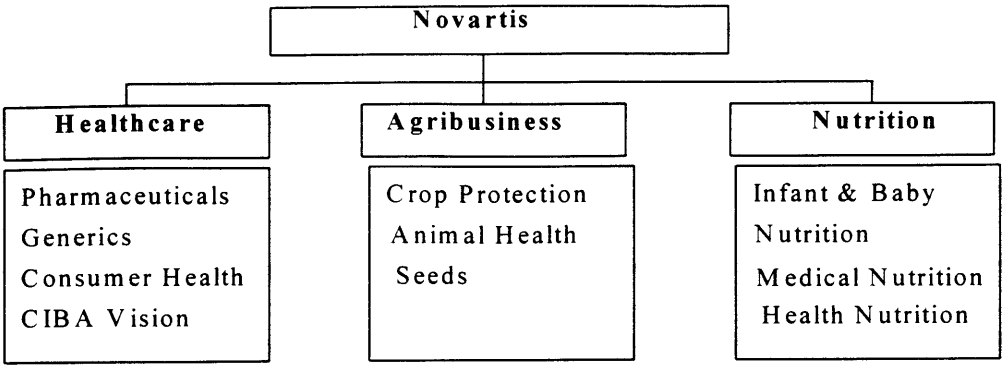


Figure 5.6 - Novartis Company Structure

Sales in 1995 were split among its three major divisions with 58% coming from Healthcare, 27% in Agribusiness and 15% in Nutrition.

Healthcare - Although a new company, Novartis has been a leading innovative force in healthcare for more than a century. Through their broad portfolio of products and services they serve the medical profession in institutions, hospitals, office practice as well as patients all around the world. Novartis currently has almost 100 projects in development, many of them in an advanced stage of clinical testing. Their research and development investment in healthcare exceeded 2 billion Swiss Francs in 1995. In addition, Novartis has a broad competence in biotechnology and gene therapy through wholly owned interests, partnerships and strategic alliances. These include organizations such as Genetic Therapy, SyStemix and Chiron in the USA. Activities in generics, consumer health , contact lenses, lens care products and ophthalmics complement their core pharmaceutical business. Their primary product lines include: 1) prescription

medicines for transplantation and immunology, cardiovascular diseases, diseases of the central nervous system such as schizophrenia, depression, epilepsy, Parkinson's Disease, migraines, illnesses of bones and locomotor system, skin diseases, allergies and respiratory illnesses, and cancer; 2) over-the-counter medicines for colds, flu, inflammation, pain, and skin care; and 3) contact lenses, lens care products, and ophthalmic medicines. These healthcare products command strong market share positions. Their pharmaceuticals rank as the second largest in the world, generics are number one worldwide, consumer health care products are 5th in Europe and 7th in the USA, and its lens care line, CIBA Vision, is the second largest in the world.

Agribusiness - The sectors that make up the Agribusiness Division contribute solutions to food problems and help to protect the health of a wide variety of crops, farm animals and pets. Novartis' crop protection products work to control weeds, pests and crop diseases that reduce yield and quality of harvests. Their animal health line keep farm and companion animals in better health and their seed products breed hardier, more productive crops which also have built-in insect and disease resistance. Novartis Crop Protection has the world's largest research and development budget in this sector and is focused on chemical and biological products which have positive benefit/risk profiles. Novartis Seeds is highly committed to biotechnology research and animal health benefits from research synergies with pharmaceuticals and crop protection products. Agribusiness products include: herbicides for maize, cereal, cotton and sugarcane; insecticides for cotton, vegetables and fruits; fungicides for cereals, vegetables and fruits; parasite control products and medicines for farm and companion animals; and seeds for

maize, sugarbeets, vegetables, and flowers. As in their Healthcare business, Novartis' Agribusiness enjoys leading market share. Crop protection is #1 in the world, animal health is #3, and seeds is #2 worldwide.

Nutrition - Novartis develops, manufactures and markets a wide range of branded, nutritional products. Through their company owned centers of excellence and joint research programs with Novartis Pharmaceuticals and Agribusiness, Novartis provides consumers with high value-added, specialized nutritional products with ingredients that can prevent illness and enhance mental and physical health. The Nutrition segments major products include: Infant nutrition (milk formula, jarfood, juices, cereals, and biscuits); medical nutrition (supplements, tubefeeding devices, dietary products); health beverages; baked goods; sport nutritional foods; sweeteners and sugar-free confectionery. Their market share positions for medical nutrition is #2 worldwide; infant nutrition (Gerber) is #1 in the USA for jarred baby foods; and health nutrition is #1 in Europe for health foods and sport nutrition.

Novartis is clearly a major competitor for Monsanto in many of its market segments. Like Monsanto, it has structured itself as a life science company and operates in most of the same businesses. The major difference in the two enterprises is that Monsanto's primary strength emanates from its biotechnology agribusiness while Novartis' strength is clearly built upon its pharmaceutical background. Novartis will undoubtedly pursue market share in the nutraceutical cardiovascular segment.

5.3 Positioning and Entry

As indicated earlier, these five companies are representative of potential major competitors for Monsanto in the nutraceutical cardiovascular market segment. Each company provides unique strengths that would allow it to achieve significant market share within this business. Moreover, some of the companies have current operations that will allow multiple entry points. Certainly P&G will push hard into the emerging nutraceutical market through its pharmaceutical business. It could also leverage its strength in its food ingredient fat replacement business to expand its offerings in the cardiovascular sector. Referring back to an earlier figure, Figure 5.7 attempts to position each of these five companies on the industry map and conceptually show their probable path to entry into nutraceuticals.

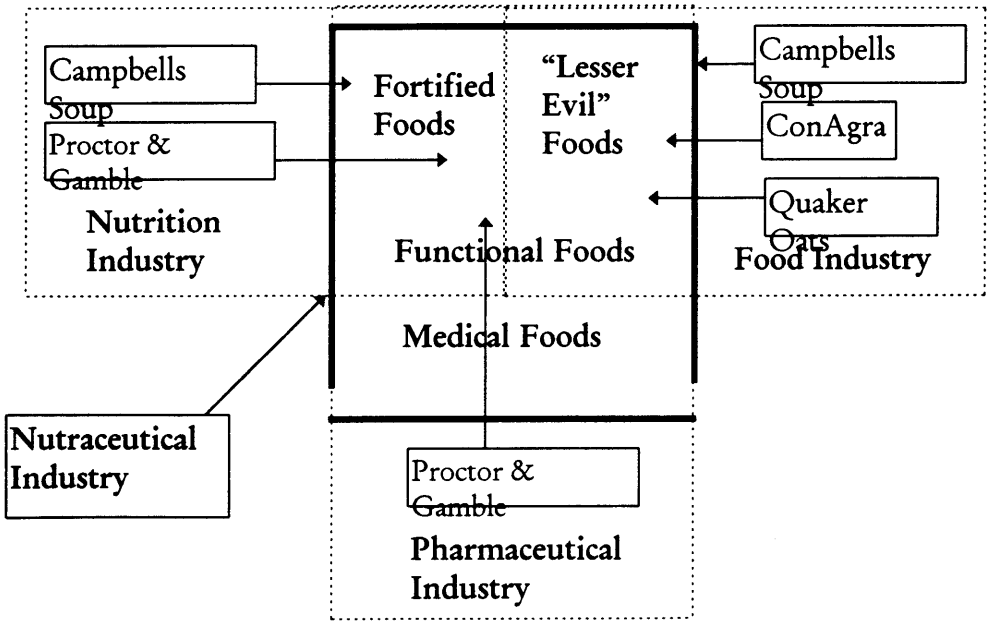


Figure 5.7 - *Competitor Positioning & Entry*

5.4 Chapter Conclusions

Today, the nutraceutical segment for the cardiovascular market is in its infancy. It is expected to emerge out of the nutrition, food, and pharmaceutical industries and contain primary competitors from those sectors. In order to compete effectively, participants must be able to leverage their existing strengths and bridge competency gaps through acquisitions and alliances. For example a pharmaceutical firm must be able to access food retailing channels and marketing capabilities. On the other hand, a food company will need to access biotechnology competencies for product innovation. Undoubtedly Monsanto will face companies such as:

Campbells Soup...	Strong brands and retail capabilities.
ConAgra....	Strong brands and wide product line, including agriculture.
P&G...	Strong brands, extensive financial resources, and major R&D.
Novartis...	Pharmaceutical strength with biotechnology capability.

Enterprises that contain the broadest collection of strengths across the three sectors should have the opportunity to become major players in CVD.

Chapter 6

Complementors

This chapter presents the concept of complementors and identifies opportunities for Monsanto to create synergistic relationships within the CVD system. It also provides insight into the current level of acceptance of nutraceutical products of a key secondary segment, cardiologists.

6.1 Overview

When considering the total nutraceutical cardiovascular business system, Monsanto must identify the complementors within the system as well as the competitors. Complementors are those entities that are resident in the segment's value chain or can have a significant impact on the value chain of a firm from an external position. Within the value chain, these entities either offer products or services as inputs to the complemented firm or receive the firm's products and consume or add value to them. Complementors within the value chain can also be competitors of a firm in the aftermarket. Outside the value chain, complementors are entities whose products or services can substantially impact demand for the firm's products. In this case, the two may or may not have a direct relationship with one another.

A classic example of complementors is taken out of the computer industry. Computer software and computer hardware are complementary products that clearly affect the

demand for each other. Advanced, more sophisticated software will encourage users to upgrade their hardware systems to allow them to take advantage of the new software. The same is true in the reverse. People who invest in new computer equipment will tend to buy additional software products that take advantage of the new features in their machines. The products are linked and are complementary as would be the companies behind the products. There are many examples of complementary businesses. Sports equipment and clothing, cars and car loans, and even as simple as peanut butter and jelly. Again, complementors will have an affect on one another's business.

Today, many companies are beginning to recognize the value of identifying their business' complementors and then creating opportunities to augment the demand for their products or services by direct or indirect bundling. In order to do this, leadership must change how they look at the marketplace and the other players on the field. Thinking complements is a different way of thinking about the business. Its about finding opportunities to make the pie bigger rather than fighting with competitors over a fixed pie.[26] Once this opportunity is understood and the mindset is resident within a firm's leaders, the next challenge becomes how to differentiate between friend and foe or complementor and competitor? Can complementors become competitors? The answer to this latter question is certainly yes. A complementor can be or could become a competitor. The key to managing this possibility is the structure or relationship that is established between two companies. These structures can be as loose as having no relationship and letting the market broker the complementary activity. On the other extreme, the structures can be quite rigid with distinct, direct relationships that take the

form of joint ventures and contractual alliances. How a company estimates the risk of complementors becoming competitors should determine the arrangements that they seek to establish. Now, to the other question. How do you differentiate between competitors and complementors? In their book, Co-opetition, Brandeburger and Nalebuff define the two as:

"A player is a complementor if customers value your product **more** when they have the other player's products than when they have your product alone."

"A player is your competitor if customers value your product **less** when they have the other players product than when they have your product alone."[27]

This is clearly a different perspective than what has typically been the view of the players within a market. In the past, everyone else engaged in similar activities were often lumped into the catch-all of competition. The view was one from the market or industry perspective. A complementor - competitor thought process changes the perspective from an industry view to what the customer might see. A customer's primary interest is whether or not their needs are satisfied and not who nor necessarily how those needs are satisfied. The right way to view other players on the field then becomes the perspective of the customer[28] and the basis for relationship with complementors becomes how do we create a bigger business through associations.

6.2 CVD System Complementors

Given this perspective, Monsanto has an opportunity to look for complementary businesses that will leverage their own business within the cardiovascular market. One approach that could be taken to identify those complementors would be to evaluate the critical risk factors, as defined in Chapter 4, and then identify associated business categories. Having done that, the next step would be to determine who are the marketshare leaders within each of those business categories on a global and local basis. In addition to marketshare leaders, Monsanto should also consider those players that have recently entered a business segment or possess unique attributes that would prove highly complementary. An example of a player with a unique skill might be a small, biotech company that has patented a gene that would provide enhanced attributes to a nutraceutical product that Monsanto was developing. Given the process of evaluating the associated businesses and companies therein, Monsanto would have a clear list of potential complementors to their cardiovascular nutraceutical business. That entire effort is beyond the scope of this thesis, however, in considering the risk factors and secondary segments discussed in Chapter 4, developing a preliminary, short list of business categories becomes fairly intuitive. Such a list should include:

- **Health and Medical Associations** - Associations such as the American Heart Association and the American Medical Association are clear examples of entities that could have a significant affect, via their endorsement, on a company's products.

- **Physicians** - Doctors, both general practitioners as well as cardiologists, are in a unique position to affect Monsanto's business as they are directly linked to those potential customers with the highest awareness of need.
- **Insurance Companies and Managed Health Organizations (HMOs)** - Business arrangements with insurance companies and HMOs could provide unique opportunities for Monsanto to supply cardiovascular products and services.
- **Company Human Resource Departments** - If Monsanto could provide cardiovascular products and services that would promote employee wellness, companies should be inclined to provide distribution opportunities in order to lower their health and medical expenses.
- **Pharmaceutical, Food, and Nutrition Companies** - Those entities that could provide products and services that would enhance Monsanto's offerings would be complementors.
- **Educational Institutions** - Direct affiliations with private and public educational institutions for the purpose of raising consumer awareness as to the need and benefits of Monsanto's cardiovascular products should have a positive affect on long-term demand.
- **Elderly Care Facilities** - Delivering products and services within elderly health care facilities that enhanced the image of the facility and the quality of life for the consumers would provide complementary benefits.
- **Others - Health and Fitness Clubs, Sporting Goods Companies, Electronic Commerce Businesses, Package Delivery Companies (e.g., Federal Express), and Nutrition Retail Outlets.**

As indicated above, this is only a partial list of the possible business categories that should contain entities that would be complementary to Monsanto's cardiovascular business. All of the aforementioned categories have the common attribute that they are all involved to some degree in promoting healthy life styles. From our perspective, this list may also be somewhat prioritized as to those categories which may provide the biggest benefits to Monsanto at this stage of the cardiovascular market. Certainly, as was shown in Chapter 5, a number of companies have already began to develop relationships with the leading medical associations such as the AHA, AMA, and the ADA. These relationships will prove beneficial particularly if the company receives endorsements for their products such as in the case of Campbells Soups' Intelligent Quisine.

6.3 Cardiologists as Key Enablers in CVD

Beyond associations, there is one category on the list that has a unique position within the cardiovascular market place today. Given the present low state of consumer education as to the benefits of heart healthy foods and nutraceuticals, physicians are in a position to greatly influence the demand for such new products in the cardiovascular market. This is clearly because they (cardiologists) are directly linked to the group of consumers that are at the highest level of need and awareness of CVD. Their patients are normally in the high risk (preventative) stage or post heart attack (treatment) stage of the market and are therefore at a heightened state of knowledge and awareness of need. To this group of consumers in the market, cardiologists have the distinction of "expert" as to

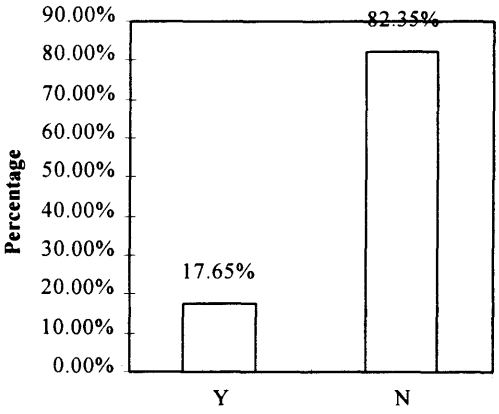
their opinions and advice as to the use of cardiovascular related products and services. In the longer term, "general practitioner" doctors should play a strong role in affecting those patients who do not necessarily have a CVD but should be interested in long-term heart healthy diet and lifestyles. Again the doctor takes a leadership role in the linkage between Monsanto's products and services and the end consumer.

In order to develop the complementary role that cardiologists play in the cardiovascular market, we developed a survey that attempts to evaluate their current understanding and acceptance of nutraceuticals and heart healthy food products. The actual survey used is shown in Appendix 9. Based on demographic data presented in Chapter 4, we selected six US cities as survey target areas. Those cities included: Houston, Texas; San Francisco, California; St. Louis, Missouri; Seattle, Washington; Detroit, Michigan; and St. Petersburg, Florida. Over 200 surveys were sent directly to cardiologists located in these six cities. The response rate to the survey was approximately 10%. While we had obviously hoped for a greater level of returns, having the opportunity to select twenty or so cardiologists from around the country and interview them as to their awareness of nutraceutical products should prove sufficiently beneficial. Their input is certainly important, particularly if one concludes that they represent a relevant sample of the total population of cardiologists within the US.

The following section of this chapter provides a summary discussion of the survey results by individual question. The statistics are based on the total surveys received and in some cases are affected by "No Responses" on some questions.

Question #1 - Are you familiar with the emerging beneficial "Heart Healthy" nutritional/nutraceutical food products? If yes, to what extent?

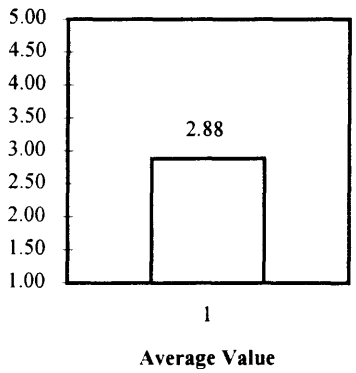
Figure 6.1
Question #1 - Familiarity



As shown in Figure 6.1, the great majority of cardiologists that responded, approximately 85%, claimed not to be familiar with nutritional/nutraceutical products for cardiovascular diseases. This clearly indicates a serious need for companies to consider a program that will provide education and communication of products and the benefits thereof to cardiologists.

Question #2 - To what extent do you expect nutritional/nutraceutical food products to play a role in cardiovascular wellness by the year 2000?

Figure 6.2
Question #2 - Role In Year 2000

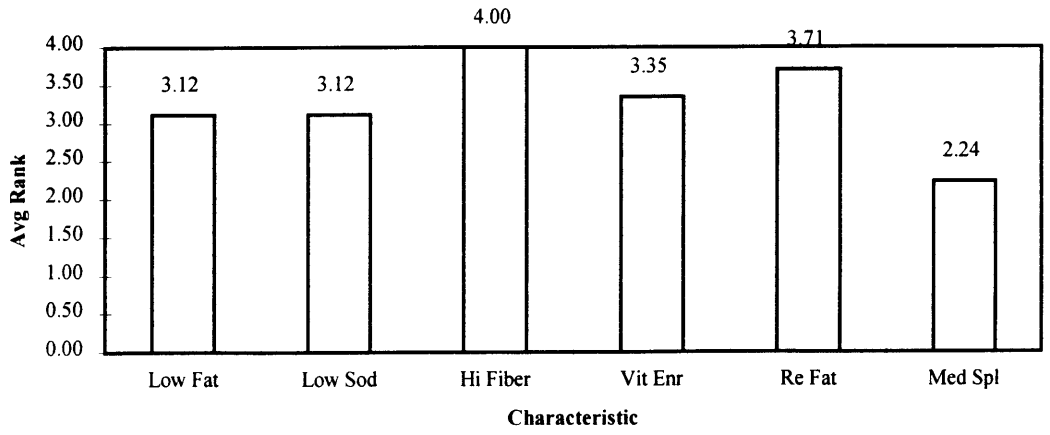


Question #2 was intended to measure the degree to which cardiologists expected nutritional/nutraceutical food products to become an alternative treatment for cardiovascular diseases by the year 2000. On a scale of 1 to 5, with 1 being low and 5 being to a high extent, the average expectation of the respondents was approximately a 3. Responses actually range from a low of 1 to a high of 5 with a fairly normal distribution. While the vast majority of the respondents claimed limited knowledge of these emerging products, the results of Question #2 may signify an expectation that technology will emerge in the next three to five years which will provide products and services in this sector.

Question #3 - How do you rank the listed food characteristics (low fatty oils, low sodium, high fiber, vitamin enriched, reduced fat, and medicinally supplemented) with regard to cardiovascular health?

Figure 6.3

Question #3 - Characteristic Rank

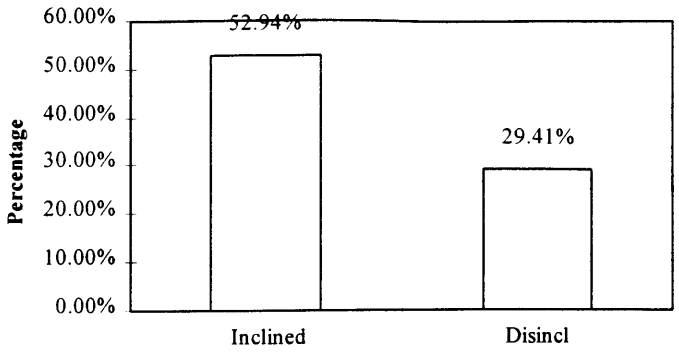


As shown in Figure 6.3, the cardiologists ranked high fiber as the most important food characteristic for cardiovascular health. Reduced fat content and vitamin enrichment were also considered important traits. The lowest average ranking was assigned to the medicinally supplemented characteristic. This may indicate a concern by the physicians as to the risk associated with consumers being able to obtain medicines outside of the current practice of prescriptive directives by the physicians themselves.

Question #4 - Would you be inclined or disinclined to prescribe a specialized diet of nutritional/nutraceutical food products?

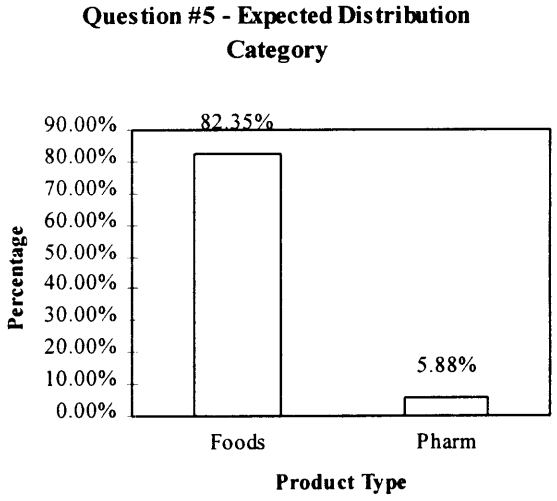
As shown in Figure 6.4, the cardiologists were clear as to their inclination to prescribe a diet of nutritional/nutraceutical food products to their heart patients. Approximately 53% said that they would do so, while 29% said they would be not be inclined to include such a diet as part of their treatment. This data does not seem to be in conflict with the previous responses particularly with regard to Question #1 which was a measure of current familiarity. Again, there appears to be indication of willingness to participate in this new emerging treatment but there is clear need as to education and knowledge. Any serious long term strategy for this market sector must consider this need within the medical community.

Figure 6.4



Question #5 - In the specific area of nutraceuticals, should food products with medical benefits be distributed as food items or pharmaceutical products?

Figure 6.5

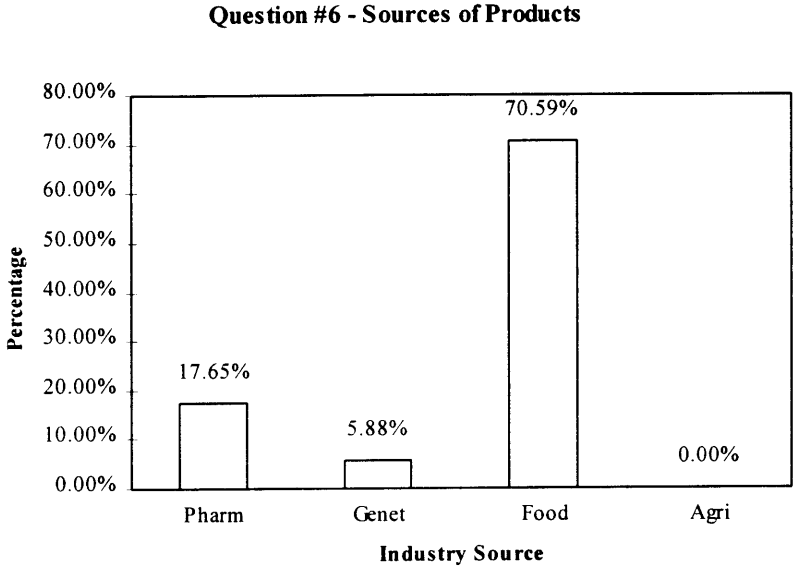


Of the total respondents, 82% of the cardiologists felt that nutritional/nutraceutical food products that contained medical benefits should be distributed as food items as opposed

to pharmaceutical products. This consideration has implications for distribution and perhaps the approval process for nutraceutical products.

Question #6 - Where do you expect nutritional/nutraceutical food products to emerge from (pharmaceutical, food, genetic, or agricultural companies)?

Figure 6.6



The vast majority of the cardiologists expect that nutritional/nutraceutical products for cardiovascular diseases will emerge from the food industry. This may reflect their low ranking of medicinally supplemented food products as shown in Question #3. Pharmacological traits in nutritional foods does not seem to be within the current scope of cardiologists.

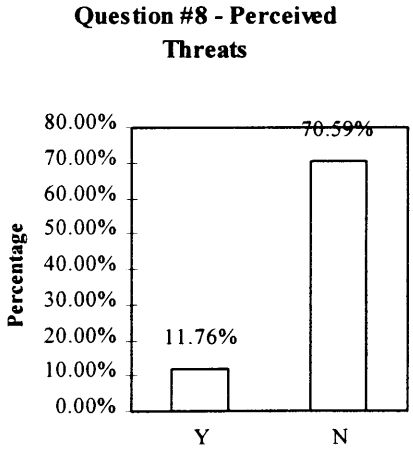
Question #7 - What is the greatest risk associated with nutritional/nutraceutical food products to the consumer?

There was a wide range of responses given to this question. However, a number of the cardiologists identified three common concerns or risks: 1) Confusion on the patients part as to the use and extent of benefits of nutraceuticals; 2) Fraud as to the claims of benefits of the products; and 3) High cost to the consumer and affordability, (will there be insurance coverage for such products).

Question #8 - Do you perceive any threats to the medical community with the advent of nutritional/nutraceutical food products?

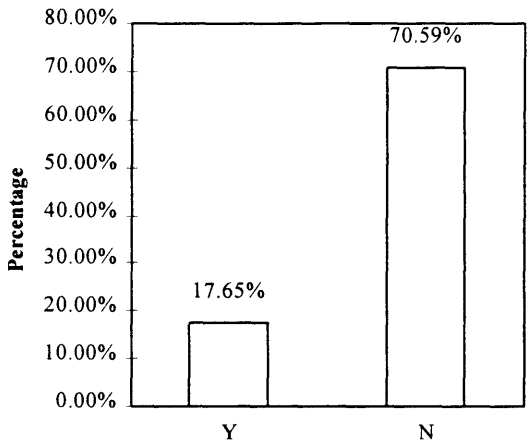
The great majority of the respondents claim not to perceive any threats to the medical community from the emergence of nutritional/nutraceutical food products. A couple of cardiologists did suggest that there maybe a threat, one of which suggested that their "income" might be affected if products were available that could be self administered.

Figure 6.8



Question #9 - Are there any companies or products that you see as first movers or market leaders in the nutritional/nutraceutical food marketplace?

Figure 6.9
Question #9 - First Movers

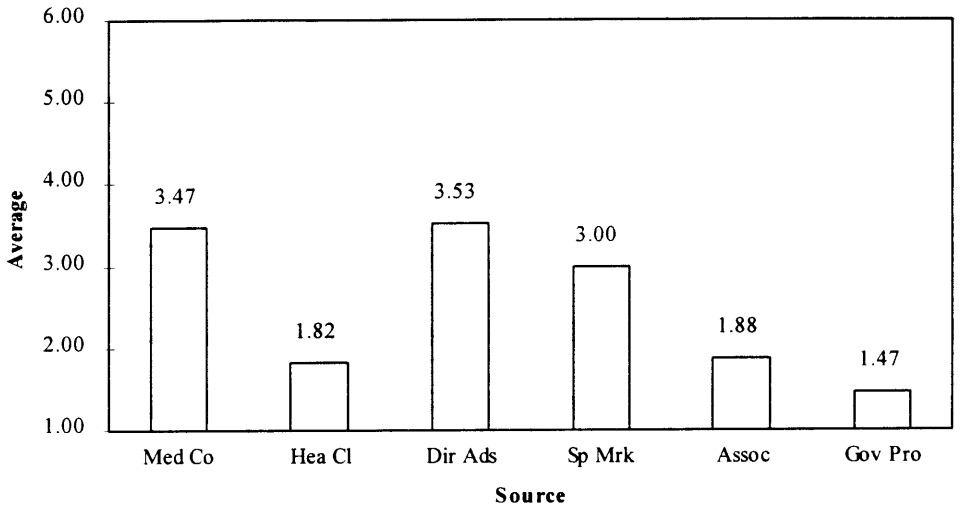


Approximately 71% of all cardiologists surveyed did not perceive any company as marketshare leaders in this emerging industry. This maybe correlated with the first question as to lack of familiarity with the industry or it maybe that they just don't see any one company in the first mover position at this time. Either way, the data further suggests an opportunity for a player to gain an advantage in what may now be a competitively neutral environment. Those physicians that responded in the affirmative, identified nutritional products that they were familiar with as opposed to the manufacturers. ConAgra's "Healthy Choice" was one of the products identified.

Question #10 - What is the best method of educating consumers about the benefits of nutritional/nutraceutical food products (medical community, health clubs, direct advertising, supermarkets, associations, or government programs)?

The need to educate the consumer as well as other stakeholders in the cardiovascular market is clearly a major requirement. As indicated in Chapter 4, there is only a small

Figure 6.10
Question #10 - Educational Methods



fraction of people in the US that are affected by CVD and are being treated. These individuals fall in the "treatment" category. There is even a greater portion of the population who should be in the "prevention" segment that are ignorant of the benefits of nutritional/nutraceutical food products. The entire group of potential consumers need to be educated. From the cardiologists perspective, the best way to do this is through direct advertising and the medical profession. Figure 6.10 provides their average

rankings, on a scale of one to six, of the education methods suggested. As shown, their lowest ranking was for government programs.

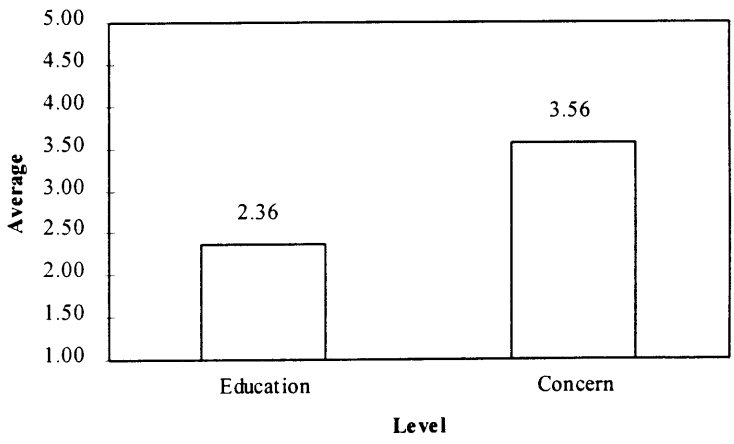
Question #11 - What do you feel are the most beneficial attributes for cardiovascular health that should be contained within a nutritional/nutraceutical food product?

The doctors provided a wide range of answers to Question #11. Some of them indicated product features while others responded with product characteristics. From those who discussed characteristics, the most common responses center around product accessibility and good taste. As far as features were concerned, the clear standout among the responses was for low fat and high fiber attributes.

Question #12 - How educated and how concerned do you feel the American consumer is about cardiovascular health?

On a scale of one to five, the cardiologists indicated that they felt that the American consumer was more concerned than they were educated. However both scores were relatively low,

Figure 6.12
Question #12 - Consumer Awareness

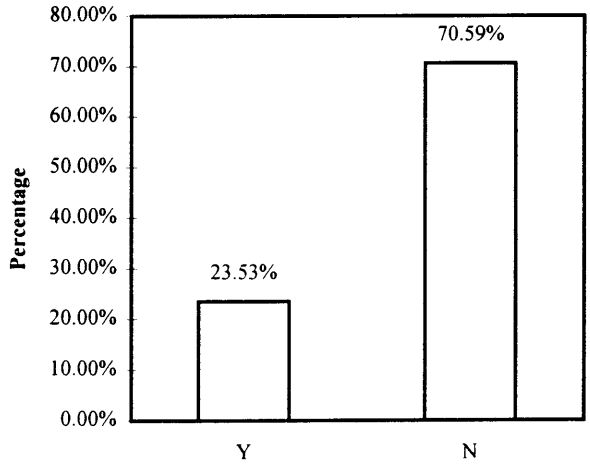


with the concern level estimated at 3.6 and the educated level lower at 2.4. This relatively low ranking and gap between the rankings also points out the opportunity for a strong marketing campaign aimed at customer awareness.

Question #13 - Do you advise your patients to use "heart healthy" nutritional food products in your practice today?

Approximately 24% of the cardiologists indicated program. Of those so indicating, most said that the advice was generic and normally was that they do advise their patients to use nutritional food products as part of their cardiovascular wellness focused on the need for a low fat high fiber diet. One cardiologist stated that he specifically utilizes the AHA's program for healthy diet with his patients. Figure 6.13 presents their responses. The greater majority of participants stated that they do not advise their patients to use any form of nutritional or nutraceutical food products in their wellness or treatment programs.

Figure 6.13
Question #13 - Advise Usage

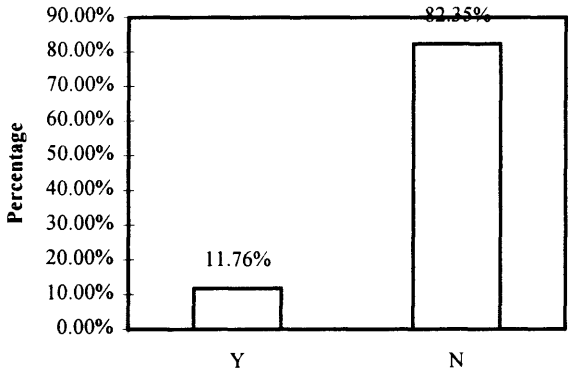


Question #14 - Have you received any educational material on nutritional/nutraceutical food products within the last 12 months?

Question #15 - Have you provided any educational information on nutritional/nutraceutical food products to your patients within the last 12 months?

The statistics for Questions #14 and #15 were identical and are therefore presented together. The vast majority of respondents indicated that they had not received nor provided any educational materials on nutritional and nutraceutical food products within the last 12 months. Of those that had, the products mentioned were nutritional beverages such as "Ensure" from Abbot Labs.

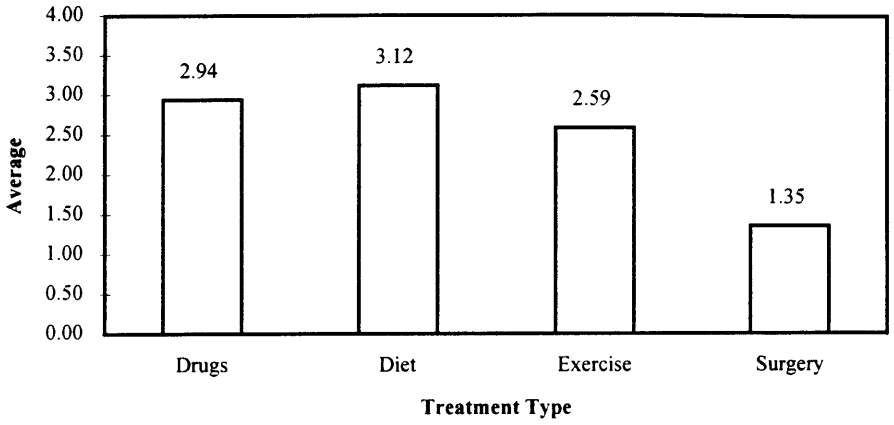
Figure 6.14
Questions #14 & 15 - Information



Question #16 - Please rank the following treatments (drugs, healthy diet, physical exercise, and surgery) for three patient profiles (high risk, post heart attack, and average adult).

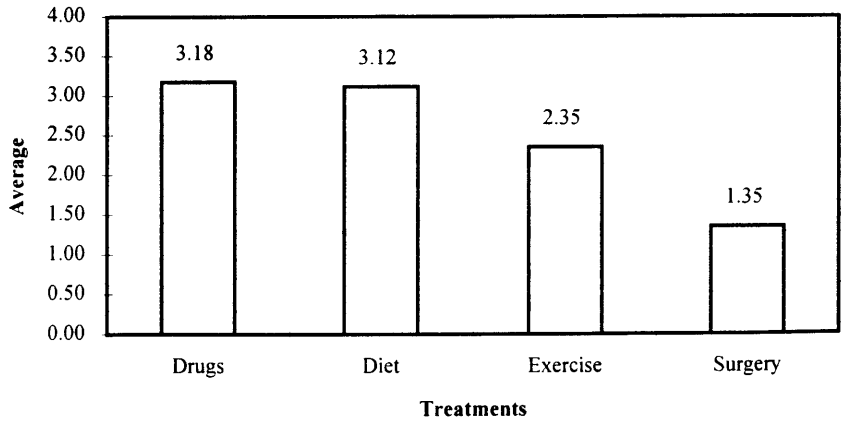
As shown in Figure 6.16, for the "High Risk" patient profile, the cardiologists ranked healthy diet as the number one treatment followed by drug therapy.

Figure 6.16
Question #16a - High Risk Patients



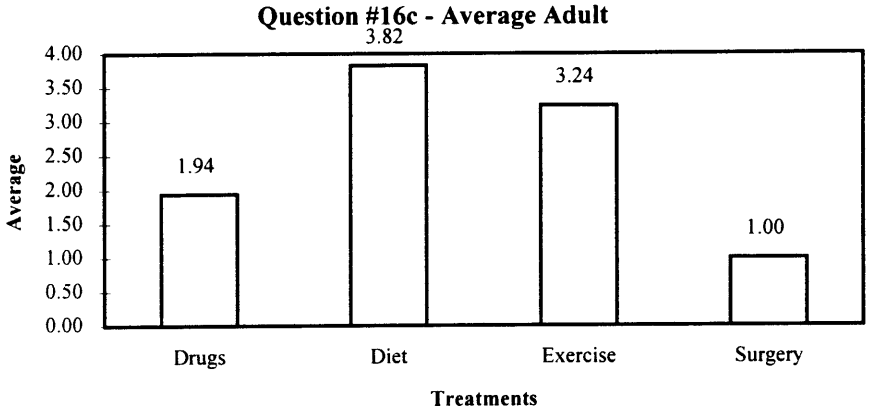
For the "Post Heart Attack" patient profile, the cardiologists indicated that drug therapy was the leading treatment followed closely by healthy diet. Diet again is seen as playing a strong role in treatment.

Figure 6.17
Question #16b - Post Heart Attack Patients



Finally, for the "Average Adult" patient profile, where there is normal risk levels, the cardiologists ranked a healthy diet as the number one treatment program.

Figure 6.18
Question #16c - Average Adult



6.4 Chapter Conclusions

This chapter focused on the need for Monsanto to fully identify the complementors within the CVD and then look for opportunities to enlarge the market "pie" by creating complementary products and services that the consumer will value. As a minimum, Monsanto needs to strengthen their relationships with the secondary segments, particularly with key industry associations (e.g. AHA & AMA) and cardiologists. A second strong track would be to leverage a position with insurance providers and large companies with regard to employee health care programs.

The survey presented herein, provided some valuable insight as to how a sample of cardiologist, a key complementor group, currently perceives nutritional/nutraceutical food products. In summary, there appears to be a clear lack of understanding about the potential use and benefits of the products. There is currently very limited marketing information flowing through this expert group to the end consumer. It also appears that they view the current nutraceutical playing field as product neutral with regard to a market share leader. The cardiologists did however recognize that they are in a unique position to affect the education level of the cardiovascular consumer.

Chapter 7

Business Model Analysis

In this chapter we will attempt to do four things. First, we will depict the positioning alternatives for Monsanto within the Adaptive Management Framework™ Business Model. We will analyze such alternatives and the requirements for a consistent organizational structure which is able to handle the creation and management of the products and services needed to support such positioning. We will also verify that Monsanto is actually developing such a consistent organizational structure, in an effort to create an entity that is able to compete in the life science industry in the 21st century.

Secondly, we will analyze Monsanto's alternative paths within the business model and also analyze the likelihood for achieving a Proprietary Standard positioning, in terms of the necessary key factors and core competencies. In this sense, we provide some examples from Monsanto's Crop Protection market and also some lessons learned from the pharmaceutical industry particularly with regard to the strategic role played by the development of technology and manufacturing processes in that industry (innovation process).

Thirdly, we will depict the type of key execution processes that Monsanto should develop and enhance to maintain a Proprietary Standard positioning.

Lastly, we will point out the positioning of Monsanto and potential competitors in this industry within the Adaptive Management Framework™ Business Model.

7.1 Positioning Alternatives for Monsanto

Monsanto can move within this market from a Best Product position toward a Total Customer Solution positioning (bundling products and a very high content of services) or they can go from a very focused Best Product positioning toward a Proprietary Standard positioning by relying on heavy activities in their innovation processes which are a strength in the area of biotechnology and agricultural product development.

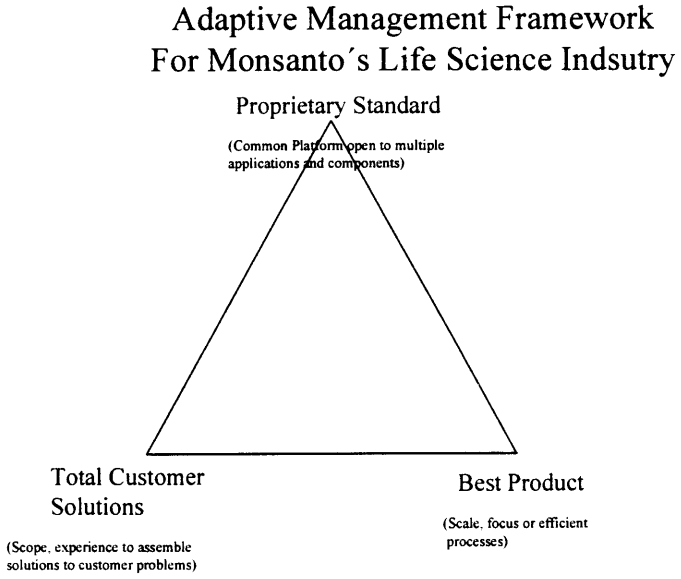


Figure 7.2.1 - *Business Model*

Moving towards a Total Customer Solution represents a big challenge in the segmentation effort required to identify who needs wants the products developed for this market (and what products) in terms of the end-consumer as segmented in Chapter 4. Monsanto should strongly consider creating alliances, mergers, and acquisitions in this portion of the value chain in order to gain expertise in marketing consumable food products directly to the public (e.g., Campbell Soup). This will enable them to accurately identify future market opportunities in the nutraceutical CVD segment. In addition, Monsanto will need to maintain its commitment to product innovation to provide the necessary inputs.

Best Product positioning is achievable if Monsanto exploits their biotechnology technical strengths and retains a leadership positioning in high speed product innovation in the life science industry. This objective can be achieved through an absolute focus on technology investment. To achieve "Best Product" status, Monsanto must create the industry's state of the art R&D capability, using internal capabilities as well as pursuing alliances/mergers/acquisitions with R&D, biotechnology, specialty chemical and food companies.

Whether Monsanto chooses the "Best Product" or "Total Customer Solution" routes, they have to find the best way to link their value chain with those of potential partners in the activities where there is the greatest potential for synergy. This approach to doing business is a practice that Monsanto already

knows very well (as seen in their successful Crop Protection Business). Now, they need to apply it to this new industry which contains a mix of old and emerging players.

7.2 Opportunities to Move to a Proprietary Standard Positioning

Figure 7.2.1 presents the alternative paths of movement for Monsanto in the cardiovascular market. As shown, Monsanto's potential patterns of movement within the Adaptive Management Framework™ are: 1) from "Best Product" to "Total Customer Solution" (involving deep granularity in the segmentation of the market to create customized bundles of products and services for the end-consumers) and, 2) going for the dominant design through an intense activity in innovation (products, services, and technology). This second path requires Monsanto to maintain an innovation pace that is fast enough to stay ahead of competitors in terms of product and manufacturing process development. They will also need to achieve strong brand leadership by emphasizing the unique benefits of their products.

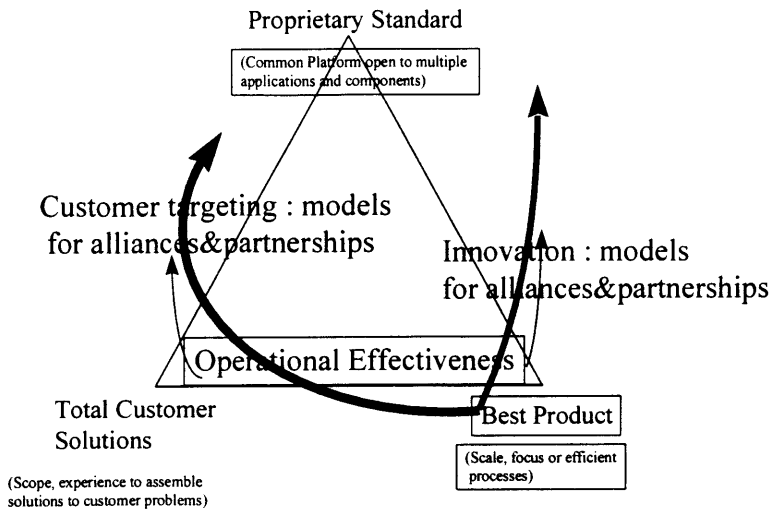


Figure 7.2.1 - *Monsanto's Strategic Positioning Options*

In either path taken, Monsanto must also consider the need to raise the level of awareness and acceptance of the general public. This was reflected in both Chapter 4 and 6 where it was shown that there is a general low level of understanding about CVD and nutraceutical products. Strong alliances with the system complementors (Chapter 6) should facilitate this activity.

While both paths are options, we would recommend the first path that moves the company initially from Best Product to a Total Customer Solution position. It is this approach that will allow Monsanto to capture the greatest share of market value while utilizing the core competencies within their current businesses. This approach is shown conceptually in Figure 7.2.2. As depicted, Monsanto should

leverage their technology capability to offer the most differentiated Best Products. This will provide the resources needed to progress towards the Total Customer Solution. From that vantage point, Monsanto will have begun to lock in the customers and complementors leading to a Proprietary Standard position. It is at this juncture that the company will realize the greatest margins for their CVD business.

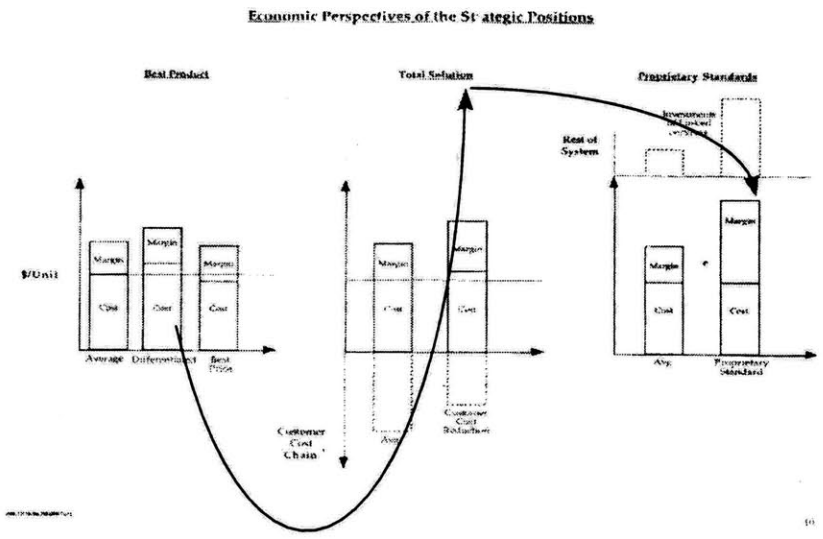


Figure 7.2.2 *Approach to Strategic Positioning*

7.3 Processes and Their Role in the Positioning Alternatives

7.3.1 Innovation

The importance of the innovation process in achieving a "Proprietary Standard" position in the CVD industry is well explained through Monsanto's experience in their Crop Protection business and also, as a second example, in the lessons learned from the pharmaceutical industry. According to Gary Pisano and Steven

Wheelright ("High Tech R&D", HBR September 1995), there are at least four hidden sources of leverage of process technology: 1) accelerated time-to-market, 2) rapid ramp-up, 3) enhanced product functionality and customer acceptance and 4) extended proprietary position. It is interesting to reflect on the last of these sources. New, great products create new markets (Best Product), attracting buyers who are willing to pay premium prices (lock-in) which enhance a company's ability to generate significant profits (and therefore, to continue strengthening a dominant design). There are clear linkages between this approach and the possibilities for a company like Monsanto in planning an entry mode into the CVD market. As stated earlier, there is an opportunity for Monsanto to go from a Best Product positioning towards a Proprietary Standard positioning through the innovation process. As shown in Chapter 4.4, the trend in the nutritionally enhanced products market is of increasing consumer shares and premium prices. The market is moving toward Best Product positions in an inertial path that can be changed by a company who will make first mover strikes.

Regarding the aforementioned extended proprietary positions, the pharmaceutical companies have learned that when a drug patent expires, proprietary process technology is one of the best protections against invasion by generic manufacturers. The changes in the pharmaceutical industry have been driven by industry specific versions of the following forces: 1) shorter product life cycles and increasingly hard to manufacture product designs, 2) fragmented, demanding markets, and 3) growing technical parity. This certainly could be the case for

enhanced food manufacturers, especially for nutraceutical products with cholesterol lowering properties.

Regarding product life cycles, in global high-technology competition there is a relentless shortening of product cycles which increases the importance of fast time-to-market and rapid ramp-up. This means that there is an increasing need to create capabilities in developing highly efficient processes before a product launch and to improve them aggressively thereafter. We expect a similar situation in the emerging CVD market, especially because of the potential size of the market in the US (over the $ 100B per year).

For product design, pharmaceutical companies have faced increasing costs due to the highly regulated environment of their market (FDA regulations). In the case of the cardiovascular market, this should not be the central issue. The central issue will be the rapidly changing nature of this market which will demand that, to gain even a temporary edge in product/service performance or functionality, companies will have to work to get to and stay at the frontiers of CVD technology and science.

We have already seen that the CVD market is currently quite disparent. Given the fragmented nature of the market, customers are demanding flexibility, higher content of service and customized features. A simple example, again from the

pharmaceutical industry, can be found in the gel-cap version of Tylenol®, which, through a distinctive manufacturing process, provided an easy-to-swallow product. This unique technology gave Johnson & Johnson a proprietary process, (similar to the well known case of Gillette, with its product Sensor®), which could not be imitated by the competitors.

Finally, concerning the issue of growing technological parity, it is important to note that because of the globalization of R&D processes and the creation of alliances, there is a rapid diffusion of technology and competencies across countries and companies. As a result, there is an increasing importance in developing core competencies that can not be easily imitated. According to Pisano and Wheelright those core competencies must remain behind the walls of the corporation and are related to the development of manufacturing processes. However, looking at the lessons from Monsanto's Crop Protection business, we also believe that the ability to create an excellent R&D network, that's closely linked to the customers and is not so easily imitated should be a strong consideration when planning alternative entry modes for the CVD industry.

7.3.2 Customer Targeting

Segmentation is a critical issue for this emerging industry. As shown in Chapter 4, segmentation has to be done in two tiers: primary and secondary segments. Primary segments define: 1) the focus for the R&D effort which represents a

large portion of the required resources in this market (e.g., financial, human resources) and, 2) the main portion of the content and media mix of the marketing campaign. The secondary segments are basically segments that are required to raise the level of awareness of CVD problems in terms of its cost and also, the benefits of the possible solutions. The secondary segments also highlight who are complementors and enablers since they represent part of the delivery mechanisms. Furthermore, they can be consumers of the services (specially information services) and also can exercise important influence (cardiologists) in those "who need it but do not want it yet". The first task in customer targeting within the primary segments is to clearly identify who wants CVD products because they will be the first segment of the market to consume the new products and services. They will be the starting point for this industry, especially for nutraceuticals. The challenge is to succinctly identify the needs of the primary segments through accurate market research and then offer an adequate bundle of products to satisfy those needs. Monsanto must aim their bundled offerings directly at this sensitive targeted segment through effective marketing campaigns and also, through the secondary segments (physicians, HMO's, employers, education institutions, and other institutions like the AHA). One immediate alternative is to target the current cardiac and stroke patients (15% of those who need to be treated). The most efficient way of doing this is through the medical community, specifically through general practitioners and cardiac specialists. As discussed in Chapter 6, they can provide information about the benefits of nutraceutical products and enhanced foods to their patients.

However, as our survey pointed out, the medical community currently does not have a favorable attitude towards nutraceutical products. Therefore, there are two types of marketing campaigns that have to be designed and implemented. One has to be designed for the primary segments and the second campaign must target the secondary segments. An additional critical issue here is the diversity in the segmentation of this market in terms of age, gender, race and even geographic location.

Targeting will require decisions about critical mass, customization of products and communication. Therefore, an initial approach to implement different actions to be taken might be one similar to those used by Capital One and other institutions in the financial industry, in terms of data mining and trials. A heavy segmentation requires the implementation of numerous trials in order to customize sets of product and service bundles for the different customer segments identified. In the CVD market there is an additional complexity because within the customers, there is a need to identify the relationships between the primary and secondary segments in order to create effective marketing approaches.

A key advantage in this market will undoubtedly be the capability of a company to provide offerings as tailored as possible to the consumers due to the nature of customer need. In fact, this could be a positioning opportunity for a company that wants to enter this emerging market, as they would be a first mover. Therefore, segmentation and trials can provide the basic behavioral information

which would enable Monsanto to decide where and how to initiate a massive campaign aimed at locking in all the customer tiers.

While an entry mode through the current, more sensitive primary segment of this market, (cardiovascular patients), looks very reasonable, this is not the major part of the potential CVD business. In order to find the best way to drive consumption to those who need it but do not currently want it (e.g., the high risk population), Monsanto must employ accurate segmentation and trials to acquire the critical information about the best entry modes, (timing, type of investments, etc.). The trial activities should be intensely focused in terms of getting performance information about the results of offering different combinations of product and services as well as the way they are delivered and communicated to the different targeted audiences. The goal of these activities is to find the right product bundles and the best marketing approach. The goal here is to force an impulse change in lifestyle for the CVD customers that need it and do not currently want it (high risk, not being treated and not caring) and also for those who are now low risk by promoting prevention for this larger segment of the population.

As was seen in Chapter 4 & 5, there is an increasing trend in sales of nutritionally enhanced products and also, an increasing offering of healthy foods (bundling of products) from food companies like Campbell Soup and Conagra. Therefore today's opportunity in the nutraceuticals and enhanced foods market

will be for those companies who are able and willing to make hard decisions in terms of creating and aggressively promoting such products in the market. There is a clear, attractive opportunity for building brand equity which can be done most effectively through accurate customer targeting.

7.3.3 Operational Effectiveness

Operational effectiveness is an absolute necessity as it is basically table stakes to get into the CVD game. This is especially true in this market it is especially true because nutraceuticals and enhanced foods have to compete with traditional balanced diets and also, they have to provide adequate financial returns in order to fund the innovation effort (R&D), in the case as in the pharmaceutical industry today. The difference here is that there will be limited patent protection for some processes but, in general, the physical benefits will probably not be protectable and therefore can be imitated by creating different products with similar healthy effects (e.g., Finnish butter vs. specialty oils to lower cholesterol, or different high fiber content products). Therefore branding and the nature of brand equity will be critical in terms of pricing as will be having efficient operational processes. This will enable a company, especially in a beginning stage, to go from a Best Product to a Total Customer Solution. In this sense, the issue here is how a company like Monsanto will be able to achieve operational efficiency in the nutraceutical industry leveraging their experience from their current divisions like NutraSweet and Kelco.

Monsanto will need to create alliances with major food companies in order to get such efficiencies, particularly in terms of gaining customer intimacy. Acquisition of existing brands and companies can be a way to get such operational efficiencies very quickly. Monsanto should also look at smaller biotechnology companies who have core competencies in developing new technologies as another way to excel in the innovation processes. This is also a tool for operational effectiveness in terms of innovation cost (financial resources and time).

7.4 Organizational Structure and Strategic Positioning

We have identified the most important areas where Monsanto should compete in this industry and, particularly, in the cardiovascular market. Monsanto is developing an internal structure that clearly holds the potential for success and can ultimately should allow the company to achieve a Proprietary Standard strategic position. Monsanto is changing its organizational structure. As we saw in Chapter 3, Figure 7.4.1 presents a preliminary organizational chart as of January 1997.

If Monsanto wants to move from a Best Product position to a Total Customer Solution in order to ultimately move towards a system lock, then this structure is appropriate because it is an accurate description of the value chain of this industry. The "segments of the value chain", are represented by the different, proposed divisions of the company.

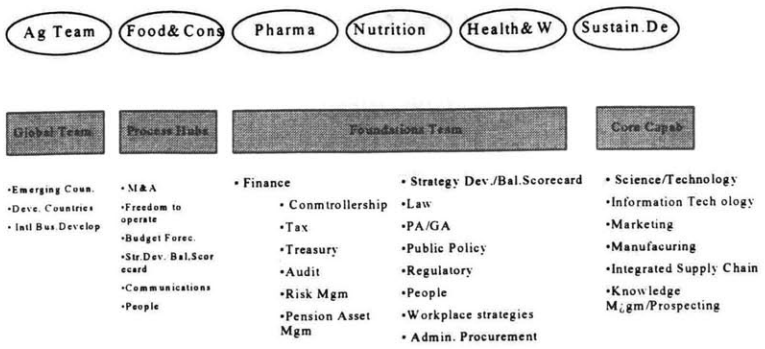


Figure 7.4.1 - *Monsanto's Life Sciences Organization*

With this organizational structure Monsanto can handle the wide variety of products and services that will enable them to bundle their products and achieve a lock in of the system. What is absolutely critical to their success is tight integration and coordination across the six businesses. The supportive teams must play the role of enabling the management of knowledge across the business in order to produce the right bundles of products of services for the defined segments of the markets. Segmentation and trial information has to flow across the organization to the divisions. Furthermore, the outputs must be a coordinated set of solutions to the customers needs. The supportive teams explicitly are in charge of integrating the results of the global innovation, customer targeting and operational effectiveness across Monsanto.

7.4.1 Current Positioning of Potential Monsanto's Competitors

The nutraceutical market for CVD is in its infancy stage. Emerging players are entering from the nutrition, food, and pharmaceutical industries based on single or limited strengths. The playing field is virtually neutral without any one company holding a dominant position. It is from this perspective that Monsanto must plot their strategic course of action.

Based on the information provided in Chapters 3 & 5, we will attempt to position Monsanto and the sample of potential competitors on the Adaptive Management Framework™ business model. Figure 7.4.1 presents this positioning for the CVD nutraceutical market.

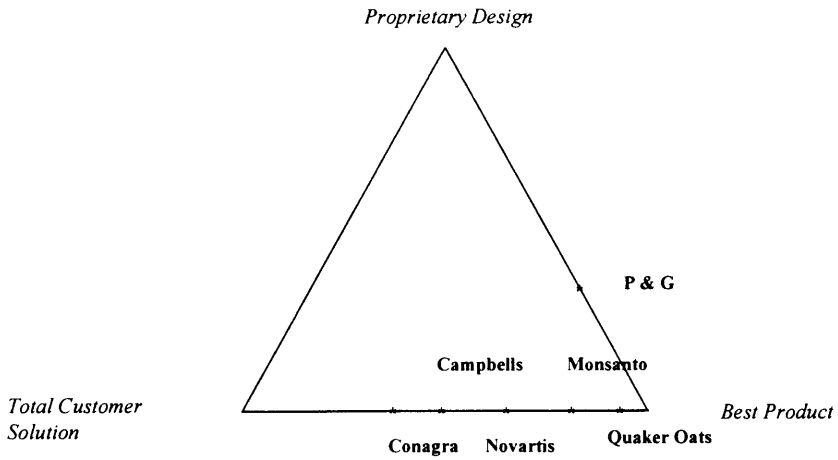


Figure 7.4.1 - *Current Positioning in the CVD Nutraceutical Market*

As shown, we believe that the players in the CVD market are tightly clustered and are entering the business with a narrow scope of capabilities. For instance, Campbell Soups has great strength in marketing and distribution channels. They also have just barely begun to align themselves with complementors for CVD. However, they have a relative limited capability in the area of biotechnology and pharmaceutical products which will be required for nutraceuticals. They also do not appear to have any avenues into the health care or wellness business. This broader assortment of capabilities will have to be resident or directly accessible if a company intends to move to a Total Customer Solution or Proprietary Standard position in this new business. Obviously, the actual positioning of the firms shown in Figure 7.4.1 is subjective and could be debated at length. Whether Novartis is to the immediate left of Monsanto or right is not as important as gaining an appreciation of the overall concentration within the nutraceutical industry today. We do in fact expect Novartis, ConAgra, and Campbell Soups to look for opportunities to broaden their capabilities and move towards a Total Customer Solution position. It also appears that P&G may rely on their product development capabilities and acquisitions in order to nurture its Best Product tradition.

As stated earlier in this chapter, we feel that Monsanto has a tremendous opportunity to be an industry leader in CVD. To do so, they must:

1) Integrate and leverage the strengths that are resident in their current businesses (biotechnology, agriculture, medical, and healthcare),

2) Acquire critical skills in marketing and distribution channels for food type products in order to segment and influence the customers,
3) Seek opportunities to cooperate with potential complementors in order to expand CVD awareness and the benefits of nutraceuticals, and
4) Drive product innovation and implement aggressive marketing trials to develop effective bundles of products and services.

This is the path that will permit Monsanto to achieve a dominant Proprietary Standard position within the nutraceutical CVD market.

7.5 Market Impact of the Proposed Adaptive Positioning

The impact of the Adaptive positioning, the role of the key processes and the need to leverage competencies through alliances and the optimal organizational structure all can be viewed through the lenses of our proposals for the CVD market contained in this chapter. Figure 7.5.1 provides summary of our proposed dynamic of the industry, which is basically the path of movements and alternatives suggested to Monsanto.

The current stage of the value chain of this emerging CVD industry is a set of independent and generally unrelated value chains, (food, biotechnology, chemical, healthcare, information technologies, others). These chains are in different stages maturity, and, for the most part, deliver their products and services independently.

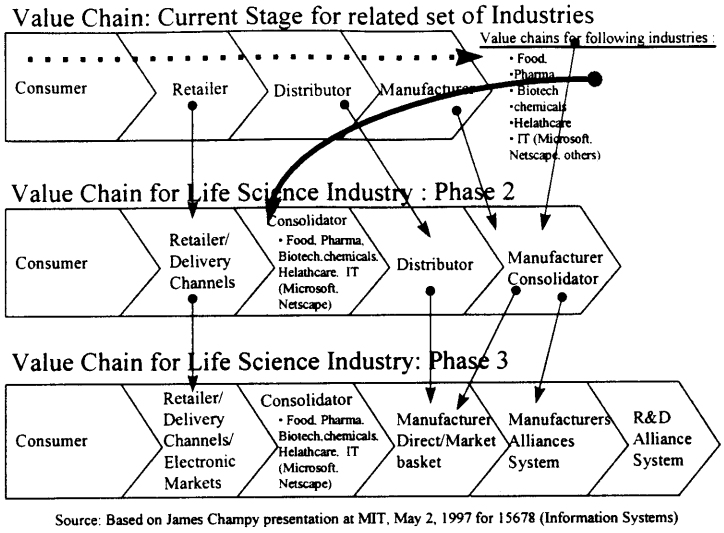


Figure 7.5.1 - *Dynamics of the Value Chain in the Life Science Industry*

Therefore, the natural positioning for the companies in such industries is the best product positioning as was seen in section 7.2. Basically, the current stage is a traditional value chain for a consumer industry: consumer - retailer - distributor - manufacturer.

The second expected phase in the industry is a transformation in the sections regarding delivery mechanisms and manufacturing. In the delivery mechanisms, as companies begin to define themselves as to Life Science companies, we expect that new CVD products will emerge in the market. We also expect that the content of information will increase through direct and indirect marketing campaigns targeting primary and secondary segments of the market. In fact we expect that many of the complementors will serve as delivery channels (employers, physician associations, other medical institutions, others). Regarding the manufacturing section, we expect that a

consolidation role will emerge. That a consolidator will bundle products and services produced within new groups of companies and alliances in order to move toward a Total Customer Solution positioning. For companies that choose to maintain their industry definition, we expect to see a deepening of their activities within their market niche, as the total CVD system grows due to the activity of competitors and complementors in the market.

In the final phase of the value chain dynamic, someone will reach the proprietary standard positioning by achieving leadership in the role as consolidator. The leading consolidator will have the tools for locking in customers and suppliers since they will have built a framework of products and services from different manufacturers and R&D alliances. The consolidator could be a manufacturer like Monsanto as it will be probably easier for a leading manufacturer to become a leading consolidator in the market. In this sense, the lock-in could be stronger if, at the same time, this consolidator is able to internally lock-in the best innovation process of the industry. If the consolidator does not lock-in the best product and service development and bundling it could loose its positioning.

Monsanto should make the first movements within the value chain in terms of locking in the total customer solution positioning. From this position, they would be able to reach a Proprietary Standard positioning by being able to build a unique set of activities within the key processes and then linking them with the complementors' systems, as is depicted in Figure 7.5.2. This concept has been identified by Michael Porter as the basis of a

sound strategy for any company and is the unique mix of the activities being performed by an organization. In the case of Mr. Hax's framework, it is more explicit in terms of showing the relationships of the different activities within the system and internal value chains.

The set of unique activities shown in Figure 7.5.2 must consider the relationships between the value chains of the key actors within the system. Porter does not have this vision in his framework and even states that the only key is the nature of the industry. In Hax's framework, the nature of the industry can be modified through the explicit recognition of the possibility of 10X forces, which are the extreme enablers of new ways of competing and shaping a whole industry. The company able to change the way of competing is likely to be the one who can lock-in the whole system and then, the industry is not the main issue but rather the way of satisfying the needs of the CVD market.

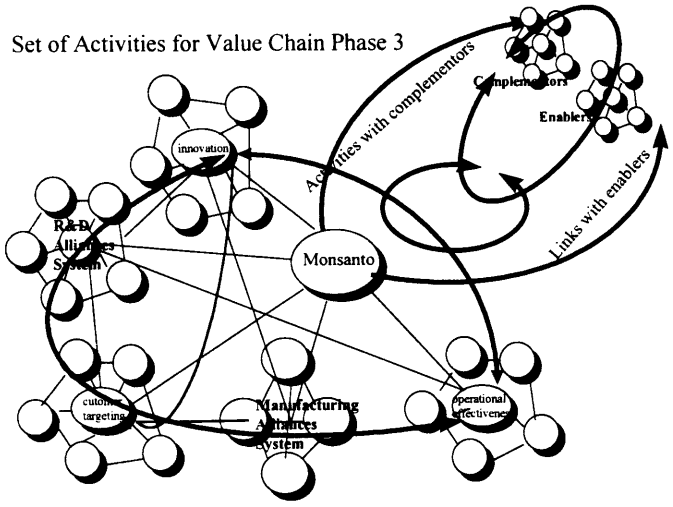


Figure 7.5.2 - *Activities for the Value Chain Consolidator*

7.6 Chapter Conclusions

In this chapter we have proposed two strategic alternatives for Monsanto's activities in the CVD market. The first approach is to go for the Best Product positioning which means that Monsanto will have to focus significant effort on the innovation process and also, create alliances with food companies. These alliances are needed to quickly acquire the required core competencies in manufacturing and marketing food products for the nutraceuticals business. Monsanto will also need to develop a sound strategy to build brand equity in the CVD market. This is another critical parameter for them to consider when choosing partnerships or acquisitions. The second approach for Monsanto is to go for a Total Customer Solution which means bundling products and services for the customer. In light of our conclusions from the segmentation analysis, in chapter 4 we feel that the best way to build customer loyalty and brand equity is through going for the Total Customer Solution alternative.

The bundling of augmented products and services that contain a high level of CVD information and even more, the important requirement to raise consumer awareness of CVD, should drive Monsanto to create important linkages with the complementors of this market. Furthermore, these bundles are the key to locking in the delivery channels. Monsanto must create a brand that includes: 1) medical and health information (locking in the medical profession, institutions such as the AHA, employers, and educators); 2) drugs; and 3) healthy foods and nutraceuticals. In the case of nutraceuticals, by developing a strong brand presence in the food retailing channels with healthy and

enhanced food products, Monsanto can create enough brand awareness to lock-in the necessary delivery mechanisms and launch their nutraceuticals. In other words, establishing a strong presence with more traditional products will provide greater negotiating power with the retailing channels making it easier to insert nutraceutical products in the system as a first mover in this market. By developing a strong link with the complementors in the medical sector, Monsanto should be able to overcome their initial resistance towards the prescription of nutraceutical products to their patients, especially for CVD prevention. As was seen in the survey of cardiologists in Chapter 6, those physicians are not predisposed to nor even aware of nutraceuticals. A correct positioning of Monsanto's brands in that secondary segments of the target market will allow the company to gain their support which could be a key enabler to enter this market.

Another interesting conclusion from this chapter is the required linkages between the approach selected for strategic positioning and the support required for such movements from the key execution processes. This consideration is also tied to the expected evolution of the system value chain for the CVD industry as presented in Section 7.5. The final chart of this chapter, Figure 7.5.2, is a graphic expression of the relationships between the processes and the external actors in this industry. In this sense, the conclusion is that Monsanto should be a first mover in locking the areas of the chain where the greatest value will exist. In particular, Monsanto has to position itself as the consolidator of the system. In considering the dynamic and evolving nature of the competition in the emerging CVD market, as a consolidator, Monsanto must have high

flexibility and adaptability to achieve a Proprietary Standard position. This position will demand core competencies in innovation and creativity to avoid a situation "a la Japanese" (going for the semiconductors, forgetting the microprocessors).

Appendix 1

Mission of the Firm

The following two charts present the mission of the firm up to the last public definition from Monsanto, as of December 1995, in terms of markets, products and geographic scope of its business, including the chemical divisions which are being divested.

MONSANTO'S MISION OF THE FIRM (Updated to 1995, under important modifications during 1996/97)

AGRICULTURAL

Major End-Use Markets	Market Scope	End-Use Products & Applications	Product Scope
Agricultural, industrial, turf and ornamental applications	Producers of Corn (maize), soybean, wheat, cotton and rice	Multipurpose, nonselective agricultural and industrial applications	*Roundup* herbicide and other glyphosate-based herbicides
		Corn, soybean, peanut and milo (sorghum) crops	*Lasso* and *Harness** herbicides and other acetanilide-based herbicides *corn only
		Wheat crops	*Avadex* BW herbicide, *Far-Go* herbicide
		Postemergence control of sedges and broadleaf weeds in corn and grain sorghum, turf and sugarcane crops	*Permit, Manage* and *Sempra* herbicides
	Producers of Corn (maize), soybean, wheat, cotton and rice worldwide	Crops tolerant of nonselective herbicides	*Roundup Ready* soybeans, *Roundup Ready* canola **
	wheat, cotton and rice	Crops protected against certain insect pests	Insect-protected cotton with the *Bollgard* gene, *NewLeaf* insect-protected potatoes
Residential applications	Homeowners and gardeners	Herbicides, insecticides, fungicides, and fertilizers	*Roundup* herbicide, *Ortho* lawn-and-garden products, and *Green Cross* brand lawn-and-garden products
Animal agricultural applications	Dairies	Increase efficiency of milk production in dairy cows	*Posilac* bovine somatotropin
End agricultural consumers	End consumers	Increase tastes and efficiency in production of fruits and vegetables	

CHEMICALS

Major End-Use Markets	Market Scope	End-Use Products & Applications	Product Scope
Construction and home furnishings	Manufacturers and purchasers of residential and commercial carpeting; makers of acrylic apparel and upholstery; producers of industrial nylon and tyres	Broadloom carpet, upholstery, blankets	Nylon carpet staple, nylon bulk continuous filament, *Acrilan* acrylic fiber
		Vinyl flooring, caulks and sealants, adhesives, coatings, wall covering, vinyl upholstery, insulation, furniture	Polymer modifiers
		Architectural glass	*Saflex* plastic interlayer
		Coatings and adhesives	Specialty resins
		Fire retardant coatings, polymer additives	Ammonium polyphosphate
		Doormats	Doormats
Vehicles	Automobile and windshield manufacturers; commercial and residential window producers, architects and builders	Windshields	*Saflex* plastic interlayer
		Automotive exterior and interior molded parts, under-the-hood applications	*Vydyne* nylon molding resins
		Tires, molding resins for auto grilles, bumpers and gears	Nylon filament, nylon polymer
	Flooring, coatings, adhesives and caulks, fire control, specialty industrial fluids, specialty chemicals and plastic products	Automotive coatings and sealants	Specialty resins, polymer modifiers
		Hydraulic fluids for commercial aircraft	*Skydrol* aviation hydraulic fluids, lubricants

Appendix 1, Chart 1 of 2

MONSANTO'S MISION OF THE FIRM (Updated to 1995, under important modifications during 1996/97)

Major End-Use Markets	Market Scope	End-Use Products & Applications	Product Scope
CHEMICALS (CONTINUATION)			
Personal products	Manufacturers of personal care products and pharmaceuticals, industrial facilities; oil and gas producers	Sweaters, half-hose, active wear, hand-knit yarns, craft yarns	*Acrilan* acrylic fiber
		Consumer electronics, medical devices	*Vydyne* nylon molding resins
		Dentifrices, dish detergents, water conditioners	Dental phosphates, industrial phosphates
Chemicals		Metal treating, cleaning and etching; plant food fertilizers; oil additives	Industrial phosphates, phosphoric acid, phosphorus pentasulfide, phosphorus trichloride
		Dyes, pigments, rubber preservatives, engineering thermoplastics, antifreeze, water treatment	Nitrochlorobenzene derivatives, sodium MBT
		Oil and gas well drilling applications	*Kelzan* X, *Kelzan* XCD and *Xanvis* xanthan gums, *Biozan* welan gum
Capital equipment		Cleaners, textile printing, paper sizings and coatings, firefighting foams	*Manutex* and *Kelgin* sodium alginates, *Kelzan* AR xanthan gum
		Heat transfer fluids	*Therminol* heat transfer fluids, diphenyl oxide
		Scale inhibitors, oil field chemicals	*Dequest* water treatment chemicals
	Manufacturers of eyeglasses, electronic security systems, industrial facilities, health conscious seniors	Process plants	Sulfuric acid and process plants (design and construction), air emission control systems
PHARMACEUTICALS			
Major End-Use Markets	**Market Scope**	**End-Use Products & Applications**	**Product Scope**
Pharmaceuticals	All health care providers, pharmacies, government agencies, patients	Cardiovascular	*Aldactone* (spironolactone), *Aldactazide* (spironolactone/ [illegible])
		Anti-inflammatory	[illegible] (ibuprofen), *Arthrotec* (misoprostol/diclofenac)
		Central nervous system (sleep)	*Ambien* (zolpidem tartrate)
		Gastrointestinal; ulcer drugs for prevention of NSAID-induced ulcers	*Cytotec* (misoprostol)
FOOD INGREDIENTS			
Major End-Use Markets	**Major Markets**	**End-Use Products & Applications**	**Major Products**
Food	Food and beverage processors and consumers, and all applications where aspartame can be substituted for other sweeteners; bakeries	High-intensity sweetener used primarily in beverages and dessert products	*NutraSweet* brand sweetener
	Cionsumers, especially health-conscious ones	Tabletop sweeteners	*Equal, Canderel, NutraSweet* and other tabletop sweeteners
		Soups, sauces, gravies, dressings, beverages, snack foods, breadings, batters, bakery products, dairy products, pet foods	*Keltone* and *Manugel* sodium alginates, *Kelcoloid* propylene glycol alginate, *Keltrol* SF and *Kel-lite* xanthan gums, *Kelcogel* gellan gum
		Bakery, dairy, meat	Food additives
Pharmaceuticals		Tablets, liquid suspensions, controlled release medications, dental impression materials	*Kelacid* alginic acid, *Keltrol* CR xanthan gum, *Kelmar* potassium alginate, *Gelrite* gellan gum

Appendix 1, Chart 2 of 2

Appendix 2

Monsanto's Acquisition, Divestitures, and Withdrawals

Appendix 2 is a summary of the main acquisitions, divestitures and withdrawals that have occurred in the last 5 years at Monsanto.

Principal Acquisitions, Divestitures and Withdrawals			
Business Sector	**Principal Products**	**Location**	**Type**
1996			
Acquiring Orcolite, a division of Benson Eyecare Corp. *	Polycarbonate and plastic lenses	Rye, N.Y.	Horizontal
Acquiring 49.9 percent of Calgene Inc. *	Fresh produce, oil seeds and other biotechnology crops	Davis, Calif.	Horizontal
Acquired 40 percent of DeKalb Genetics Corp.	Seeds for crops	DeKalb, Ill.	Vertical
Formed biotechnology collaboration with Ecogen Inc.	Crops protected against insect pests	Leghorn, Pa.	Horizontal
Sold interest in Monsanto joint venture in Thailand	Styrenics plastics	Map Ta Phut Industrial Estate, Thailand	Horizontal
1995			
Sold styrenics plastics business	*Lustran* ABS and SAN plastics, *Triax* alloys, and *Centrex* weatherable polymers	Various	Horizontal
Acquired Syntex women's health care product lines, a subsidiary of Roche Holding Ltd.	Women's health care product lines	Palo Alto, Calif.	Horizontal
Acquired 49 percent stake in Química M	Polyvinyl butyral (PVB) interlayer for laminated safety glass	Puebla, Mexico	Horizontal
Formed joint venture with Jiangsu Chemical Pesticide Group Co.	*Therminol* heat transfer fluids	Suzhou, China	Horizontal
Acquired Kelco, a division of Merck & Co. Inc.	Food ingredients and specialty chemical products	Various	Horizontal
Formed joint venture (Flexsys L.P.) with Akzo Nobel N.V.	Rubber chemicals and instruments	Various	Horizontal
1994			
Sold pyridine research program	Dithiopyr and thiazopyr herbicides	Muscatine, Iowa	Horizontal
1993			
Acquired Ortho Consumer Products Division of Chevron Chemical Co.	Lawn-and-garden products	Fort Madison, Iowa	Horizontal
Sold investment in a Monsanto joint venture in Japan	ABS and SAN plastics	Tsukuba and Yokkaichi, Japan	Horizontal
Sold linear alkyl benzene surfactant business	Laundry and dish detergent surfactants	Alvin, Texas	Horizontal
Sold chemical intermediates operation	Maleic anhydride	Pensacola, Fla.; St. Louis, Mo.	Vertical
Sold Form-Cor business	Extruded polystyrene foam board	Glasgow, Ky.	Horizontal
1992			
Sold Fisher Controls International Inc.	Control valves, process instrumentation and regulators	Various	Horizontal
Sold ACL brand chlorine business	Dry chlorine product for disinfecting swimming pools	Sauget, Ill.; Luling, La.	Horizontal
Sold investment in a Monsanto joint venture in Mexico	Chemical products	Mexico	Horizontal
Acquired Diamonex Inc.	Polycrystalline diamond substrates and super-hard coatings	Allentown, Pa.	Horizontal
Acquired partner's interest in an Italian and U.S. pharmaceutical joint venture	Prescription pharmaceuticals	Various	Horizontal
Formed tomato business venture	Genetically improved tomatoes	Various	Vertical
1991			
Sold animal feed ingredients business	Animal feed ingredients	Alvin, Texas; Nitro, W.Va.	Horizontal
Sold gas separations business	Gas separations	Various	Horizontal
Acquired partner's interest in a French pharmaceutical joint venture	Prescription pharmaceuticals	Evreux, France	Horizontal
Acquired 12.25 percent of Hokuriku Seiyaku Co. Ltd.	Prescription pharmaceuticals	Japan	Horizontal

Appendix 3

Monsanto's Current and Future Markets

Charts 1-9 contain Monsanto's major end-use markets classified by industry, detailing and summarizing the following information: major end-use market, SBU, brief description of the SBU, major markets targeted, end-use products & applications, major products (and brands), major competition major plants, and major raw materials required. In addition, Charts 6-9 depict Monsanto's major "pipeline" development projects by major business sector.

Monsanto's Major End-Use Markets
Pharmaceuticals

Major End-Use Markets	SBU's	Brief description	Markets	End-Use Products & Applications	Major Products	Major Competitors
Pharmaceuticals	**SEARLE**	Develops, manufactures and markets cardiovascular, arthritis, sleep disorder, gastrointestinal and anti-infective pharmaceuticals	All health care providers, pharmacies, gobernment agencies, patients	Cardiovascular	*Aldactone* (spironolactone), *Aldactazide* (spironolactone/ hydrochlorothiazide), *Calan* formulations (verapamil HCl),	American Home Products Bayer Berlex Bristol-Myers Squibb Ciba-Geigy Hoechst Marion Roussel Hoffman-LaRoche Knoll Merck Parke-Davis Pfizer Rhone-Poulenc Rorer Sandoz SmithKline Beecham Zeneca
				Anti-inflammatory	*Daypro* (oxaprozin), *Arthrotec* (misoprostol/diclofenac)	American Home Products Ciba-Geigy Hoffman-LaRoche Pharmacia & Upjohn Pratt SmithKline Beecham
				Central nervous system (sleep)	*Ambien* (zolpidem tartrate)	Abbott American Home Products Apothecon Eli Lilly Pharmacia & Upjohn Roche Roerig Sandoz SmithKline Beecham Wallace Zeneca
				Gastrointestinal, ulcer drugs for prevention of NSAID-induced ulcers	*Cytotec* (misoprostol)	Astra Merck Eli Lilly Glaxo Wellcome Janssen Hoechst Marion Roussel Merck SmithKline Beecham TAP Pharmaceuticals

Product Pipeline Data Pharmaceuticals

Product Pipeline Data	Product Category	Primary Uses/Benefits	Stage of Development
Covera-HS	Cardiovascular	Advanced treatment for hypertension and angina; provides full 24-hour effectiveness against rise in blood pressure and heart rate	New drug application (NDA) approved by U.S. FDA[1] in Feb. 1996; launch in 1996
Arthrotec (misoprostol/ diclofenac)	Arthritis/ Inflammation	Arthritis treatment that combines *Cytotec* ulcer preventive drug and the nonsteroidal anti-inflammatory diclofenac to significantly decrease the incidence of gastrointestinal ulcers	New launches in several countries; new drug application (NDA) submitted to U.S. FDA in 1995
Celecoxib (Cox-2 Inhibitor)	Arthritis/ Inflammation	Improved mechanism to treat arthritis pain selectively without gastrointestinal side effects	Phase II clinical trials
Synthokine-1	Oncology/Immuno-inflammatory	Adjunctive therapy to stimulate platelets and infection-fighting cells in chemotherapy patients	Phase II clinical trials
Xemilofiban	Cardiovascular	Prevents/inhibits blood clots associated with bypass surgery or angioplasty	Phase II clinical trials
Tissue Factor Pathway Inhibitor (TFPI)	Cardiovascular	Prevents blood clotting during microvascular surgery; also being evaluated to treat sepsis	Phase II clinical trials for microvascular surgery; Phase I clinical trials for sepsis
Orbofiban	Cardiovascular	Backup for xemilofiban with slightly improved profile	Phase I clinical trials
Epoxymexrenone	Cardiovascular	Treatment of hypertension and congestive heart failure (next-generation *Spironolactone*) with improved profile	Preclinical
Second-generation COX-2 Inhibitor	Arthritis/ Inflammation	Once-a-day dosing to treat arthritis pain selectively without gastrointestinal side effects	Preclinical
Spironolactone	Cardiovascular	Treatment of hypertension and congestive heart failure	Establishing effectiveness for treatment of congestive heart failure
Flagyl MR	Oncology/Immuno-inflammatory	Product-line extension to treat certain vaginal infections	Target launch in 1996
Oxaprozin salt	Arthritis/ Inflammation	Product-line extension of *Daypro* arthritis treatment to speed the relief of arthritis pain	Target launch in 1998

Monsanto's Major End-Use Markets
Agricultural Products

Major End-Use Markets	SBU's	Brief description	Major Markets	End-Use Products & Applications	Major Products
Agricultural, industrial, turf and ornamental applications	**Crop Protection**	Produces and markets a broad range of products for agricultural, industrial, turf and other markets, including the world's leading herbicide, Roundup. The unit also markets crops that are resistant to glyphosate herbicides	Producers of Corn (maize), soybean, wheat, cotton and rice worldwide	Multipurpose, nonselective agricultural and industrial applications	*Roundup* herbicide and other glyphosate-based herbicides
				Corn, soybean, peanut and milo (sorghum) crops	*Lasso* and *Harness** herbicides and other acetanilide-based herbicides *corn only
				Wheat crops	*Avadex* BW herbicide, *Far-Go* herbicide
				Postemergence control of sedges and broadleaf weeds in corn and grain sorghum, turf and sugarcane crops	*Permit, Manage* and *Sempra* herbicides
	Ceregen	World leader inb the dicovery and development of agricultural products based on advanced chemistry and biotechnology, such as crops withi built-in insect protection	Producers of Corn (maize), soybean, wheat, cotton and rice worldwide	Crops tolerant of nonselective herbicides	*Roundup Ready* soybeans, *Roundup Ready* canola **
				Crops protected against certain insect pests	Insect-protected cotton with the *Bollgard* gene, *NewLeaf* insect-protected potatoes
Residential applications	**Solaris**	Formulates and markets lawn and garden products as it pursues its mission to "creeate a world of fifference in outdoor living"	Homeowners and gardeners	Herbicides, insecticides, fungicides, and fertilizers	*Roundup* herbicide, *Ortho* lawn-and-garden products, and *Green Cross* brand lawn-and-garden products
Animal agricultural applications	**Protiva**	Uses biotechnology to develop and produce products for animal productivity, helping the world's farmer produce more for less, thereby benefiting both farmers and consumers	Dairies	Increase efficiency of milk production in dairy cows	*Posilac* bovine somatotropin
End agricultural consumers	**Produce**	Researches, develops, produces and markets fresh fruits and vegetables, using both traditional breeding and biotechnology to produce that tastes better and to improve the effficiency of food production	End consumers	Increase tastes and efficiency in production of fruits and vegetables	

** Final variety approval pending

Product Pipeline Data
Agricultural Products

Product Benefits	Stage of Development
Roundup Ready cotton	U.S. regulatory process completed; full commercialization in 1997
Delayed-ripening tomatoes	U.S. regulatory process completed in October 1995
YieldGard insect-protected corn for European corn borers	Nonregulated status granted by USDA[1]; in consultation with U.S. FDA[2] and U.S. EPA[3]
Genesis plant growth regulator, a pollen suppressant to aid in hybridizing wheat	In expanded field trials under EUP[4] from U.S. EPA; in consultation with U.S. EPA. Provisional registration granted in France
MON 37500 herbicide for postemergence control of grasses and some broadleaf weeds in global wheat crops	Provisional approvals and EUP granted in Switzerland, Czech Republic and United States in 1995
Roundup Ready corn	In field trials
Roundup Ready sugar beets	In field trials
Roundup Ready oilseed rape	In field trials in Europe
NewLeaf Plus insect- and virus-protected potatoes	In field trials
Higher-solids potatoes with improved processing properties	In field trials
Nematicide for control of nematodes in high-value crops such as potatoes, fruits and vegetables	Under development
MON 48500 herbicide primarily for pre-emergence control of broadleaf weeds and grasses in European cereals	Under development
MON 65500 fungicide for control of take-all disease in wheat	Under development
Plants that produce biodegradable plastic polymers	Under development
Corn resistant to corn rootworm and other insect pests	Under development
Cotton resistant to boll weevil	Under development
Disease-resistant potatoes	Under development
Disease-resistant wheat	Under development
Improved oil soybeans	Under development
Corn yield improvement project	Under development
Calgene Inc. Pipeline Products	
Canola that produces improved oils for cleaning and personal care products	Nonregulated status granted by USDA; in expanded field trials
Canola that produces improved oils for confectionery products	Nonregulated status granted by USDA; in expanded field trials
BXN[5] herbicide-tolerant and *Bollgard* insect-protected cotton	In consultation with U.S. EPA; in expanded field trials
Virus-protected tomatoes	In expanded field trials
Insect-protected tomatoes	In expanded field trials
Canola that produces improved oils for margarine and shortenings	In development
Canola that produces improved oils for nutritional products	In development
Higher-sugar fresh-market tomatoes for improved flavor	In development
Disease-resistant tomatoes	In development
Higher-solids tomatoes	In development
Higher-sugar strawberries for improved flavor	In development
Disease-resistant strawberries	In development
Plants that produce naturally colored cotton fibers	In development
Canola that produces improved oils for lubricants and biofuels	In development
Canola that produces improved oils for nutraceuticals	In development

[1] USDA stands for U.S. Department of Agriculture

[2] U.S. FDA stands for U.S. Food and Drug Administration

[3] U.S. EPA stands for U.S. Environmental Protection Agency

[4] EUP stands for Experimental Use Permit

[5] BXN is a registered trademark of Rhone Poulenc Agrochimie

Monsanto's Major End-Use Markets Chemicals

Major End-Use Markets	SBU's	Brief description	Major Markets	End-Use Products & Applications	Major Products
Construction and home furnishings	Fibers	Makes and markets a broad range of industry-leading nylon and acrylic fibers for carpeting, apparel, home furnishing, and automotive products	Manufacturers and purchasers of residential and commercial carpeting; makers of acrylic apparel and upholstery; producers of industrial nylon and tyres	Broadloom carpet, upholstery, blankets	Nylon carpet staple, nylon bulk continuous filament, *Acrilan* acrylic fiber
				Vinyl flooring, caulks and sealants, adhesives, coatings, wall covering, vinyl upholstery, insulation, furniture	Polymer modifiers
				Architectural glass	*Saflex* plastic interlayer
				Coatings and adhesives	Specialty resins
				Fire retardant coatings, polymer additives	Ammonium polyphosphate
				Doormats	Doormats
Vehicles	Saflex	Global leader in the manufacture and marketing of plastic interlayer for laminated automobile and architectural glass. The unit also produces intermediate chemicals in making plastic interlayer	Automobile and windshield manufacturers; commercial and residential window producers; architects and builders	Windshields	*Saflex* plastic interlayer
				Automotive exterior and interior molded parts, under-the-hood applications	*Vydyne* nylon molding resins
				Tires; molding resins for auto grilles, bumpers and gears	Nylon filament, nylon polymer
	Specialty Products	Collection of diverse business servimg a variety of major markets and target industries	Flooring, coatings, adhesives and caulks, fire control, specialty industrial fluids, specialty chemicals and plastic products	Automotive coatings and sealants	Specialty resins, polymer modifiers
				Hydraulic fluids for commercial aircraft	*Skydrol* aviation hydraulic fluids, lubricants

Monsanto's Major End-Use Markets
Chemicals - continued

ption	Major Markets	End-Use Products & Applications	Major Products	Major Competitors	Major Plants
e refining of elemental and manufacturing of oducts. In addition, the n over the alginate and strial material products y managed by the old	Manufacturers of personal care products and pharmaceuticals, industrial facilities; oil and gas producers	Sweaters, half-hose, active wear, hand-knit yarns, craft yarns	*Acrilan* acrylic fiber	Cytec	Decatur, Ala.
		Consumer electronics, medical devices	*Vydyne* nylon molding resins	DuPont	Pensacola, Fla.
		Dentifrices, dish detergents, water conditioners	Dental phosphates, industrial phosphates	Albright & Wilson FMC Rhone-Poulenc	Augusta, Ga. Newport, United Kingdom Ruabon, United Kingdom St. Louis, Mo.
		Metal treating, cleaning and etching; plant food fertilizers; oil additives	Industrial phosphates, phosphoric acid, phosphorus pentasulfide, phosphorus trichloride	Albright & Wilson FMC Rhone-Poulenc	Augusta, Ga. Luling, La. St. Louis, Mo. Sauget, Ill. Trenton, Mich.
		Dyes, pigments, rubber preservatives, engineering thermoplastics, antifreeze, water treatment	Nitrochlorobenzene derivatives, sodium MBT	Bayer Hoechst Celanese	Anniston, Ala. Nitro, W.Va. Ruabon, United Kingdom Sauget, Ill.
		Oil and gas well drilling applications	*Kelzan* X, *Kelzan* XCD and *Xanvis* xanthan gums, *Biozan* welan gum	ADM Rhone-Poulenc	Knowsley, United Kingdom Okmulgee, Okla. San Diego, Calif.
		Cleaners, textile printing, paper sizings and coatings, firefighting foams	*Manutex* and *Kelgin* sodium alginates, *Kelzan* AR xanthan gum	Hercules Pronova Rhone-Poulenc Unilever	Girvan, United Kingdom Knowsley, United Kingdom Okmulgee, Okla. San Diego, Calif.
		Heat transfer fluids	*Therminol* heat transfer fluids, diphenyl oxide	Dow Hüls Nippon Steel	Alvin, Texas Anniston, Ala. Newport, United Kingdom
		Scale inhibitors, oil field chemicals	*Dequest* water treatment chemicals	Albright & Wilson Bayer Mayo	Newport, United Kingdom
f smaller businesses with r growth. Envirochem g services and tal products), Diamonex	Manufacturers of eyeglasses, electronic security systems, industrial facilities, health conscious seniors	Process plants	Sulfuric acid and process plants (design and construction), air emission control systems	Chemetics Lurgi	On-site construction

Product Pipeline Chemicals

Product Pipeline Data	Product Category	Uses/Benefits	Stage of Development
Diamonex diamond materials	Polycrystalline diamond substrates and amorphous diamond coatings	Substrates for heat management of electronic devices; coatings for hard, low-friction, scratch-resistant surfaces; abrasion-resistant coatings for lenses	Market development and growth
Welan gum	Industrial	Processing aid for cement materials used in construction	Market development under way
Saflex SV interlayer	Plastic interlayer	Plastic interlayer for laminated glass that provides improved customer processing efficiencies	Commercial introduction in progress in North America and Japan
Santosol dimethyl esters	Family of pure and mixed solvents	Readily biodegradable and lower in toxicity than traditional solvents	Commercial introduction in progress
Santotac MRS	Polymer modifier	Improved binder for resilient flooring	Commercial introduction in progress
Vydyne nylon molding resins	Flame-retardant nylon thermoplastics	Flame resistance without halogens	Commercial introduction in progress
Glacier metal-working fluid	Metal-working fluid	Metal-working fluid used in automobile assembly plants and other operations that cut, blend and drill metals; environmentally friendly and readily waste-treatable	Commercial trials under way

Monsanto's Major End-Use Markets
Food Ingredients

Major End-Use Markets	SBU's	Brief description	Major Markets	End-Use Products & Applications	Major Products
Food	The NutraSweet Kelco Company	Merger of the food ingredients business of Kelco, NutraSweet Group, and Performance Materials (food phosphates). A leading world's food ingredients company. The unit expect to grow in current products/areas and expand into new product lines	Food and beverage processors and consumers, and all applications where aspartame can be substituted for other sweeteners; bakeries	High-intensity sweetener used primarily in beverages and dessert products	*NutraSweet* brand sweetener
	Benevia	In 1995 the consumer produccts operations of the NutraSweet Company and Searle merged to become Benevia. Worldwide leader in the consumer alternative sweetener market, selling products in more than 100 countries. Will expand to other healthy/nutrit.prods	Cionsumers, especially health-conscious ones	Tabletop sweeteners	*Equal, Canderel, NutraSweet* and other tabletop sweeteners
				Soups, sauces, gravies, dressings, beverages, snack foods, breadings, batters, bakery products, dairy products, pet foods	*Keltone* and *Manugel* sodium alginates, *Kelcoloid* propylene glycol alginate, *Keltrol* SF and *Kel-lite* xanthan gums, *Kelcogel* gellan gum
				Bakery, dairy, meat	Food additives
Pharmaceuticals				Tablets, liquid suspensions, controlled release medications, dental impression materials	*Kelacid* alginic acid, *Keltrol* CR xanthan gum, *Kelmar* potassium alginate, *Gelrite* gellan gum

Product Pipeline Data Food Ingredients

Product Pipeline Data	Product Category	Primary Uses/Benefits	Stage of Development
Leverage heat-activated leavening agent	Leavening agent for use in food processing	Heat-activated leavening agent for bakery industry	Market development under way; commercial introduction in 1996
Eggcellent cholesterol- and fat-reduced egg product	Food processing	Ingredient for food products including dressings, baked goods and spreads	Process, product and market development under way
High surface area cellulose	Food processing	Suspending, binding and thickening agent for food systems	Process, product and market development under way
Omega-3 fatty acids	Nutritional supplements ("nutraceuticals")	Applications in human health and foods, infant nutrition, aquaculture and animal feeds	Process, product and market development under way
Omega-6 fatty acids	Nutritional supplements ("nutraceuticals")	Applications in infant nutrition, human health and animal feeds	Process, product and market development under way
Sweetener 2000/ high-intensity sweetener	Sweetener for use in food processing	Replacement for sugar and other sweeteners in all uses, including commercial and consumer cooking and baking applications	Product testing on two formulations continues; petitions to worldwide regulatory agencies should be filed by the end of the decade.
Citric acid replacement	Food preservative	Ingredient for beverages	Under development
Stevia-derived sweeteners	Sweetener for use in food processing	Replacement for sugar and other sweeteners in many uses	Under development
Ultrapure algin	Biomedical	Biomedical applications including the treatment of diabetes	Under development

Appendix 4 - Monsanto's Performance Comparison With Peers

Selected Peer Group For Monsanto's Financial Comparison

	Company Name	Ticker	Primary SIC	Primary SIC Description	PeerScape Industry Group
	Monsanto Company	**MTC**	**2800**	**Chemicals & Allied Prods**	**Chemicals**
1.	B.F. Goodrich Co.	GR	2800	Chemicals & Allied Prods	Chemicals
2.	Union Carbide Corporation	UK	2860	Industrial Organic Chemicals	Chemicals
3.	Eastman Chemical Company	EMN	2821	Plastics,Resins,Elastomers	Chemicals
4.	Hercules Incorporated	HPC	2890	Misc Chemical Products	Chemicals
5.	Rohm and Haas Company	ROH	2821	Plastics,Resins,Elastomers	Chemicals
6.	Dow Chemical Company	DOW	2821	Plastics,Resins,Elastomers	Chemicals
7.	Air Products & Chemicals	APD	2810	Indl Inorganic Chemicals	Chemicals
8.	Praxair, Inc.	PX	2810	Indl Inorganic Chemicals	Chemicals
9.	E.I. DuPont De Nemours	DD	2820	Plastic Matl,Synthetic Resin	Chemicals
10.					

All figures expressed in millions except per share and multiples data

	Company Name	Fundamentals Update 10K	Fundamentals Update 10Q	Sales	Net Income	Total Assets	02/28/97 Price	Primary LTM EPS	PE Multiple	Market Value	Total Debt	Other Capital	Enterprise Value
	Monsanto Company	**Dec-95**	**Sep-96**	**$9,173**	**$739**	**$11,163**	**$36.38**	**$1.47**	**24.0**	**$21,001**	**$2,138**		**$23,139**
1.	B.F. Goodrich Co.	Dec-95	Sep-96	2,257	75	2,672	40.63	1.91	23.1	2,134	552		2,686
2.	Union Carbide Corporation	Dec-95	Sep-96	5,997	925	6,518	47.25	4.85	9.7	6,384	1,378	152.11	7,914
3.	Eastman Chemical Company	Dec-95	Sep-96	4,890	559	5,105	55.13	5.52	10.0	4,407	1,280		5,687
4.	Hercules Incorporated	Dec-95	Sep-96	2,115	333	2,354	46.50	3.05	15.1	5,045	476		5,521
5.	Rohm and Haas Company	Dec-95	Sep-96	3,932	292	3,973	92.00	5.25	18.2	6,194	706	134.94	7,035
6.	Dow Chemical Company	Dec-95	Sep-96	19,744	1,891	24,984	81.00	7.63	10.7	20,328	5,724	1,880.53	27,932
7.	Air Products & Chemicals	Sep-96	Sep-96	4,008	416	6,522	74.13	3.71	19.7	8,192	2,195		10,387
8.	Praxair, Inc.	Dec-95	Sep-96	4,105	262	7,459	48.75	1.61	27.2	6,851	2,378	736.16	9,965
9.	E.I. DuPont De Nemours	Dec-95	Sep-96	44,185	3,293	38,761	107.25	6.09	17.6	59,577	12,295	246.20	72,118
10.													
				$4,498	**$488**	**$6,520**			**17.9**	**$6,617**	**$1,758**	**$246.20**	**$8,940**

Appendix 4 continued
Selected Peer Group For Monsanto's Financial Comparison

Peer Group Methodology of Selected Peer Companies

	Company Name	Peer Group Methodology	# Companies in Peer Group
	Monsanto Company	Selected Peer Group	10
1	B.F. Goodrich Co.	Selected Peer Group	7
2	Union Carbide Corporation	Selected Peer Group	9
3	Eastman Chemical Company	Selected Peer Group	10
4	Hercules Incorporated	Selected Peer Group	11
5	Rohm and Haas Company	Selected Peer Group	11
6	Dow Chemical Company	Selected Peer Group	7
7	Air Products & Chemicals	Selected Peer Group	11
8	Praxair, Inc.	Selected Peer Group	11
9	E.I. DuPont De Nemours	Selected Peer Group	6
10			

Ticker Symbols of Selected Peer Companies

Co. Incl.	1	2	3	4	5	6	7	8	9	10	11
Yes	GR	LK	EMN	HPC	ROH	DOW	APD	PX	DD		
Yes	GT	CTB	GRA	DEX	OLN	GON					
Yes	DOW	DD	HPC	MTC	LYO	EMN	ROH	RCM			
Yes	UK	ROH	GR	GON	WLM	DEX	BCU	RXN	MWT		
Yes	DOW	DD	MTC	ROH	UK	IFF	GLK	MII	NLC	BTL	HPC
Yes	EMN	GON	BCU	RXN	MWT	DOW	DD	HPC	MTC	UK	ROH
Yes	DD	MTC	UK	EMN	HPC	ROH					
Yes	PX	CBT	EMN	GR	GRA	MTC	DOW	DD	HPC	UK	APD
Yes	APD	CBT	EMN	GR	GRA	MTC	DOW	DD	HPC	UK	PX
Yes	DOW	MTC	UK	EMC	HPC						

Shareholders Return Statistics

S-Curve Summary Statistics					
	Beginning	02/28/87	02/28/94	02/28/96	11/30/96
Monsanto Company and Peer Group	Ending	02/28/97	02/28/97	02/28/97	02/28/97
MTC Compound Annual Return		20.7%	36.8%	36.2%	-30.9%
Positive/(Negative) Performance vs Peer Group Median***		7.1%	12.6%	15.2%	-27.2%
Positive/(Negative) Performance vs S&P500 Median***		8.4%	21.4%	17.2%	-42.5%
S&P500 Quintile Placement		First	First	Second	Fifth
Peer Group Number of Companies		8	10	10	10
Peer Group Highest Shareholder Return		20.7%	39.1%	41.7%	83.5%
Lowest		8.5%	8.4%	-23.0%	-31.5%
Mean		14.1%	23.7%	16.7%	10.6%
Median		13.5%	24.2%	21.0%	-3.7%
S&P500 Quintile Placement		Third	Second	Third	Fourth

S-Curve Summary Statistics					
	Beginning	02/28/87	02/28/94	02/28/96	11/30/96
S&P500	Ending	02/28/97	02/28/97	02/28/97	02/28/97
S&P500 First Quintile Threshold		18.1%	30.0%	41.3%	57.7%
Second		13.9%	19.0%	24.7%	25.3%
Third		10.7%	12.0%	13.0%	3.5%
Fourth		6.9%	5.4%	-1.9%	-20.1%
S&P500 Number of Companies		448	484	496	499
S&P500 Highest Shareholder Return		46.5%	124.8%	312.2%	626.1%
Lowest		-18.4%	-29.6%	-55.3%	-96.4%
Mean		12.4%	17.1%	20.6%	24.3%
Median		12.3%	15.4%	19.0%	11.6%

**** This is the number of percentage points above or below the respective median; not the percent difference*

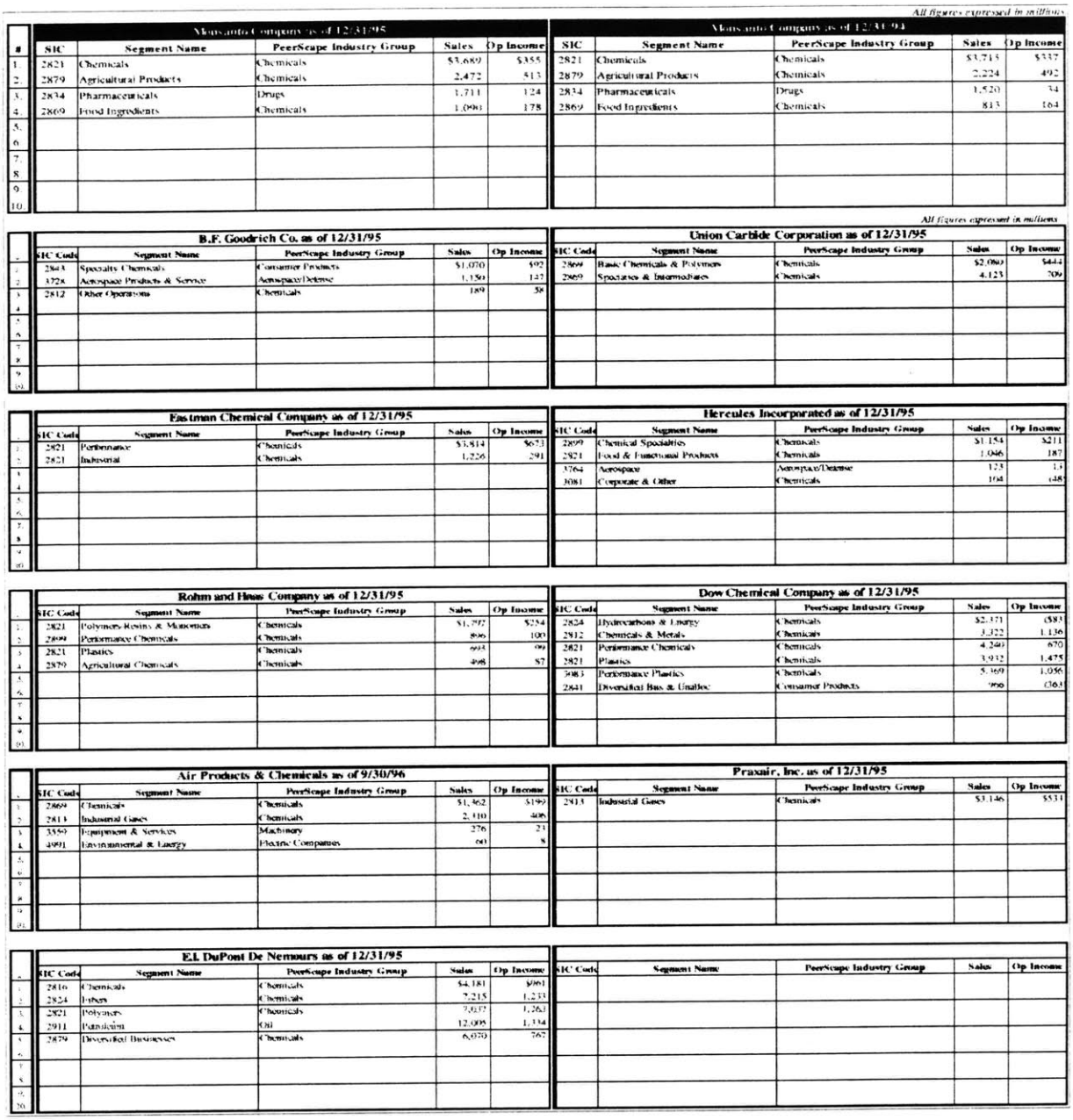
Appendix 4, chart 2 of 12

Appendix 4, Contd.

Monsanto's Performance Comparison

With Peers

Comparative Business Segments



All figures expressed in millions

#	Monsanto Company as of 12/31/95					Monsanto Company as of 12/31/94				
	SIC	Segment Name	PeerScape Industry Group	Sales	Op Income	SIC	Segment Name	PeerScape Industry Group	Sales	Op Income
1.	2821	Chemicals	Chemicals	$3,689	$355	2821	Chemicals	Chemicals	$3,715	$337
2.	2879	Agricultural Products	Chemicals	2,472	513	2879	Agricultural Products	Chemicals	2,224	492
3.	2834	Pharmaceuticals	Drugs	1,711	124	2834	Pharmaceuticals	Drugs	1,520	34
4.	2869	Food Ingredients	Chemicals	1,090	178	2869	Food Ingredients	Chemicals	813	164
5.										
6.										
7.										
8.										
9.										
10.										

All figures expressed in millions

	B.F. Goodrich Co. as of 12/31/95					Union Carbide Corporation as of 12/31/95				
	SIC Code	Segment Name	PeerScape Industry Group	Sales	Op Income	SIC Code	Segment Name	PeerScape Industry Group	Sales	Op Income
1	2843	Specialty Chemicals	Consumer Products	$1,070	$92	2869	Basic Chemicals & Polymers	Chemicals	$2,060	$444
2	3728	Aerospace Products & Service	Aerospace/Defense	1,150	127	2869	Specialties & Intermediates	Chemicals	4,123	709
3	2812	Other Operations	Chemicals	189	56					
4										
5										
6										
7										
8										
9										
10										

	Eastman Chemical Company as of 12/31/95					Hercules Incorporated as of 12/31/95				
	SIC Code	Segment Name	PeerScape Industry Group	Sales	Op Income	SIC Code	Segment Name	PeerScape Industry Group	Sales	Op Income
1	2821	Performance	Chemicals	$3,814	$653	2899	Chemical Specialties	Chemicals	$1,154	$211
2	2821	Industrial	Chemicals	1,226	291	2821	Food & Functional Products	Chemicals	1,046	187
3						3764	Aerospace	Aerospace/Defense	123	13
4						3081	Corporate & Other	Chemicals	104	(48)
5										
6										
7										
8										
9										
10										

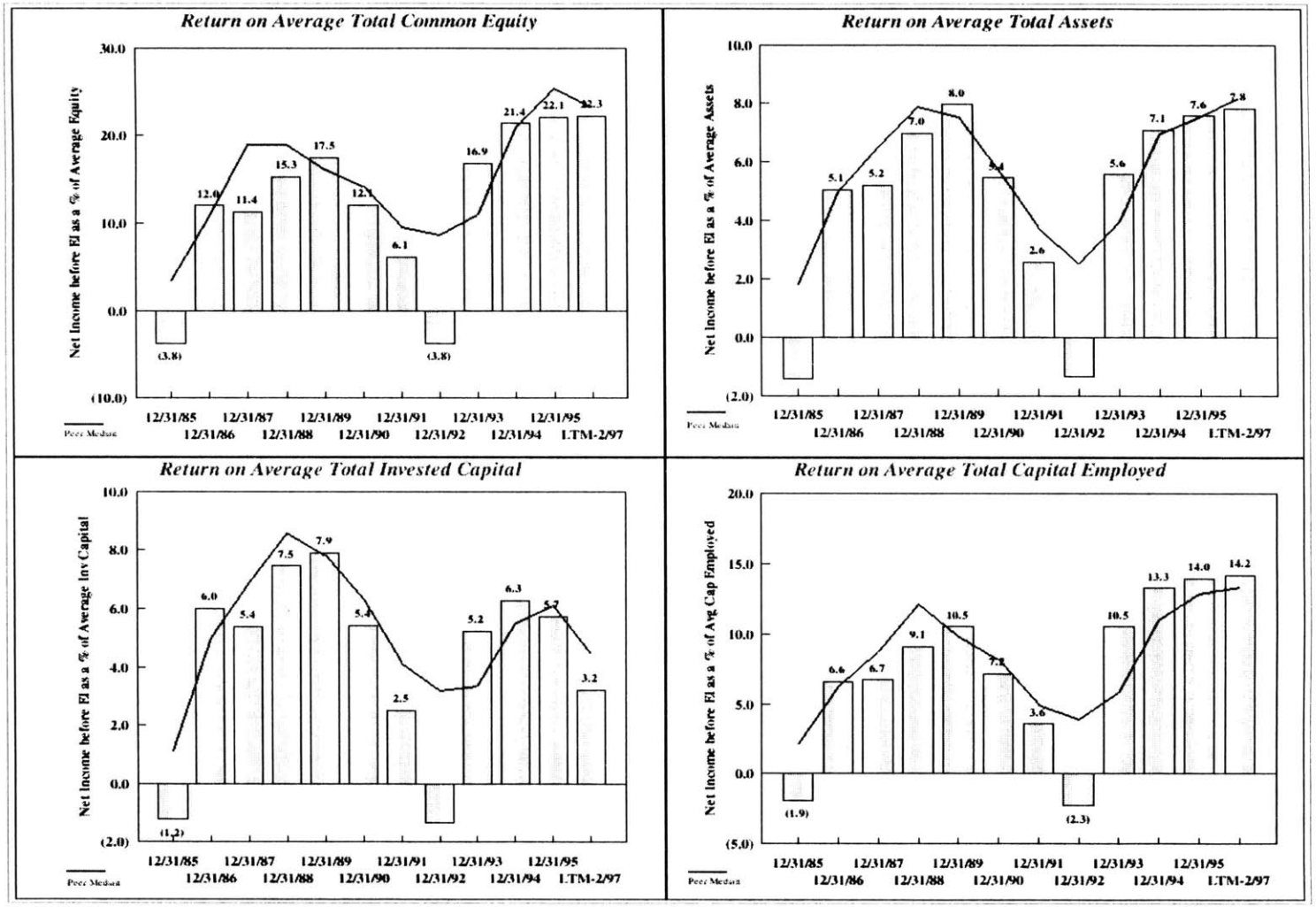
	Rohm and Haas Company as of 12/31/95					Dow Chemical Company as of 12/31/95				
	SIC Code	Segment Name	PeerScape Industry Group	Sales	Op Income	SIC Code	Segment Name	PeerScape Industry Group	Sales	Op Income
1	2821	Polymers-Resins & Monomers	Chemicals	$1,797	$254	2824	Hydrocarbons & Energy	Chemicals	$2,371	($83)
2	2899	Performance Chemicals	Chemicals	866	100	2812	Chemicals & Metals	Chemicals	3,322	1,136
3	2821	Plastics	Chemicals	693	99	2821	Performance Chemicals	Chemicals	4,240	670
4	2879	Agricultural Chemicals	Chemicals	498	87	2821	Plastics	Chemicals	3,932	1,475
5						3083	Performance Plastics	Chemicals	5,369	1,056
6						2841	Diversified Bus & Unalloc	Consumer Products	996	(363)
7										
8										
9										
10										

	Air Products & Chemicals as of 9/30/96					Praxair, Inc. as of 12/31/95				
	SIC Code	Segment Name	PeerScape Industry Group	Sales	Op Income	SIC Code	Segment Name	PeerScape Industry Group	Sales	Op Income
1	2869	Chemicals	Chemicals	$1,362	$199	2813	Industrial Gases	Chemicals	$3,146	$531
2	2813	Industrial Gases	Chemicals	2,110	406					
3	3559	Equipment & Services	Machinery	276	23					
4	4991	Environmental & Energy	Electric Companies	60	8					
5										
6										
7										
8										
9										
10										

	E.I. DuPont De Nemours as of 12/31/95									
	SIC Code	Segment Name	PeerScape Industry Group	Sales	Op Income	SIC Code	Segment Name	PeerScape Industry Group	Sales	Op Income
1	2816	Chemicals	Chemicals	$4,181	$961					
2	2824	Fibers	Chemicals	7,215	1,233					
3	2821	Polymers	Chemicals	7,037	1,263					
4	2911	Petroleum	Oil	12,005	1,334					
5	2879	Diversified Businesses	Chemicals	6,970	767					
6										
7										
8										
9										
10										

Appendix 4, Chart 3 of 12

Return on Investment



Appendix 4, Chart 4 of 12

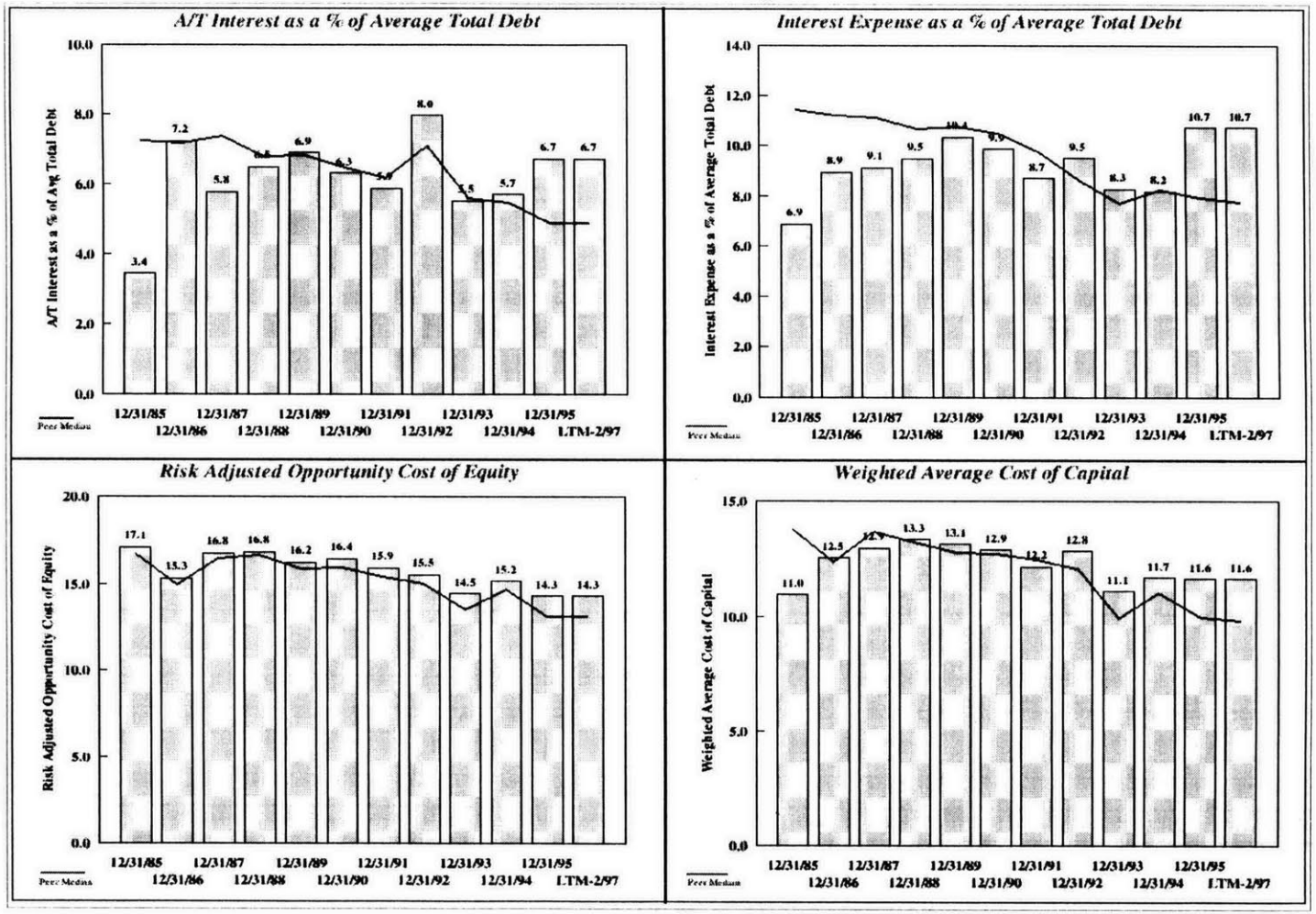
Return on Investment continued

No		Return on Avg Common Equity									Return on Average Total Assets									Return on Avg Total Inv Cap									Return on Avg Total Cap Emp								
		12/31/94			12/31/95			LTM-2/97			12/31/94			12/31/95			LTM-2/97			12/31/94			12/31/95			LTM-2/97			12/31/94			12/31/95			LTM-2/97		
		%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q
	MTC	21.4	5	2	22.1	7	2	22.3	6	2	7.1	5	2	7.6	5	2	7.8	6	2	6.3	2	2	5.7	7	2	3.2	8	3	13.3	3	2	14.0	5	2	14.2	4	1
1	GR	8.2	10	4	14.6	10	4	9.8	10	4	2.7	10	4	5.0	10	4	3.5	9	4	4.1	8	4	6.2	5	1	2.5	9	4	4.5	9	4	8.6	10	4	6.2	9	4
2	UK	24.6	3	1	52.4	1	1	32.3	3	1	6.9	6	2	15.6	1	1	10.0	2	1	7.0	1	1	15.2	1	1	6.6	1	1	13.6	2	2	29.7	1	1	18.4	2	1
3	EMN	28.5	1	1	39.6	2	1	27.4	4	1	7.7	2	2	12.1	3	1	8.6	4	2	6.0	4	2	9.6	2	1	5.8	2	1	11.2	5	2	19.0	2	1	13.6	5	2
4	HPC	20.6	6	2	28.0	4	1	32.6	2	1	9.0	1	2	12.2	2	1	14.2	1	1	5.4	6	2	5.7	8	2	5.0	4	1	14.1	1	2	18.5	3	1	21.0	1	1
5	ROH	18.9	7	2	18.6	8	3	20.4	7	2	7.1	4	2	7.5	7	2	8.6	5	2	5.6	5	2	6.0	6	1	3.9	7	2	11.0	6	2	11.5	7	3	13.1	6	2
6	DOW	9.5	9	4	24.3	6	1	24.4	5	1	3.0	9	4	7.5	6	2	7.6	7	2	2.7	10	5	7.2	3	1	5.3	3	1	4.0	10	5	11.9	6	3	12.3	7	2
7	APD	10.8	8	4	16.0	9	3	16.7	8	2	4.8	8	4	6.8	9	3	6.7	8	2	3.7	9	4	5.3	9	2	4.8	5	1	6.9	8	4	9.8	9	3	9.4	8	2
8	PX	27.5	2	1	26.7	5	1	12.5	9	3	6.0	7	3	6.8	8	3	3.4	10	4	4.8	7	3	4.8	10	3	2.1	10	4	8.4	7	3	9.8	8	3	4.9	10	4
9	DD	23.1	4	2	31.7	3	1	39.7	1	1	7.4	3	2	8.9	4	2	8.7	3	2	6.2	3	2	6.8	4	1	4.1	6	2	12.4	4	2	15.0	4	2	14.8	3	1
Median		21.0	-	2	25.5	-	1	23.3	-	2	7.0	-	2	7.6	-	2	8.2	-	2	5.5	-	2	6.1	-	1	4.4	-	3	11.1	-	2	12.9	-	3	13.4	-	2

= peer group rank....Q = S&P500 quintile....LTM = trailing 12 months through date shown. Refer to "Monsanto Company Corporate Profiles" for firm names, data sources/updates and disclaimer.

Appendix 4, Chart 5 of 12

Cost of Capital



Appendix 4, Chart 6 of 12

Cost of Capital continued

No		A/T Interest % of Avg Total Debt									Interest Exp % of Avg Total Debt									Risk Adjusted Opp Cost of Equity									Weighted Average Cost of Capital								
		12/31/94			12/31/95			LTM-2/97			12/31/94			12/31/95			LTM-2/97			12/31/94			12/31/95			LTM-2/97			12/31/94			12/31/95			LTM-2/97		
		%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q
	MTC	5.7	8	4	6.7	9	4	6.7	10	5	8.2	5	3	10.7	10	5	10.7	10	5	15.2	8	5	14.3	10	5	14.3	9	5	11.7	4	5	11.6	1	4	11.6	1	5
1	GR	5.3	5	3	5.8	8	3	5.8	7	4	9.0	10	4	9.0	7	4	9.0	7	4	15.1	7	5	13.5	7	4	13.5	7	4	11.1	5	4	10.6	3	4	10.6	3	4
2	UK	6.0	9	4	4.7	4	2	4.7	6	2	8.4	7	3	7.8	5	3	7.8	6	3	13.2	1	4	11.8	2	2	11.8	2	3	10.3	7	4	8.9	8	2	8.9	8	3
3	EMN	5.0	3	3	4.5	2	2	4.5	2	2	6.5	1	1	7.3	2	2	7.3	2	2	14.4	4	5	13.3	6	4	13.3	6	4	9.9	9	3	9.4	7	2	9.4	7	3
4	HPC	4.9	1	3	4.3	1	2	4.3	1	2	7.4	3	2	6.6	1	1	6.6	1	1	14.9	6	5	12.3	3	3	12.3	3	3	12.1	1	5	9.8	6	3	9.8	6	3
5	ROH	5.0	2	3	5.4	7	3	5.4	4	4	7.7	4	2	7.7	3	2	7.7	4	2	15.7	10	5	13.0	5	4	13.0	5	4	12.0	2	5	10.8	2	4	10.8	2	4
6	DOW	5.5	6	4	5.1	6	3	5.1	5	3	8.9	9	4	7.7	4	2	7.7	5	2	14.0	2	4	11.2	1	2	11.2	1	2	10.2	8	4	8.6	9	2	8.6	9	3
7	APD	5.2	4	3	4.7	3	2	4.5	3	2	7.2	2	2	8.1	6	3	7.4	3	2	15.5	9	5	14.0	8	4	14.4	10	5	11.8	3	5	10.1	5	3	9.8	5	4
8	PX	6.7	10	5	6.8	10	4	6.8	9	5	8.5	8	3	9.7	9	4	9.7	9	5	14.6	5	5	14.2	9	5	14.2	8	5	9.8	10	3	10.2	4	3	10.2	4	4
9	DD	5.7	7	4	4.8	5	2	4.8	8	3	8.3	6	3	9.5	8	4	9.5	8	4	14.2	3	5	12.6	4	3	12.6	4	3	11.0	6	4	8.0	10	1	8.0	10	2
Median		5.5	-	4	4.9	-	3	4.9	-	3	8.3	-	3	8.0	-	3	7.8	-	3	14.7	-	5	13.1	-	4	13.1	-	4	11.1	-	4	10.0	-	3	9.8	-	3

= peer group rank....Q = S&P500 quintile....LTM = trailing 12 months through date shown. Refer to "Monsanto Company Corporate Profiles" for firm names, data sources/updates and disclaimer.

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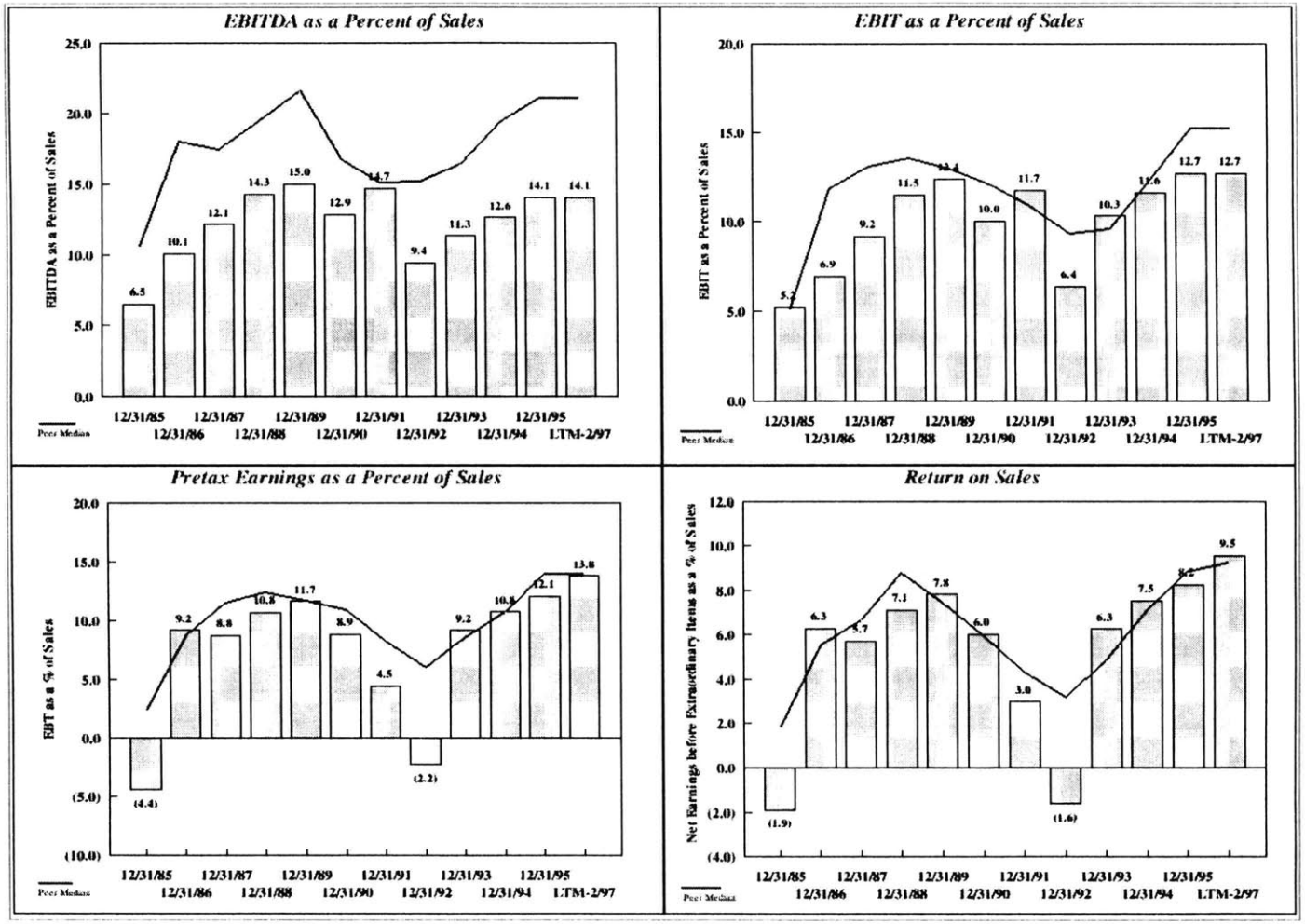
Profitability



Appendix 4, Chart 8 of 12

Profitability continued

No		EBITDA as a % of Sales									EBIT as a % of Sales									Pretax Earnings as a % of Sales									Return on Sales								
		12/31/94			12/31/95			LTM-2/97			12/31/94			12/31/95			LTM-2/97			12/31/94			12/31/95			LTM-2/97			12/31/94			12/31/95			LTM-2/97		
		%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q
	MTC	12.6	8	4	14.1	9	3	14.1	9	3	11.6	7	3	12.7	9	2	12.7	9	3	10.8	6	3	12.1	8	2	13.8	6	2	7.5	3	2	8.2	7	2	9.5	5	1
1	GR	12.2	9	4	13.8	10	3	13.8	10	3	8.0	10	4	9.9	10	3	9.9	10	3	4.9	10	4	8.2	10	3	7.8	10	3	3.0	10	4	5.1	10	3	4.1	10	4
2	UK	17.0	7	3	28.1	1	1	28.1	1	1	11.3	8	3	22.9	1	1	22.9	1	1	9.7	8	3	21.4	1	1	16.1	3	1	6.9	6	3	14.9	1	1	10.9	2	1
3	EMN	21.7	3	2	24.8	3	1	24.8	3	2	14.1	3	2	18.7	3	1	18.7	3	2	12.7	2	2	17.8	3	1	14.4	5	2	7.8	2	2	11.1	3	1	9.0	6	2
4	HPC	21.2	4	2	22.0	5	1	22.0	5	2	15.9	2	2	16.5	5	1	16.5	5	2	14.5	1	2	20.8	2	1	23.8	1	1	9.7	1	2	13.7	2	1	15.8	1	1
5	ROH	19.5	5	2	19.3	8	2	19.3	8	2	13.0	4	3	13.0	8	2	13.0	7	2	11.5	4	2	11.4	9	2	13.4	7	2	7.5	5	2	7.5	9	2	8.7	7	2
6	DOW	11.1	10	4	19.5	7	2	19.5	7	2	10.9	9	3	19.3	2	1	19.3	2	2	9.7	7	3	17.5	4	1	16.7	2	1	4.6	9	4	9.4	5	1	9.6	4	1
7	APD	23.2	2	2	23.9	4	1	23.5	4	2	12.9	5	3	13.8	7	2	13.0	8	2	9.3	9	3	14.3	5	2	15.2	4	1	6.7	8	3	9.5	4	1	10.4	3	1
8	PX	26.6	1	2	26.3	2	1	26.3	2	2	16.5	1	2	17.4	4	1	17.4	4	2	12.5	3	2	13.7	6	2	10.0	9	3	7.5	4	2	8.3	6	2	6.1	9	3
9	DD	19.3	6	2	20.3	6	2	20.3	6	2	11.9	6	3	14.0	6	2	14.0	6	2	10.9	5	3	12.5	7	2	12.6	8	2	6.8	7	3	7.6	8	2	7.7	8	2
Median		19.4	-	2	21.1	-	1	21.1	-	2	12.4	-	3	15.3	-	1	15.3	-	2	10.9	-	3	14.0	-	2	14.1	-	2	7.2	-	2	8.8	-	2	9.3	-	2

= peer group rank....Q = S&P500 quintile....LTM = trailing 12 months through date shown. Refer to "Monsanto Company Corporate Profiles" for firm names, data sources/updates and disclaimer.

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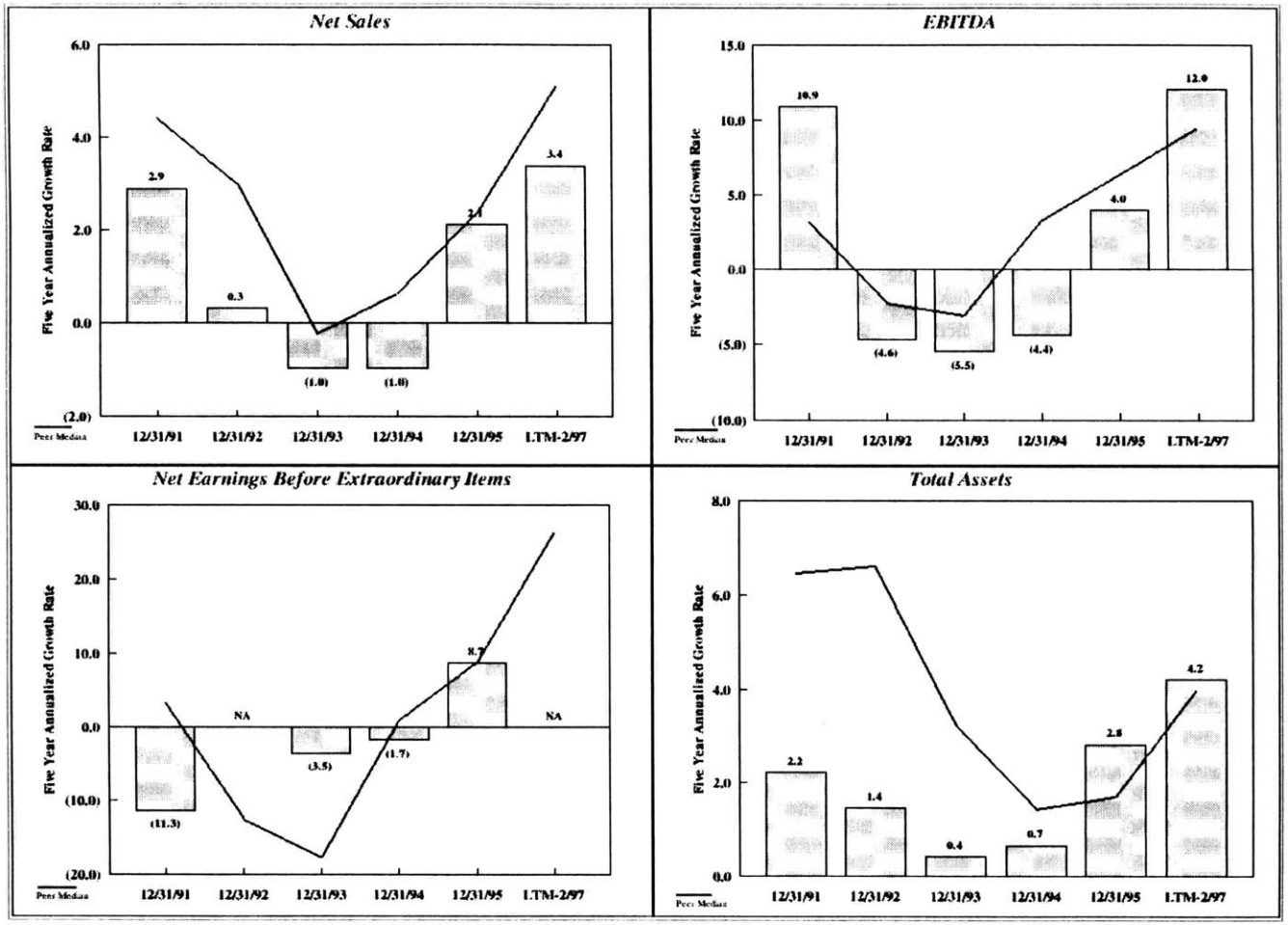
Growth



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Growth continued

No.		Net Sales Growth									EBITDA Growth									Net Earnings Before E/I Growth									Total Asset Growth								
		12/31/94			12/31/95			LTM-2/97			12/31/94			12/31/95			LTM-2/97			12/31/94			12/31/95			LTM-2/97			12/31/94			12/31/95			LTM-2/97		
		%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q	%	#	Q
	MTC	(1.0)	5	5	2.1	6	5	3.4	7	4	(4.4)	6	5	4.0	9	5	12.0	4	2	(1.7)	5	5	8.7	6	4	-	-	-	0.7	6	4	2.8	4	5	4.2	4	3
1	GR	(1.9)	8	5	(0.2)	9	5	6.5	2	2	(6.2)	7	5	4.4	8	5	8.8	7	3	(17.4)	7	5	1.2	10	5	50.7	1	1	1.7	4	4	0.6	5	5	1.7	7	4
2	UK	(2.8)	9	5	2.4	5	5	4.2	6	3	(8.8)	8	5	12.6	2	3	22.2	1	1	(8.6)	6	5	30.2	2	1	37.6	3	1	(9.5)	8	5	(3.3)	8	5	5.7	3	3
3	EMN	-	-	-	8.0	1	3	5.1	5	3	-	-	-	16.6	1	2	8.4	8	3	-	-	-	9.3	5	4	7.9	9	3	-	-	-	-	-	-	4.0	5	3
4	HPC	(1.8)	7	5	(5.4)	10	5	(5.9)	10	5	20.6	1	1	4.9	7	5	(1.1)	10	5	-	-	-	30.7	1	1	15.7	6	2	(4.2)	7	5	(7.6)	9	5	(6.1)	10	5
5	ROH	5.8	1	3	6.6	2	3	5.1	4	3	11.2	2	2	10.8	3	4	9.1	6	3	8.4	2	3	7.1	8	5	14.4	7	2	9.5	1	2	7.7	2	3	2.5	6	4
6	DOW	(1.0)	6	5	0.4	8	5	0.8	9	5	(14.4)	9	5	5.9	6	5	15.5	2	2	(20.9)	8	5	6.4	9	5	47.1	2	1	3.8	3	4	(0.3)	6	5	(0.3)	9	5
7	APD	5.7	2	3	6.0	3	4	6.5	3	3	5.7	4	4	6.9	4	4	6.2	9	3	1.0	4	4	9.9	4	4	10.8	8	2	8.4	2	2	8.3	1	3	9.1	2	2
8	PX	5.5	3	3	5.4	4	4	9.5	1	2	8.9	3	3	6.4	5	4	12.5	3	2	36.4	1	1	18.1	3	3	24.6	5	1	-	-	-	6.4	3	4	17.4	1	1
9	DD	2.3	4	4	1.3	7	5	2.9	8	4	0.9	5	4	3.0	10	5	9.9	5	2	1.9	3	4	7.3	7	5	28.3	4	1	1.2	5	4	(0.4)	7	5	(0.1)	8	5
Median		0.7	-	5	2.4	-	5	5.1	-	3	3.3	-	4	6.4	-	4	9.5	-	2	1.0	-	4	9.0	-	4	26.4	-	1	1.4	-	4	1.7	-	5	4.0	-	3

= peer group rank....Q = S&P500 quintile....LTM = trailing 12 months through date shown. Refer to "Monsanto Company Corporate Profiles" for firm names, data sources/updates and disclaimer.

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Productivity continued

No.		Sales per Employee									Net Earnings per Employee									Free Cash Flow per Employee									EBITDA per Employee								
		12/31/94			12/31/95			LTM-2/97			12/31/94			12/31/95			LTM-2/97			12/31/94			12/31/95			LTM-2/97			12/31/94			12/31/95			LTM-2/97		
		$000s	#	Q	$000s	#	Q	$000s	#	Q	$000s	#	Q	$000s	#	Q	$000s	#	Q	$000s	#	Q	$000s	#	Q	$000s	#	Q	$000s	#	Q	$000s	#	Q	$000s	#	Q
	MTC	281.8	5	2	314.3	5	2	321.7	5	2	21.2	5	2	25.9	6	2	30.7	5	2	11.1	7	3	8.3	7	3	8.9	8	3	35.6	8	3	44.2	9	2	45.2	9	3
1	GR	164.2	9	4	181.4	9	3	170.0	10	4	4.9	10	4	9.3	10	3	7.0	10	4	5.2	9	4	7.1	8	3	5.9	9	4	20.0	10	4	25.0	10	3	23.5	10	4
2	UK	405.3	1	1	511.1	1	1	520.5	1	1	27.8	1	2	76.3	1	1	56.9	1	1	21.3	4	2	55.0	1	1	57.0	1	1	68.7	2	2	143.6	1	1	146.2	1	1
3	EMN	247.4	7	2	284.6	7	2	276.1	6	2	19.2	6	2	31.6	4	1	24.9	8	2	24.0	2	2	25.3	4	1	23.8	4	2	53.6	5	2	70.6	4	1	68.5	4	2
4	HPC	235.3	8	3	307.5	6	2	268.0	7	2	22.9	3	2	42.2	3	1	42.2	3	1	23.8	3	2	35.5	2	1	29.1	3	2	49.8	6	2	67.7	5	1	59.0	8	2
5	ROH	289.4	4	2	332.8	4	2	336.9	4	2	21.6	4	2	25.0	7	2	29.2	6	2	16.7	5	2	16.2	6	2	16.8	6	2	56.5	4	2	64.2	6	1	65.0	5	2
6	DOW	311.6	3	2	510.9	2	1	499.4	2	1	14.4	8	3	47.8	2	1	48.0	2	1	1.1	10	5	23.3	5	1	22.0	5	2	34.7	9	3	99.4	2	1	97.1	2	1
7	APD	262.1	6	2	261.1	8	2	263.7	8	2	17.6	7	3	24.9	8	2	27.4	7	2	9.7	8	3	(11.9)	10	5	(19.1)	10	5	60.8	3	2	62.5	7	1	62.0	6	2
8	PX	152.5	10	4	172.6	10	4	225.3	9	3	11.4	9	3	14.4	9	3	13.8	9	3	16.1	6	2	4.0	9	4	15.2	7	3	40.5	7	3	45.4	8	2	59.2	7	2
9	DD	376.1	2	1	412.0	3	1	420.8	3	1	25.5	2	2	31.4	5	1	32.2	4	2	27.2	1	2	30.3	3	1	31.6	2	2	72.7	1	2	83.6	3	1	85.3	3	2
Median		281.8	-	2	310.9	-	2	298.9	-	2	21.2	-	2	28.6	-	1	30.0	-	2	16.7	-	2	19.8	-	2	19.4	-	2	53.6	-	2	65.9	-	1	63.5	-	2

= peer group rank....Q = S&P500 quintile....LTM = trailing 12 months through date shown. Refer to "Monsanto Company Corporate Profiles" for firm names, data sources/updates and disclaimer.

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Appendix 5

Monsanto's Experience in Crop Protection

This appendix provides a clear view of the strategy pursued by Monsanto, not only in terms of geographic scope, but also in terms of the globalization/localization practices of its core activities in its largest business area : Crop Protection (Agriculture biotechnology and chemicals, measured in terms of revenues and biotechnology R&D investments). This Crop Protection example will be helpful to analyze Monsanto's ability to develop a global business in the life science industry and, specifically, in the cardiovascular business. We will see through this example that Monsanto has developed core competencies and capabilities to face the uncertainties of the emerging life sciences industry.

When looking at Crop Protection through the Adaptive Management Framework™, we will see that Monsanto started at "Best Product" with products such as "Round Up" and moved toward "Proprietary Standard" by strengthening the total market and system for "Round Up" and through innovation in the development of new products to lock in the customer. In this sense, the role of R&D has been very important, as well as the marketing efforts in developing granular segmentation on a global scale.

As seen in Figure A5.1, Monsanto moved to a dominant design in Crop Protection by going for "Total Customer Solution" through customer targeting and innovation. The innovation effort played an important role in the customer solution positioning through

bundling chemicals and biotechnology products (which are complements) and also by accelerating the development of new products that maintained the state of the art in the market or, in other words, were more "Best Products".

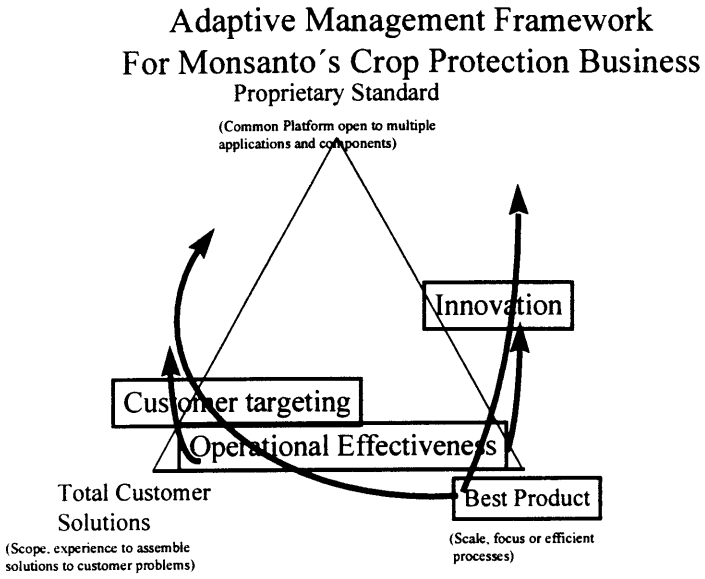


Figure A5.1 - *Monsanto's Crop Protection Business*

The similarities of the challenges found in this area and the ones to be faced in nutraceuticals make this analysis very relevant and provides insight as to how Monsanto might use this experience (especially in regards to creating their internal skills for innovation) in order to enter and achieve a leadership position in this emerging industry. Additionally, when looking for different models of competitive practices and approaches to strategic positioning in a certain industry, this internal biotechnology industry example shows that possible benchmarks can be found inside the same company under analysis.

A.5.1 Description of the Industry

The global crop protection business is a $30B industry and its main products are chemicals: fungicides, herbicides, insecticides and other pesticides that are chemically synthesized. However there is a new stream of products coming from a different technological source, agriculture biotechnology. Agriculture biotech, among other product lines, is focused in developing seeds with tolerance to pests (insect resistant engineered traits), herbicides (tillage can be avoided or minimized) and also includes gene stacking (the ability to genetically engineer multiple traits into a plant). Agriculture biotechnology allows the farmer to diminish the use of crop protection chemicals and also to grow crops with higher nutrition content (fiber, oil, etc.) which will mean a new offer to food processors and food companies in terms of yields (productivity) and also in terms of new products for the end-consumer (functional foods and nutraceuticals). The following figure shows worldwide sales in 1994 by type of chemicals .

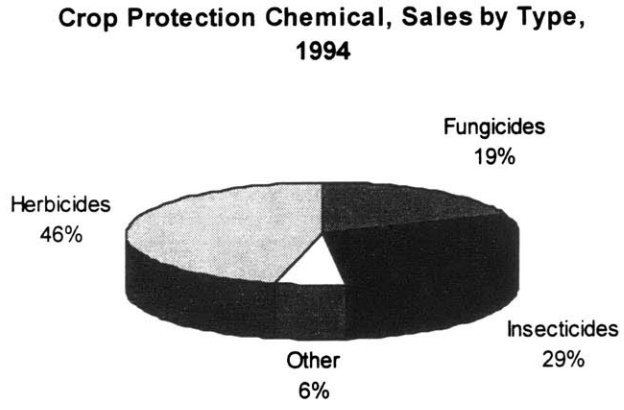


Figure A.5.1.1 - *Crop Protection Chemical Sales*

As can be seen in Figure A.5.2, in 1994, herbicides accounted for almost half of crop protection chemical revenues.

A.5.2 Industry Characteristics

In terms of scope, the industry is mainly global however, nevertheless there are still underdeveloped economic areas in the world that are only just beginning to use more advanced technologies and farming practices as they experience a higher rate of economic development.

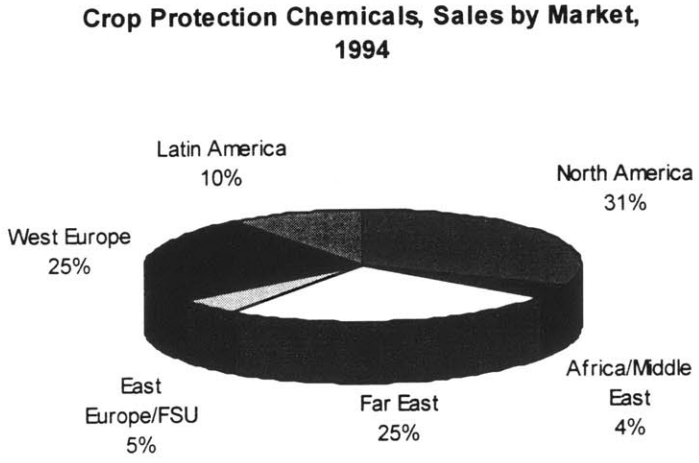
The Crop Protection business is dominated by a small group of international players **(Relevant to Cardiovascular)**. As can be seen in the following table, the top ten global players account for approximately 75% of the total world sales in this industry. The remaining 25% is composed of continental/local players (with a decreasing trend in share).

Top Ten Crop Protection Chemical Producers - 1994 sales

Company	$ billions	% of Total
Novartis	4.2	14.5%
AgrEvo	2.3	8.0%
DuPont	2.3	8.0%
Monsanto	2.2	7.5%
Zeneca	2.2	7.5%
Bayer	2.1	7.2%
Rhone-Poulenc	1.9	6.5%
DowElanco	1.8	6.2%
American-Home Products	1.7	5.8%
BASF	1.1	3.8%
Total	21.8	75%

Figure A.5.2.1 - *Share of Sales (1994)*

Regarding the geographical activity in this industry, North America has historically been the largest market for these products **(Relevant to Cardiovascular)**. However, the developing countries are expected to become more important markets for crop chemicals, as farmers in those countries increasingly adopt conservation tillage practices. The following graph shows the detail of sales per geographical market in this industry.



FigureA.5.2.2 - *Geographic Market Share (1994)*

A.5.3 Crop Protection Globalization Drivers

The industry is becoming increasingly global in terms of market integration, R&D, and manufacturing, especially as the developing countries become more important as they begin to use more of these products (conservation tillage) and as the global players move into these new markets.

Customer Needs (Relevant to Cardiovascular - *Customer needs are basically the same worldwide* in terms of conservation tillage in farming to minimize soil erosion (mainly through the use of herbicides) and protection against pests and insects. The main chemical products have a wide range of protection (especially the leading herbicide Roundup) however, the primary sources of revenue come from corn and soybean protection.

Customers (Relevant to Cardiovascular) - The end user of crop protection chemicals is the farmer, *who is local.* However, the next step in the value chain contains food processors and food companies, which are increasingly global in scale and highly dense in local integration, especially with regard to the marketing activities.

Channels - The two primary channels used in crop protection are the seeds companies, which are global players, and the distributors of chemical products (a mix of global/local players).

Cost Globalization Drivers (Relevant to Cardiovascular) - The high development costs ($200M per herbicide), the fast-changing technologies, and the global scale economies of having a homogenous line of products all contribute to the globalization of this industry as contrasted to a local one which is clearly less competitive.

Competition - The competitors in the crop protection business are mainly from the US. They are global in terms of their sales, obtaining around 60% of their revenues from outside the US. There is an increasing trend in terms of sales to emerging markets such as Latin America as the farmers there are adopting the new technologies for crop protection.

Internationalization of the Crop Protection Industry - The following graph describes the internationalization of the Crop Protection industry, in terms of market integration, scale, unique inputs and knowledge/leverage.

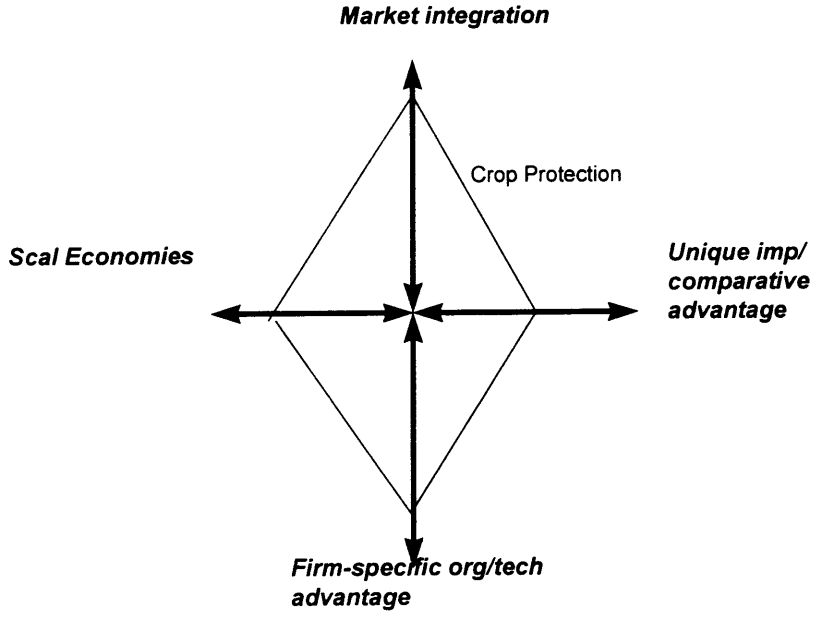


Figure A.5.4.1 - *Internalization of the Crop Protection Chemical Industry*

- **Market Integration (Relevant to Cardiovascular)** - The market for crop protection products is global as the customer needs are common and the products offered are basically the same, (for instance, the needs of protecting corn and soybean are rather similar across countries). Therefore there is extensive market integration that occurs.

- **Configuration of Key Activities (Relevant to Cardiovascular)** - Again this is global. The biggest players have facilities located mainly in the US and in western Europe for their worldwide operations. In addition their distribution activities are also global. Knowledge leverage is global because of the economies of scale in R&D. Localization of activities are superficial as the main activities are located in the US.

- **Unique Inputs/Comparative Advantage** - Competitive advantage of the existing, dominant players is decreasing as the main patents in US are expiring and are not recognized elsewhere. On the other hand, the technology is beginning to change which will probably slow new entrants in the future.

- **Firm Specific/Technological Advantage (Relevant to Cardiovascular)** - This is high because of the complex and very expensive technology involved in the development of the products.

A.5.5 Monsanto Globalization

This section is a further analysis of the environmental scan performed on Monsanto in Section 3.8. Basically that analysis indicated that Monsanto will increase its activities in Latin America, Asia, Middle East, Pakistan, Africa and Philippines. Today, Monsanto has activities in around 130 countries.

In terms of crop protection, the chemical side of the business, (herbicides and pesticide) are highly globalized and high in terms of local integration. The best example is Roundup herbicide. The biotechnology side of the business is engineering seeds that are Roundup resistant in order to extend product demand (also high in terms of global scale but low in terms of local density). This stream of products is just being introduced in the larger markets. In terms of functions, R&D and manufacturing are high-global and low-local as they are mainly located in the US. On the other hand, marketing and sales are in the center because of the global and local characteristics of the end-customers.

In terms of the geographic arena, the position of North America and West Europe represent the highest level of development and use of the latest technologies in the farm. Latin America is moving toward high global/low local; Asia toward high global/high local and Africa remains a low global/ low local position.

The main reason for this degree of internationalization is the success of Monsanto's Roundup herbicide. As indicated earlier, the company is facing the expiration of its US

patent in the year 2000 . It is currently registered in 130 countries and used on more than 100 crops for 300 species of weeds. Estimates say that Roundup generates $1.5B in sales annually for Monsanto and 40% of its operating profits. As its main component (glyphosphate) has became accessible to other competitors, generic brands have appeared outside of US taking the price levels there to 50% of US levels.

A.5.6 Internationalization and Competitive Advantage

There are clear advantages of being global and international in this business. The nature of the customer needs is global (especially because the main crops in terms of sales of the products are corn and soybean whose production is spread across different continents). On the other hand, the nature of the end-customers is local in terms of location, however, in the down stream portion of the value chain we find the food processors, who are highly global and local in terms of their nature (scale and integration). Adding considerations of factors and cost drivers, there are important economies of scale in manufacturing and also in R&D, which is very expensive.

The trend of changes in this industry, especially in the technology side, will boost the importance of going global and intensify the localization of activities on the service side. The unique characteristics of the technology will allow companies to bundle products (biotech-chemicals) and will allow them the opportunity to lock-in the customers in terms of specific seeds and chemicals used on the farm directly or through licensing the arrangements. Therefore, the important issue for a firm will be its ability to set or

influence the standard of the industry. In order to reach this level, companies will have to stress their skills in going global in terms of scale and deeply local in terms of integration/knowledge.

Appendix 6

US Smoking Statistics Segmentation

Table 63. Current cigarette smoking by persons 18 years of age and over, according to sex, race, and age: United States, selected years 1965–93

[Data are based on household interviews of a sample of the civilian noninstitutionalized population]

Sex, race, and age	*1965*	*1974*	*1979*	*1983*	*1985*	*1987*	*1988*	*1990*	*1991*	*1992*	*1993*
All persons	Percent of persons 18 years of age and over										
18 years and over, age adjusted	42.3	37.2	33.5	32.2	30.0	28.7	27.9	25.4	25.4	26.4	25.0
18 years and over, crude	42.4	37.1	33.5	32.1	30.1	28.8	28.1	25.5	25.6	26.5	25.0
All males											
18 years and over, age adjusted	51.6	42.9	37.2	34.7	32.1	31.0	30.1	28.0	27.5	28.2	27.5
18 years and over, crude	51.9	43.1	37.5	35.1	32.6	31.2	30.8	28.4	28.1	28.6	27.7
18–24 years	54.1	42.1	35.0	32.9	28.0	28.2	25.5	26.6	23.5	28.0	28.8
25–34 years	60.7	50.5	43.9	38.8	38.2	34.8	36.2	31.6	32.8	32.8	30.2
35–44 years	56.2	51.0	41.8	41.0	37.6	36.6	36.5	34.5	33.1	32.9	32.0
45–64 years	51.9	42.6	39.3	35.9	33.4	33.5	31.3	29.3	29.3	28.6	29.2
65 years and over	28.5	24.8	20.9	22.0	19.6	17.2	18.0	14.6	15.1	16.1	13.5
White:											
18 years and over, age adjusted	50.8	41.7	36.5	34.1	31.3	30.4	29.5	27.6	27.0	28.0	27.0
18 years and over, crude	51.1	41.9	36.8	34.5	31.7	30.5	30.1	28.0	27.4	28.2	27.0
18–24 years	53.0	40.8	34.3	32.5	28.4	29.2	26.7	27.4	25.1	30.0	30.4
25–34 years	60.1	49.5	43.6	38.6	37.3	33.8	35.4	31.6	32.1	33.5	29.9
35–44 years	57.3	50.1	41.3	40.8	36.6	36.2	35.8	33.5	32.1	30.9	31.2
45–64 years	51.3	41.2	38.3	35.0	32.1	32.4	30.0	28.7	28.0	28.1	27.8
65 years and over	27.7	24.3	20.5	20.6	18.9	16.0	16.9	13.7	14.2	14.9	12.5
Black:											
18 years and over, age adjusted	59.2	54.0	44.1	41.3	39.9	39.0	36.5	32.2	34.7	32.0	33.2
18 years and over, crude	60.4	54.3	44.1	40.6	39.9	39.0	36.5	32.5	35.0	32.2	32.7
18–24 years	62.8	54.9	40.2	34.2	27.2	24.9	18.6	21.3	15.0	16.2	19.9
25–34 years	68.4	58.5	47.5	39.9	45.6	44.9	41.6	33.8	39.4	29.5	30.7
35–44 years	67.3	61.5	48.6	45.5	45.0	44.0	42.5	42.0	44.4	47.5	36.9
45–64 years	57.9	57.8	50.0	44.8	46.1	44.3	43.2	36.7	42.0	35.4	42.4
65 years and over	36.4	29.7	26.2	38.9	27.7	30.3	29.8	21.5	24.3	28.3	27.9
All females											
18 years and over, age adjusted	34.0	32.5	30.3	29.9	28.2	26.7	26.0	23.1	23.6	24.8	22.7
18 years and over, crude	33.9	32.1	29.9	29.5	27.9	26.5	25.7	22.8	23.5	24.6	22.5
18–24 years	38.1	34.1	33.8	35.5	30.4	26.1	26.3	22.5	22.4	24.9	22.9
25–34 years	43.7	38.8	33.7	32.6	32.0	31.8	31.3	28.2	28.4	30.1	27.3
35–44 years	43.7	39.8	37.0	33.8	31.5	29.6	27.8	24.8	27.6	27.3	27.4
45–64 years	32.0	33.4	30.7	31.0	29.9	28.6	27.7	24.8	24.6	26.1	23.0
65 years and over	9.6	12.0	13.2	13.1	13.5	13.7	12.8	11.5	12.0	12.4	10.5
White:											
18 years and over, age adjusted	34.3	32.3	30.6	30.1	28.3	27.2	26.2	23.9	24.2	25.7	23.7
18 years and over, crude	34.0	31.7	30.1	29.4	27.7	26.7	25.7	23.4	23.7	25.1	23.1
18–24 years	38.4	34.0	34.5	36.5	31.8	27.8	27.5	25.4	25.1	28.5	26.8
25–34 years	43.4	38.6	34.1	32.2	32.0	31.9	31.0	28.5	28.4	31.5	28.4
35–44 years	43.9	39.3	37.2	34.8	31.0	29.2	28.3	25.0	27.0	27.6	27.3
45–64 years	32.7	33.0	30.6	30.6	29.7	29.0	27.7	25.4	25.3	25.8	23.4
65 years and over	9.8	12.3	13.8	13.2	13.3	13.9	12.6	11.5	12.1	12.6	10.5
Black:											
18 years and over, age adjusted	32.1	35.9	30.8	31.8	30.7	27.2	27.1	20.4	23.1	23.9	19.8
18 years and over, crude	33.7	36.4	31.1	32.2	31.0	28.0	27.8	21.2	24.4	24.2	20.8
18–24 years	37.1	35.6	31.8	32.0	23.7	20.4	21.8	10.0	11.8	10.3	8.2
25–34 years	47.8	42.2	35.2	38.0	36.2	35.8	37.2	29.1	32.4	26.9	24.7
35–44 years	42.8	46.4	37.7	32.7	40.2	35.3	27.6	25.5	35.3	32.4	31.5
45–64 years	25.7	38.9	34.2	36.3	33.4	28.4	29.5	22.6	23.4	30.9	21.3
65 years and over	7.1	8.9	8.5	13.1	14.5	11.7	14.8	11.1	9.6	11.1	10.2

NOTES: Estimates for 1992 and beyond are not strictly comparable with those for earlier years, and estimates for 1992 and 1993 are not strictly comparable with each other due to a change in the definition of current smoker in 1992 and the use of a split sample in 1992. See discussion of current smoker in Appendix II.

SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, Division of Health Interview Statistics: Data from the National Health Interview Survey, data computed by the Division of Health and Utilization Analysis from data compiled by the Division of Health Interview Statistics.

Appendix 7

Cholesterol Incidence in the US

	Percentage of population with high serum cholesterol	Estimates of High Cholesterol population (thousands)	Mean serum cholesterol mg/dL	Median Age	Estimates of Resident population (thousands)
20–74 years, age adjusted					
Both sexes	19.5%	37,503	205	34.0	192,323
Male	18.8%	17,339	204	32.9	92,231
Female	20.0%	20,018	205	35.2	100,092
White	19.7%	31,957		35.0	162,471
White male	19.1%	14,977	205	33.9	78,412
White female	20.2%	16,980	205	36.2	84,059
Black	18.1%	3,986		29.0	22,080
Black male	16.1%	1,629	200	27.2	10,117
Black female	19.7%	2,357	203	30.4	11,963
White, non-Hispanic	19.5%	**28,664**		36.2	147,179
White, non-Hispanic male	18.8%	**13,289**	205	36.2	70,686
White, non-Hispanic female	20.1%	**15,375**	205	37.4	76,493
Black, non-Hispanic	18.1%	3,834		36.2	21,125
Black, non-Hispanic male	16.3%	1,572	201	27.3	9,643
Black, non-Hispanic female	19.7%	2,262	204	30.6	11,482
Both Sexes, all races (Rough estimation based upon sources of information)					
20–34 years	8.6%	5,099	187		59,114
35–44 years	15.8%	6,424	203		40,784
45–54 years	25.1%	7,179	217		28,657
55–64 years	35.8%	7,483	230		20,922
65–74 years	36.6%	6,826	229		18,640
75 years and over	31.8%	4,492	224		14,133
Total		37,503			182,250
Male, all races					
20–34 years	9.1%	3,057	188		33,594
35–44 years	19.9%	4,375	207		21,985
45–54 years	25.1%	3,760	217		14,982
55–64 years	31.3%	3,299	222		10,540
65–74 years	27.1%	2,334	217		8,614
75 years and over	19.5%	1,020	205		5,229
Total					94,944
Female, all races					
20–34 years	8.0%	2,042	185		25,520
35–44 years	10.9%	2,049	194		18,799
45–54 years	25.0%	3,419	216		13,675
55–64 years	40.3%	4,184	236		10,382
65–74 years	44.8%	4,492	235		10,026
75 years and over	39.0%	3,473	230		8,904
Total					87,306

1 The race groups, white and black, include persons of Hispanic and non-Hispanic origin. Conversely, persons of Hispanic origin may be of a
NOTES: High serum cholesterol is defined as greater than or equal to 240 mg/dL (6.20 mmol/L). Risk levels have been defined by the Secon
Cholesterol Education Program Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults. National Heart, Lu
National Institutes of Health. September 1993. (Summarized in JAMA 269 (23): 3015–23. June 16, 1993.) Some data have been revised and
editions of Health, United States.

Figure A.7.1 - *Cholesterol Levels in the US (1993)*

Appendix 7

Cholesterol Incidence in the US

Table 70. Serum cholesterol levels among persons 20 years of age and over, according to sex, age, race, and Hispanic origin: United States, 1960–62, 1971–74, 1976–80, and 1988–91

[Data are based on physical examinations of a sample of the civilian noninstitutionalized population]

Sex, age, race, and Hispanic origin[1]	Percent of population with high serum cholesterol				Mean serum cholesterol level, mg/dl			
	1960–62	1971–74	1976–80[2]	1988–91	1960–62	1971–74	1976–80[2]	1988–91
20–74 years, age adjusted								
Both sexes	31.8	27.2	26.3	19.5	220	214	213	205
Male	28.7	25.8	24.6	18.8	217	213	211	204
Female	34.5	28.2	27.6	20.0	222	215	214	206
White male	29.4	25.9	24.6	19.1	218	213	211	205
White female	36.1	28.1	28.0	20.2	223	215	214	206
Black male	24.5	25.1	24.1	18.1	210	212	208	200
Black female	30.7	29.2	24.9	19.7	216	217	213	203
White, non-Hispanic male	---	---	24.7	18.8	---	---	211	205
White, non-Hispanic female	---	---	28.3	20.1	---	---	214	205
Black, non-Hispanic male	---	---	24.0	16.3	---	---	208	201
Black, non-Hispanic female	---	---	24.9	19.7	---	---	214	204
Mexican-American male	---	---	18.8	19.9	---	---	207	206
Mexican-American female	---	---	20.0	19.8	---	---	207	205
20–74 years, crude								
Both sexes	33.6	28.2	26.8	19.4	222	216	213	205
Male	30.7	26.8	24.9	18.8	220	214	211	204
Female	36.3	29.6	28.5	20.0	225	217	215	205
White male	31.4	26.9	25.0	19.2	221	215	211	205
White female	37.5	29.8	29.2	20.7	227	217	216	206
Black male	26.7	25.1	23.9	14.7	214	212	208	198
Black female	29.9	28.8	23.7	16.8	216	216	212	200
White, non-Hispanic male	---	---	25.1	19.3	---	---	211	206
White, non-Hispanic female	---	---	29.8	21.0	---	---	216	206
Black, non-Hispanic male	---	---	23.7	14.9	---	---	208	198
Black, non-Hispanic female	---	---	23.7	17.0	---	---	212	200
Mexican-American male	---	---	16.6	16.9	---	---	203	201
Mexican-American female	---	---	16.5	15.7	---	---	202	199
Male								
20–34 years	15.1	12.4	11.9	9.1	198	194	192	188
35–44 years	33.9	31.8	27.9	19.9	227	221	217	207
45–54 years	39.2	37.5	36.9	25.1	231	229	227	217
55–64 years	41.6	36.2	36.8	31.3	233	229	229	222
65–74 years	38.0	34.7	31.7	27.1	230	226	221	217
75 years and over	---	---	---	19.5	---	---	---	206
Female								
20–34 years	12.4	10.9	9.8	8.0	194	191	189	186
35–44 years	23.1	19.3	20.7	10.9	214	207	207	194
45–54 years	46.9	38.7	40.5	25.0	237	232	232	216
55–64 years	70.1	53.1	52.9	40.3	262	245	249	236
65–74 years	68.5	57.7	51.6	44.8	266	250	246	236
75 years and over	---	---	---	39.0	---	---	---	230

[1]The race groups, white and black, include persons of Hispanic and non-Hispanic origin. Conversely, persons of Hispanic origin may be of any race.
[2]Data for Mexican Americans are for 1982–84. See Appendix I.

NOTES: High serum cholesterol is defined as greater than or equal to 240 mg/dL (6.20 mmol/L). Risk levels have been defined by the Second report of the National Cholesterol Education Program Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults, National Heart, Lung, and Blood Institute, National Institutes of Health, September 1993. (Summarized in JAMA 269 (23): 3015–23, June 16, 1993.) Some data have been revised and differ from previous editions of *Health, United States*.

SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, Division of Health Examination Statistics. Unpublished data.

Figure A.7.2 - *Historical Comparison of US Cholesterol Levels*

Appendix 8

Overweight Segmentation

Table 71. Overweight persons 20 years of age and over, according to sex, age, race, and Hispanic origin: United States, 1960–62, 1971–74, 1976–80, and 1988–91

[Data are based on physical examinations of a sample of the civilian noninstitutionalized population]

Sex, age, race, and Hispanic origin[1]	1960–62	1971–74	1976–80[2]	1988–91
			Percent of population	
20–74 years, age adjusted				
Both sexes	24.4	24.9	25.4	33.0
Male	22.9	23.6	24.0	31.9
Female[3]	25.6	25.9	26.5	34.1
White male	23.1	23.8	24.2	32.3
White female[3]	23.5	24.0	24.4	32.6
Black male	22.2	24.3	25.7	32.9
Black female[3]	41.7	42.9	44.3	49.6
White, non-Hispanic male	---	---	24.1	32.4
White, non-Hispanic female[3]	---	---	23.9	31.0
Black, non-Hispanic male	---	---	25.6	32.9
Black, non-Hispanic female[3]	---	---	44.1	49.8
Mexican-American male	---	---	31.0	39.9
Mexican-American female[3]	---	---	41.4	48.2
20–74 years, crude				
Both sexes	25.5	25.5	25.7	33.3
Male	23.4	24.0	24.2	31.9
Female[3]	27.4	27.0	27.1	34.6
White male	23.7	24.2	24.4	32.6
White female[3]	25.4	25.2	25.1	33.0
Black male	22.5	24.5	25.7	32.4
Black female[3]	43.0	43.2	43.7	48.6
White, non-Hispanic male	---	---	24.4	32.9
White, non-Hispanic female[3]	---	---	24.8	31.8
Black, non-Hispanic male	---	---	25.6	32.4
Black, non-Hispanic female[3]	---	---	43.4	49.0
Mexican-American male	---	---	29.5	36.4
Mexican-American female[3]	---	---	39.1	47.3
Male				
20–34 years	19.6	19.2	17.3	22.8
35–44 years	22.0	29.4	28.9	36.7
45–54 years	28.1	27.6	31.0	35.5
55–64 years	26.9	24.6	26.1	40.5
65–74 years	21.8	25.0	25.2	42.2
75 years and over	---	---	---	26.0
Female[3]				
20–34 years	13.2	14.8	16.8	24.5
35–44 years	24.1	27.3	27.0	35.1
45–54 years	30.7	32.3	32.5	39.8
55–64 years	43.2	38.5	37.0	48.7
65–74 years	42.9	38.0	38.4	39.7
75 years and over	---	---	---	31.5

[1]The race groups, white and black, include persons of Hispanic and non-Hispanic origin. Conversely, persons of Hispanic origin may be of any race.
[2]Data for Mexican Americans are for 1982–84. See Appendix I.
[3]Excludes pregnant women.

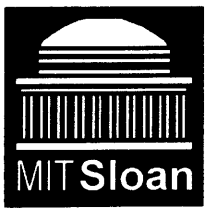
NOTES: Overweight is defined for men as body mass index greater than or equal to 27.8 kilograms/meter^2 and for women as body mass index greater than or equal to 27.3 kilograms/meter^2. These cut points were used because they represent the sex-specific 85th percentiles for persons 20–29 years of age in the 1976–80 National Health and Nutrition Examination Survey. Height was measured without shoes; two pounds are deducted from data for 1960–62 to allow for weight of clothing. Some data have been revised and differ from previous editions of *Health, United States*.

SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, Division of Health Examination Statistics. Unpublished data.

Figure A.8.1 - *Overweight Segmentation*

Appendix 9

Cardiologist Survey



March 12, 1997

Subject: MIT Sloan Master's Thesis Survey

Dear Sir/Madam,

As part of our Master's Thesis, we have chosen to undertake a structured project that will investigate the viability of a "Healthy Heart" or Nutraceutical food industry. We have decided to investigate this area of research for two fundamental reasons; first, to assess the strategic posturing of firms within this market sector and then, to determine the viability of selling these Healthy Heart products.

In order to assess whether or not Healthy Heart products are wanted or feasible, it is necessary for us to understand the thoughts and level of interest on this subject of medical professionals, in the field of cardiology, such as yourself. Attached, please find a survey that we hope will give us insight as to your perspective. We would greatly appreciate it if you would fill out the attached survey and write down any other issues that you care to address. It would be most helpful if you could complete the survey and return it to us no later than April 1, 1997 (please use the enclosed, self-addressed stamped envelope to facilitate your response). If you would like a copy of the survey results, please so indicate on the survey and be sure to include you name and address.

Your open and candid assessment will be of tremendous value to us in understanding the "Healthy Heart" or Nutraceutical food industry. Thank you in advance for your assistance.

Best Regards,

Horacio Caperan, Stuart Nichols, & Larry Volz
Massachusetts Institute of Technology
1997 Sloan Fellows

1) Are you familiar with the emerging beneficial "Heart Healthy" Nutritional/Nutraceutical food products? Yes____ No ____

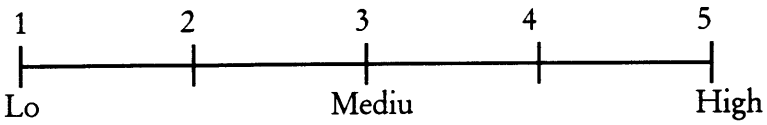
If yes, to what extent?

_____

_____

_____

2) To what extent do you expect Nutritional/Nutraceutical food products to play a role in cardiovascular wellness by the year 2000?



3) From your perspective, how do you rank the following food characteristics with regard to cardiovascular health (1 to 6 with 1 being the highest)?

Low Fatty Oil ___ Low Sodium ___
High Fiber ___ Vitamin Enriched ___
Reduced Fat ___ Medicinally Supplemented ___

Others (Please specify) _____

4) Would you be inclined or disinclined to prescribe a specialized diet of Nutritional food products and or Nutraceuticals?

_____

_____

_____

5) In the specific area of Nutraceuticals, should food products with medical benefits be distributed as:

___ Food Items or ___Pharmaceuticals?

6) Where do you most expect Nutritional/Nutraceutical food products to emerge from?

___ Pharmaceutical Companies ___ Food Companies
___ Genetic Laboratories ___ Agricultural Companies

7) What is the greatest risk associated with Nutritional/Nutraceutical food products (with cardiovascular benefits) to the consumer?

_____
_____
_____

8) Do you perceive any threats to the medical community with the advent of Nutritional/Nutraceutical food products? Yes____ No ____

If yes, what are they?

_____
_____
_____

9) Are there any companies or products today that you see as "First Movers" (or market leaders) in the Nutritional/Nutraceutical food marketplace?

Yes____ No ____ If yes, who?

_____
_____
_____

10) What is the best method of educating consumers about the benefits of Nutritional/Nutraceutical food products (Rate 1 to 6 with 1 being the highest)?

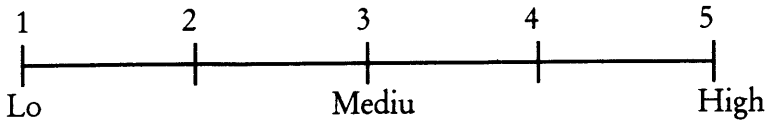
___ Medical Community
___ Health Clubs
___ Associations
___ Direct Advertising
___ Supermarkets
___ Government Programs

Other (Please specify) _____

11) What do you feel are the most beneficial attributes for cardiovascular health that should be contained within a Nutritional/Nutraceutical food product?

_____
_____
_____

12) How educated do you feel the American Consumer is today about cardiovascular health issues? How concerned is the American Consumer? (Place an "**E**" on the scale for level of Education and a "C" for level of concern)



13) Do you advise your patients to use "Healthy Heart" Nutritional food products in your practice today? Yes____ No ____

If yes, explain.

_____

_____

_____

14) Have you received any educational materials on Nutritional/Nutraceutical food products within the last 12 months? Yes____ No ____

If yes, from whom?

_____

_____

15) Have you provided any educational information on Nutritional/Nutraceutical food products to your patients in the last 12 months? Yes____ No_____

16) Please rank the following treatments for the patient profiles shown:

"High Risk"	"Post Heart Attack"	"Average Adult"
Drugs____	Drugs____	Drugs____
Healthy Diet____	Healthy Diet____	Healthy Diet____
Physical Exercise____	Physical Exercise____	Physical Exercise____
Surgery____	Surgery____	Surgery____

Thank You for your time and consideration!

Name (optional):_____

Address (optional):_____

_____

Appendix 10

Application of the Adaptive Management Framework™

As shown in Chapter 1, we used a compliment of interviews and literary searches to develop an understanding of Monsanto and the nutraceutical marketplace. The format of the discussions at Monsanto were ad hoc as we attempted to explain the concept of the Adaptive Management Framework™ and extract the necessary information to make an evaluation of the business. The meetings were typically with a single individual that had a functional link to the company's nutrition business.

Having gone through the process once with Monsanto, we determined that it was necessary to develop a workable application tool that could be employed during onsite interviews. The purpose of the tool is to provide a methodology which would facilitate the capture of business data that would ultimately provide a picture of a company's positioning on the business model as well as an overview as to its use of strategic processes. Such information as product, customer, and system segmentation, business strengths, value chain maps, and an overview of the industry ecology are critical to understand a firm's strategic positioning within the context of the Adaptive Management Framework™. The actual tool that we developed is a combination of new formats and an amalgamation of existing frameworks employed in the "Business Strategic Planner"[29]. Those existing frameworks are essentially focused on assessing an industry's Five Forces Analysis as developed by Michael Porter.

As stated earlier, the purpose for the application tool is to transform the concept of the Adaptive Management Framework™ into a document that facilitates data collection and ultimately leads to a strategic analysis of a firm's business. As we developed the tool, we hoped to utilize it onsite at Monsanto during our final interviews with key functional team members associated with the company's Food and Nutrition business segments (Monsanto choose not to participate). Optimally, we would envision that a two day forum be utilized which would include participants from key functions such as; marketing, sales, product development, operations, and business development. At this forum, the team would work through the Adaptive Management Framework™ document as it applies to a selected product or market segment. This forum would be supplemented as necessary by one on one interviews with additional experts both from within the company as well as from external industry groups.

Figure A.10.1 provides an overview of the application tool. As shown, the set of charts begin with formats that are designed to segment the targeted business by product, customer, and system perspectives. The next sections look at; preliminary mappings of the existing industry participants on the Adaptive Management Framework™ business model; an assessment of unique critical competencies required for success; the industry's value chain and ecology; the role of the firm's key adaptive processes; and finally, the most relevant competitors and complementors in the targeted business segment.

I. Adaptive Management Framework™ Analysis

A. Product Scope
B. Customer Scope
C. System Scope

II. Positioning of the Firm and Key Competitors on the Business Model

III. Assessment of Unique Competencies

IV. Value Chain Mapping - External (Product, Complementor, and Customer)

V. Targeted Future Positioning of the Firm and Key Competitors

VI. Role of the Key Adaptive Processes

VII. Industry Analysis
A. Barriers to Entry & Exit
B. Rivalry Among Competitors and Availability of Substitutes
C. Focus of Power - Suppliers & Buyers
D. Government Action and Industry Impact
E. Overall Assessment

VIII. Summary of Most Relevant Competitors and Complementors

IX. Assessment of Competitor and Complementor Strengths

Figure A.10.1 - Overview of the Application Tool

What follows is a detailed look at each of the charts within the application tool and a brief description of their purpose and intended use.

10.1 Section I - Adaptive Management Framework™ Analysis

The first section of the application tool is focused on segmentation of the firm's targeted business from three perspectives; product scope, customer scope, and system scope. Segmentation is the critical first step in developing a strategic plan as it seeks to answer the basic question of what businesses the firm is in and perhaps, should not be in. The

essence of segmentation consists of ultimately selecting the customers that the firm will serve as well as the competitors it will consequently face[30]. Typically, segmentation efforts focus on two areas of analysis; product vs markets segments and product vs geographic business segments. Utilizing this typical approach, a firm would look at its existing businesses and endeavor to segregate its product offerings as finitely as possible with respect to the markets and the geographic regions in which they are sold. The activity is clearly product focused. In the Adaptive Management Framework™, the segmentation effort focuses on the overall targeted business and seeks to evaluate that business with respect to the three positions on the business model; product, customer, and system scope.

Figure A.10.1.1 presents the Product Scope format. The purpose of this figure, Product Scope, is to define the firm's current and emerging product lines within the targeted business segment. For each product, the team needs to estimate the cost advantages that the product has in the market, that product's degree of differentiation with respect to the best in class product or, the products closest competitor (if it is best in class), and finally, the priority that the firm places on the product for its future business success. In addition, the key competitor is identified for each product entry. Once completed, the team should have an initial assessment of its ability to compete on a "Best Product" basis.

The next segment is customer scope. Figure A.10.1.2 depicts the format for this assessment. The format presented in Figure A.10.1.2, Customer Scope, attempts to segment the business by the firm's major customer segments, channels of distribution,

and its key accounts. The emphasis here is to determine to what extent that the firm is operating within the "Total Customer Solutions" position on the Business Model. For each entry, the team needs to determine how much of the customer's (or channels) business has the firm's products captured. This is done by the two ranks; "Degree of Total Solution" and "Contribution to

No.	Current Product Lines	Cost Advantages -- - E + ++	Degree of Differentiation -- - E + ++	Product Priority -- - E + ++	Key Competitor
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
	New Product Lines				
1					
2					
3					
4					
5					
6					
7					
8					
9					

Figure 8.1.1 - *Product Scope*

Customer Benefits". Again, the intent is to look at this segmentation from the perspective of the recipient of the firm's product offerings within the targeted business

No.	Current Customer Segments, Channels, and Key Accounts	Degree of Total Solution -- - E + ++	Contribution to Customer Benefits -- - E + ++	Customer Segments, Channels, & Key Accounts..Prioritization -- - E + ++
	Customer Segments			
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
	Channels	-- - E + ++	-- - E + ++	-- - E + ++
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
	Key Accounts	-- - E + ++	-- - E + ++	-- - E + ++
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Figure A.10.1.2 - *Customer Scope*

area. In addition to the two rankings, each customer or channel entry is assessed a priority to the firm based on the team's expectations for future business activities. Once

the team has completed the matrix for the *current* customer segments, channels, and key accounts, the team then works on a similar analysis for targeted *new* customer segments, channels, and key accounts. The two rankings associated with the new entries should be considered in light of the potential for the future business with that company. What is critical is for the team to give sufficient consideration to these targeted new companies in order to properly prioritize their future importance to the firm.

A simple example of an application of the Customer Scope matrix would be from the perspective of an automobile component manufacturing firm that produces wiring harnesses. If the firm sells to multiple customer tiers, i.e., to subcomponent suppliers, car manufacturers, and also directly to car owners for replacement components, all of these customers would be listed in the customer segment section. Assuming for this example that the evaluation team is considering just the automobile wiring business, the team would then complete the two rankings and priority entries for each customer segment. The group would then evaluate the firm's distribution channels, (e.g., wholesalers, major parts retailers, etc.), in a similar manner as well as identify the major, key accounts for the firm. Once completed, the team would then turn its attention to new, potential customers for the firm's business under evaluation. Having done so, a team should have a good, preliminary picture of the extent to which it competes from a "Total Customer Solution" position.

The final segmentation matrix is System Scope as shown in Figure A.10.1.3. Segmentation of the firm's targeted business along the lines of *system scope* endeavors to

evaluate the firm's complementors. Complementors are those companies whose products support and or augment the demand for the firm's products. Some maybe upstream on the firm's value chain, such as a critical supplier, while some complementors may not be directly on the firm's value chain at all.

No.	Existing System Complementors	Relative Importance of Complementors -- - E + ++	Degree of Bonding With Complementors -- - E + ++	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
	New Complementors	-- - E + ++	-- - E + ++	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

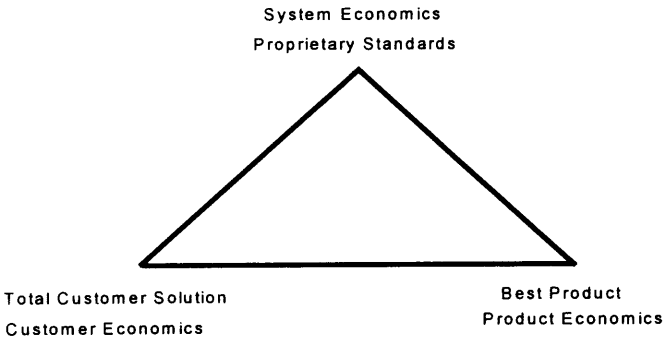
Figure A.10.1.3 - System Scope

An example of this is a firm involved in selling long distance service and a complementor company engaged in the business of developing optical communication lines with expanded capabilities. Perhaps another more straightforward example would include a firm engaged in the business of selling clothing for alpine skiing and a complementor company that produces alpine skis and in so doing, promotes and expands the overall alpine skiing market.

In completing the System Scope matrix, the team identifies all of the firm's existing and potential new complementors who are or could be associated with the targeted business. For each entry, the team ranks the relative importance of the complementor with respect to the overall business (consider the term "system"). The second ranking considers the degree of bonding that the firm has with the current or new complementors. From this assessment, the team can easily determine which complementors are deemed to be important to the firm's targeted business and to what extent the firm has or does not have a strong linkage with each of those critical companies. The completed matrix should begin to give the team an initial perspective on the firm's ability to successfully position itself as a "Proprietary Standard" thereby achieving a system lock on the business. For each of the completed segmentation matrices the team should also create a list of the challenges associated with changes in each of the three areas; Product Scope, Customer Scope, and System Scope. These lists will prove valuable later as the firm begins to identify action plans.

A.10.2 Section II - Positioning of the Firm and Key Competitors on The Business Model

Having finished Section I, the team should have a sufficient understanding of the firm and its targeted business to collectively complete an assessment of the "Business Model". Figure A.10.2.1 depicts the format for Section II.



1. Statement of Products Under Consideration

2. Current Positioning of Products within the Business Model (Consensus of Opinion)

3. Current Positioning of Key Competitors within the Business Model (Consensus of Opinion)

4.) Issues & Other Comments

Figure A.10.2.1 - *Positioning of the Firm and Key Competitors on the Business Model*

With a clear statement of the products (business area) under consideration, the team reaches consensus as to the current position of the firm on the Business Model. This is done in full consideration of the three segmentation matrices completed in Section I and the perspective contained therein. Does the firm have strong product economics through cost advantages and product differentiation? Perhaps the firm's strengths lie more in its relationship with its customers and its ability to provide a bundle of products and services that enhance the customers overall economics. Finally, the team may see the firm as being positioned closer to a "Proprietary Standard" because of the degree of lock that the firm enjoys over the total business system. Based on the answer to these types of questions, the team positions the firm somewhere around the business model continuum. At this juncture, it is helpful to note two things: 1) the assessment of the team is subjective and based on intuitive endorsement, and 2) that such a positioning does not necessarily have to be at one of the three apexes of the model but can lie along any one side.

Having completed the current positioning of the firm, the team performs a similar evaluation of each of the major competitors in the targeted business. A full discussion of each competitor's current business and their approach to market (regarding the three segmented scopes) should provide the team with the necessary insight to position each competitor on the business model as well as enhance the team's understanding of the firm's business adversaries. Having completed the positioning assessment, the team should have a solid understanding of the business and the current value proposition of each participant.

A.10.3 Section III - Assessment of Unique Competencies

Section III requires the team to evaluate the current capabilities of the firm, particular as those capabilities may or may not provide a competitive advantage to the firm in the targeted business. Figure A.10.3.1 presents the application matrix for this assessment.

No.	Existing Unique Competencies	Relative Importance (Impact to Business) -- - E + ++	Value Chain Function	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
	Required New Competencies	**-- - E + ++**	**Value Chain Function**	**Comments**
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Figure A.10.3.1 - *Assessment of Unique Competencies*

An extensive listing of the current unique competencies of the firm is developed with each competency ranked with regard to its relative importance to the targeted business. In addition, the team identifies the firm's internal value chain function that is responsible for sustaining the competency. Once completed, the team then considers the targeted business and identifies a list of required *new* competencies that may not currently reside within the firm. This assessment should provide the team with a road-map as to the skills and capabilities that are deemed to be critical success factors for the strategic position that the firm will take in the targeted business. It can then take the necessary actions to invest in acquiring, developing and or strengthening those areas identified.

A.10.4 Section IV - External Value Chain Mapping

At this juncture, the team needs to shift from its internal focus to consider the entire external value chain for the business. Figure A.10.4.1 shows the application matrix developed for mapping the firm's external value chain. Again, the team's perspective for this task must be the entire value chain of the business and not the firm's specific value chain. The first step in completing this matrix is to map out all the steps in the business cycle. This should include all activities commencing from the earliest subtier supply sequence through the final consumption (in economic terms) of the product or service. Having completed laying out all the steps in the business cycle, the team then begins to evaluate each step. A list of the key industry participants in that particular business cycle step is made and then each key participant is further identified as a competitor, a complementor, or a customer. In some cases, a participant may not fall into anyone of those three categories in which case the entry is assigned a "Not Applicable". Once

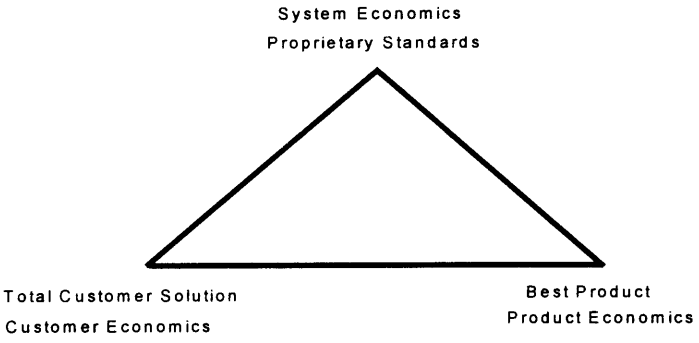
completed, the team has a comprehensive view of the entire business cycle and a reaffirmation of the nature of the key system participants.

No.	Steps in the Business Cycle	No.	Key Industry Players	Competitor	Complimentor	Customer
1		1				
		2				
		3				
		4				
		5				
2		1				
		2				
		3				
		4				
		5				
3		1				
		2				
		3				
		4				
		5				
4		1				
		2				
		3				
		4				
		5				
5		1				
		2				
		3				
		4				
		5				
6		1				
		2				
		3				
		4				
		5				
7		1				
		2				
		3				
		4				
		5				

Figure A.10.4.1 - *External Value Chain Mapping*

A.10.5 Section V - Targeted Future Positioning of the Firm and Key Competitors

Section V requires the team to return to the Adaptive Management Framework™ Business Model and determine the desired, future strategic position of the firm . This is done having developed a more comprehensive understanding of the entire business and the possibilities of the firm to move from its current strategic positioning. The team uses a format similar to what was used in Section II (see Figure A.10.5.1 below).



1. Statement of Products Under Consideration

2. Future Positioning of Products within the Business Model (Consensus of Opinion)

3. Expected Future Positioning of Key Competitors within the Business Model (Consensus of Opinion)

4.) Issues & Other Comments

Figure A.10.5.1- *Targeted Future Positioning of the Firm and Key Competitors*

A.10.6 Section VI - Role of the Key Adaptive Processes

This section is an internal scrutiny of the firm's key adaptive processes: 1) operational effectiveness; 2) customer targeting; and 3) innovation. The requirement is for the team to consider what role these processes take within the firm for each of the three areas of strategic positioning on the Adaptive Management Framework™ Business Model. The objective is to determine the degree of alignment between the desired future strategic positioning and the existing processes. If the firm is targeting a "Total Customer Solution" position, the team should be able to identify inherent strength across each of the three adaptive processes in this area. Lacking this, the team has a good idea of what gaps exist between the firm's current activity and its desired future strategic positioning. Figure 8.6.1 presents the format for the Operational Effectiveness Process.

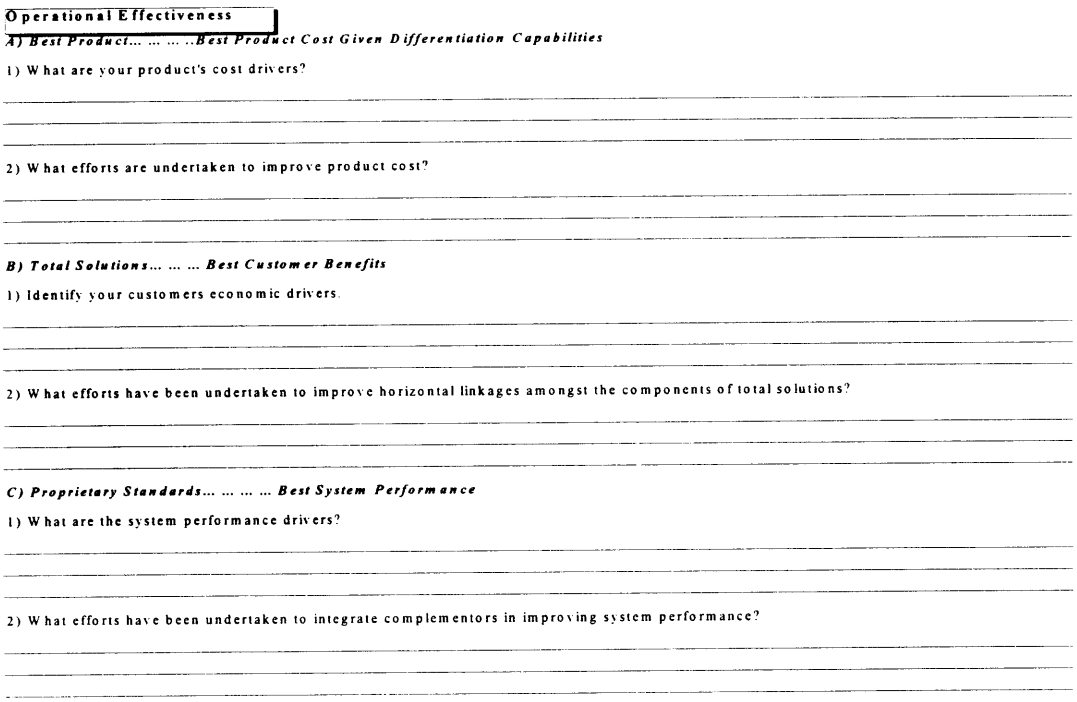


Figure A.10.6.1 - *Operational Effectiveness*

Figure A.10.6.2 presents the format for evaluating the Customer Targeting process.

Customer Targeting

A) Best Product.....Target Products and Distribution Channels

1) What is the product profitability by customer/channel/Key Accounts?

No.	Customer Segments, Channels, and Key Accounts	% of Their Total Sales	Sales Profitability (L-M-H)	Profitability Compared to Key Competitor (L-M-H)	Opportunities to Improve Profitability
	Customers				
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
	Channels				
1					
2					
3					
4					
5					
	Key Accounts				
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

B) Total Solutions.....Target Customer Bundles

1) What opportunties exist to add value to your key customers by bundling solutions?

2) What efforts have been undertaken to increase customer value & possible alliances to bundled solutions?

C) Proprietary Standards.....Target System Architecture

1) Describe efforts undertaken to date to consolidate a lock-in position with your complementors.

Figure A.10.6.2 - *Customer Targeting*

The first section of this matrix is an evaluation of the firm's product's profitability segmented by each customer, channel, and key account in the context of "Best Product" positioning. The team assesses the significance of the product by % of total sales, the products relative profitability, and endeavors to identify opportunities to improve product economics. The remaining two sections address the customer targeting with regard to "Total Solutions" and "Proprietary Standards" positions. Figure A.10.6.3 presents the final matrix in this section for the Innovation process assessment.

Innovation

A) Best Product.....Product Innovation

1) Define product innovation with the product family.

2) What efforts have been made to be first to the market and to achieve a dominant design?

B) Total Solutions.....Customer Service Innovation

1) What are the innovation opportunities that exist which are linked to the customer's value chain?

2) What have you offered to the customer value chain to improve your customer's economics?

C) Proprietary Standards.....System Innovation

1) What innovation opportunities exist to create customer and system lock-in?

2) What have been your efforts to customize your products and to create compatibility with your complementors?

Figure A.10.6.3 - *Innovation*

This matrix completes Section VI of the application tool.

A.10.7 Section VII - Industry Analysis

As part of the strategic assessment of the targeted business, in Section VII the team takes an external look at the industry by considering an analysis based on Michael Porters' 5 Forces Analysis (see Attachment 1 at the end of this chapter). The 5 Forces Analysis examines the attractiveness of the targeted business by considering; 1) the threat of new entrants, 2) the power of suppliers, 3) the power of buyers, 4) the availability of substitutes, and 5) the intensity of the rivalry among the primary competitors. Figure A.10.7.1 presents the formats for evaluating the threat of new entrants.

Barrier To Entry	Current / Future	Highly Unattractive	Mildly Unattractive	Neutral	Mildly Attractive	Highly Attractive	
Economies of Scale	Small						Large
Product Differentiation	Little						Big
Brand Identification	Low						High
Switching Cost	Low						High
Distribution Channel Access	Ample						Restricted
Capital Requirements	Low						High
Access to Latest Technology	Ample						Restricted
Access to Raw Materials	Ample						Restricted
Government Protection	Negative						Positive
Experience Effect	Unimportant						Very Important

Barrier To Exit	Current / Future	Highly Unattractive	Mildly Unattractive	Neutral	Mildly Attractive	Highly Attractive	
Asset Specialization	High						Low
One-time Cost of Exit	High						Low
Strategic Interrelationship	High						Low
Emotional Barriers	High						Low
Government Restrictions	High						Low
Social Restrictions	High						Low

Figure A.10.7.1 - *Barriers to Entry and Exit*

The team considers each possible barrier to entry and exit and fills in a simple bar (from left to right) for both the current business environment as well as for the expected future environment. Figure A.10.7.2 depicts a similar matrix for Rivalry Among Competitors and Availability of Substitutes.

Rivalry Among Competitors	Current / Future	Highly Unattractive	Mildly Unattractive	Neutral	Mildly Attractive	Highly Attractive	
Number of Equally Balanced	Large						Small
Relative Industry Growth	Slow						Fast
Fixed or Storage Cost	High						Low
Product Features	Commodity						Speciality
Capacity Increases	Large Increments						Small Increments
Diversity of Competitors	High						Low
Strategic Stakes	High						Low

Availability of Substitutes	Current / Future	Highly Unattractive	Mildly Unattractive	Neutral	Mildly Attractive	Highly Attractive	
Access to Close Substitutes	Large						Small
Users' Switching Cost	Low						High
Substitute Producers' Profitability & Aggressiveness	High						Low
Substitute Price/Value	High						Low

Figure A.10.7.2 - *Rivalry Among Competitors and Availability of Substitutes*

The team completes each of these two matrices by assessing the level of attractiveness for each entry item in the same manner as the Barriers to Entry and Exit formats. Figure

A.10.7.3 contains the formats used to assess the power of both the suppliers and the buyers in the targeted business. The team evaluates the relative concentration and degree of power that each of these two groups exert within the targeted business.

Power of Suppliers	Current / Future	Highly Unattractive	Mildly Unattractive	Neutral	Mildly Attractive	Highly Attractive	
Number of Important Suppliers	Few						Many
Availability of Substitutes	Low						High
Differentiation or Switching Cost of Suppliers' Products	High						Low
Suppliers' Threats of Backward Integration	High						Low
Industry Threat of Backward Integration	High						Low
Suppliers' Contribution to Quality & Service	High						Low
Total System Cost Contributed By Suppliers	Large Fraction						Small Fraction
Importance of Industry to Supplier's Profit	Small						Large

Power of Buyers	Current / Future	Highly Unattractive	Mildly Unattractive	Neutral	Mildly Attractive	Highly Attractive	
Number of Important Buyers	Few						Many
Availability of Substitutes	Many						Few
Buyers' Switching Costs	Low						High
Buyers' Threat of Backward Integration	High						Low
Industry Threat of Forward Integration	Low						High
Contribution to Quality & Service of Buyers Products	Small						Large
Total Buyers' Cost Contributed by the System	Large Fraction						Small Fraction
Buyers Profitability	Low						High

Figure A.10.7.3 - *Power of Suppliers and Power of Buyers*

The final two matrices in the Industry Analysis Section provide a measure of the impact that local governments can have on the firm's operations as well as an overall, summary assessment of the 5 Forces evaluation. These matrices are presented in Figure A.10.7.4.

Government Actions	Current / Future	Highly Unattractive	Mildly Unattractive	Neutral	Mildly Attractive	Highly Attractive	
Industry Protection	Unfavorable						Favorable
Industry Regulation	Unfavorable						Favorable
Consistency of Policies	Low						High
Capital Movement	Restricted						Unrestricted
Custom Duties	Restricted						Unrestricted
Foreign Exchange	Restricted						Unrestricted
Foreign Ownership	Limited						Unlimited
Assistance to Competitors	Substantial						None

Overall Assessment	Current / Future	Highly Unattractive	Mildly Unattractive	Neutral	Mildly Attractive	Highly Attractive
Barriers to Entry						
Barriers to Exit						
Rivalry Among Competitors						
Power of Buyers						
Power of Suppliers						
Availability of Substitutes						
Government Actions						

Figure A.10.7.4 - *Government Actions and Overall Assessment*

These two matrices are filled out in the same manner as the previous matrices in the Industry Analysis section. The Government Actions framework is intended to provide the team with a understanding of the role that the local governments will play in the

business for those markets that the firm targets to enter. The Overall Assessment Matrix is a summary of all previous matrices. The intent is to for the team to review each of the previous matrix and summarize each one as a single line entry on the Overall Assessment Matrix. Once completed, the team has a solid analysis of the industry and the general challenges that it can expect to face in the marketplace.

A.10.8 Section VIII - Summary of the Most Relevant Competitors and Complementors

In an effort to add definition to the analysis of the firm's competitors and complementors, the team works in Section VIII to provide financial performance measures for the most relevant companies in each of the aforementioned groups. This data is intended to cover the last three years of operations and includes: Last Years Sales, 3 Year Average Growth Rate of Sales, 3 Year Average Profitability (as measured by return on equity), and Last Year's Market Share.

No.	Relevant Competitors	Market Point of View			
		Last Year's Sales	3 Year Avg. Growth Rate of Sales	3 Year Avg. Profitability (ROE)	Last Year's Market Share
1					
2					
3					
4					
5					

No.	Relevant Complimentors	Market Point of View			
		Last Year's Sales	3 Year Avg. Growth Rate of Sales	3 Year Avg. Profitability (ROE)	Last Year's Market Share
1					
2					
3					
4					
5					

Figure A.10.8.1 - *Relevant Competitor and Complementor Data*

A.10.9 Section IX - Critical Success Factors

In the final section of the application tool, the team is challenged to identify the critical success factors that are most relevant to the firm's targeted business. These critical success factors should coincide with the unique competencies outlined earlier in Section III. Once identified, the team then assesses their own firm as well as the relevant competitors and complementors against each of those critical success factors. The objective is to have an understanding of functional areas within the firm that need to be strengthened as well as those that should provide the firm with competitive advantage. Figure A.10.9.1 presents the matrix for assessing the firm.

Current / Future **Critical Success Factors**	**Impact to Future Success** -- - E + ++	**High Weakness**	**Mild Weakness**	**Neutral**	**Mild Strength**	**High Strength**
Managerial Infrastructure						
Human Resource Management						
Finance						
Product Innovation						
Operations Effectiveness - Manufacturing						
Operational Effectiveness - Procurement						
Customer Targeting & Interface						
Overall Assessment						

Figure A.10.9.1 - *Assessment of Critical Success Factors for the Firm*

The matrix requires the team to evaluate the importance of each success factor as to its impact to the future success of the firm in the targeted business. Then the team assesses the firm's current strength of each success factor as well as an estimate of where the firm could be with regard to the success factor in the next three to five years. Once completed, the team then turns their attention to ranking their relevant competitors and complementors as identified in Section VIII. Figure A.10.9.2 depicts the format used for this final assessment activity.

No.	Relevant Competitors -- - E + ++	Critical Success Factors	Managerial Infrastructure	Human Resource Mgmt	Finance	Product Innovation	Operational Effectiveness Manufacturing	Operational Effectiveness Procurement	Customer Targeting & Interface	Overall Assessment
1										
2										
3										
4										
5										
No.	Relevant Complimentors									
1										
2										
3										
4										
5										

Figure A.10.9.2 - *Critical Success Factors for Competitors & Complementors*

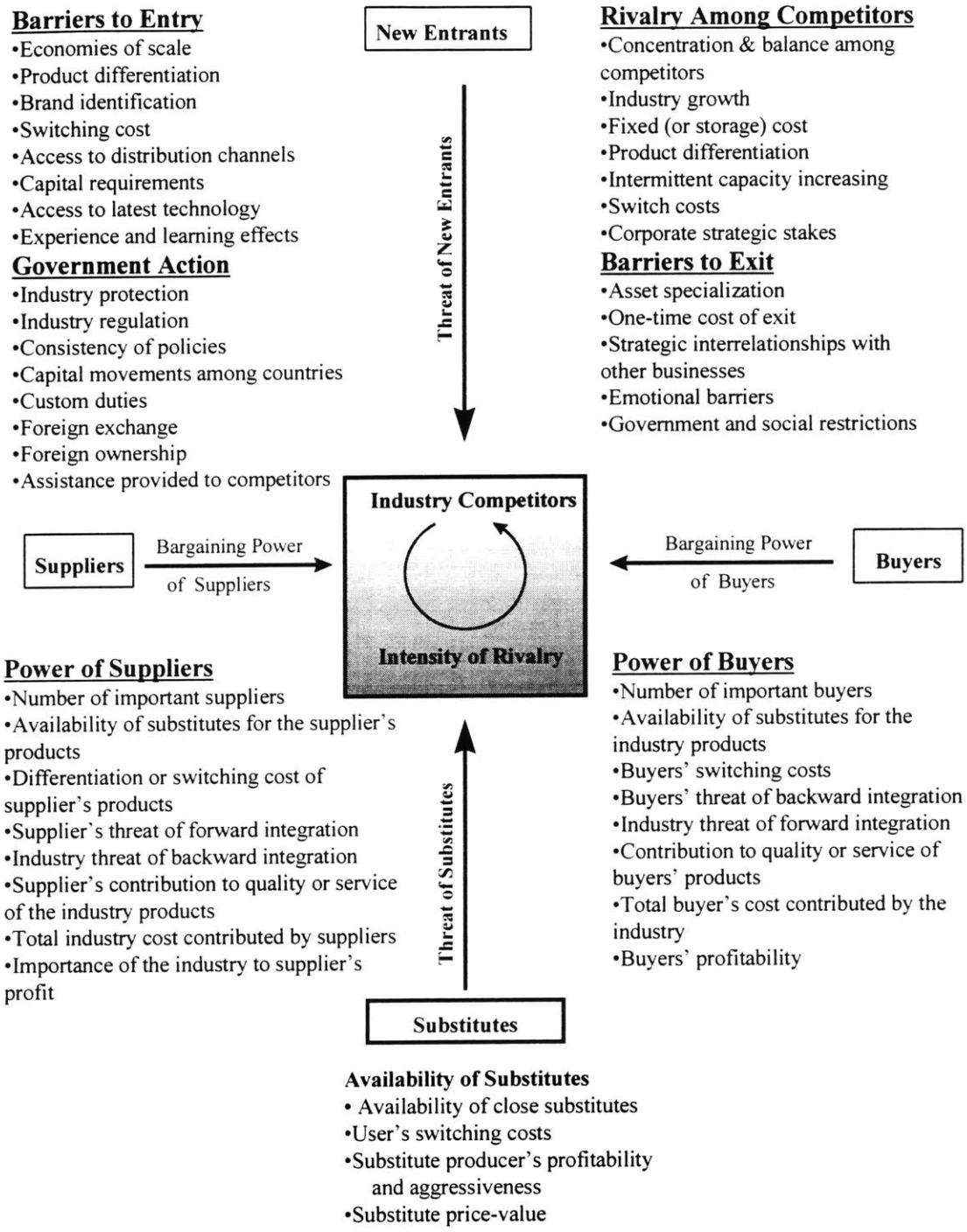
Considered together, the two matrices allow the team to have a comprehensive view of their own firm's critical success factors as well as their position relative to the companies that they will deal with in the targeted business. It also provides a good scorecard as to which companies may present opportunities for effective alliances for the firm in the future.

The application tool as presented is designed to be completed in a continuous multi-day forum with a team of people that represent the major functions within the firm. As

completed, the model will provide the firm with a thorough picture of: 1) the firm's posture within the Adaptive Management Framework™, 2) the external value chain and the industry, and 3) areas of competitive advantages and disadvantages.

Attachment I - Five Forces Analysis

Elements of Industry Structure: Porter's Five-Forces Model
as Applied to:



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