

**FINDING A POSITION FOR A FIRM TO
SUCCEED IN THE SEED INDUSTRY**

by

THOMAS R. CARLSON

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Approved by:

Major Professor
Dr. Arlo Biere

ABSTRACT

The investors I am representing would like to know if they can be successful in the seed industry. They have certain skills and abilities along with industry experience that provides them with certain advantages that would allow them to succeed in the industry. The thesis or study will provide them with a detailed study of the possibilities and the challenges that are before them.

To gain insight into positioning a firm in the industry, one must find a tool to help us to discover the answers to the question. I will use “Strategic Visioning in Cascade ®“, this model outlines area of interest such as; a strategic overview, a value proposition, a market analysis, a functional analysis, financial projection and exit strategy in its total. The focus of the study will provide insight into the value proposition and market analysis.

The value proposition will follow Michael Porter’s Competitive Strategy analogy of cost leadership, differentiation and focus strategies. The market analysis will follow Thompson and Strickland’s seven questions that lead to understanding of the selected industry.

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To Dr. Arlo Beire for the conversations that brought insight and greater understanding to business as we viewed and reviewed the Seed Industry. To Vincent Amanor-Boadu; I was reminded that great answers come from great questions.

Dr. Featherstone, Lynnette Brummett and staff thanks for taking a chance on me, I have learned much.

Let’s go make it a good day!

CHAPTER 1: THE CLIENTS AND ENTERING THE SEED INDUSTRY

A group of three farming partners operate 3,800 acres in a corn and soybean rotation. The land they farm is spread out over a 25 mile radius. There is high competition for farm land; sugar beets to the south west and housing projects to the east (the Twin Cities is 60 miles east and urban sprawl has affected the price of land). With the size of equipment and the strength of work force they could operate up to 4,500 acres before increasing their employees and equipment. Growing the business to capture economies of scale is an option, but land availability is hard to come by. Recently, they have started a trucking company to serve their own needs and the needs of a few other farmers. The partners have also set up a small grain storage business to augment their core business of cash crop farming.

In considering the economies of scope as an option to grow their enterprises, the opportunity of backward integration into the seed industry would provide them with synergies of agricultural production. Due to the clustering of one global and eight regional seed companies in the area, each of the partners has a variety of experiences in the seed industry. They range from serving on the board of directors of one company, working with research and development, producing seed, processing or conditioning the seed, warehousing and distribution of seed units, along with marketing and management of sales. In addition, they have a good connection with suppliers of genetics, and access to a competent salesperson with a loyal customer following.

Their financial resources are limited, so they will need to start small and use their earnings to finance growth as they move towards developing a critical mass that would help achieve a sustainable competitive advantage and succeed in the industry. They are willing to accept a less than average profit margin on the seed business if the total business enterprise would profit from this added venture.

They know that prior to 1996 it was easier to enter the seed industry. Private and public soybean seed research practices were standardized and available to most companies. Seed

corn genetics could be obtained from private firms: Holden's Foundation, Seed Genetics and about twenty other genetic suppliers. Customers were neighbors who farmed close by, and there was little power of the seller in contrast of what is seen today.

The partners would like to know if an entry into the industry, today, would generate above average returns. Plus the partner/investors are looking for a marketing strategy that would lead to a sustainable competitive advantage. The purpose of this research is to answer the partners question about entering the seed business.

CHAPTER 2: LITERATURE REVIEW AND OVERVIEW OF STUDY

The application of “The Strategic Visioning Cascading®,” a business planning model, was used to guide this thesis research. Laying out all the stages of a business plan came from Vincent Amanor-Boadu. Each step leads to the next step. The first four steps are of a conceptual approach of vision and mission, marketing strategies, analyzing the industry, and examining the value chain. The next step in the approach is the financial analysis using Net Present Values (NPV) or Internal Rate of Returns (IRR). In planning, the goal is to maximize opportunities and minimize errors.

For analyzing the industry, Thompson and Strickland’s seven questions provide a road map that leads to learning all the important information and data involving an industry. Economic features are the most prevalent information reviewed in the process. The results of the study should allow for a good analysis of competitors strategies and their offensive or defensive moves. One should be able to see their competitive advantages, and then, position one’s company to compete, minimize risks and maximize gains.

Michael Porter’s three generic competitive strategies led me to think of how to position Caliber Seed Company (CSC) in the market place. The information provided understanding to the economic environment, such as the five forces of rivalry, new entries, substitutes, buyers and sellers and how these work with or against firms.

Michael Porter’s book on competitive advantage provided consideration of how to put together activities that result in above average profits. First, a firm would select a generic strategy. Then they need to construct or build their value chain of activities that provide for some type of competitive advantage.

Bruce Greenwald and Judd Kahn indicated that understanding the economic environment was important in order to anticipate what might happen next in the industry. They also describe how strategy of being local or an area of focus (concentration) is easier for a firm to find a competitive advantage. They argue that competitive advantages usually comes in

three main ways; scale economies, proprietary technology and customer captivity. These three advantages are similar to the key success factors, and reinforce the idea of competitive advantage.

Geoffrey Moore explained that if your two hands represent two ways to set up a value chain, use your stronger hand for your best strategy. The two strategies are a complex system or a volume operation. In this article a volume operation is high sales volume with low cost and the complex system is a high touch approach which focuses on building customer relationships. One of these strategies will be employed by CSC.

Mark Ash, Janet Livezey and Erik Dohlman's article on the market background for soybeans and corn provided a base for determining revenue for corn and soybeans. Understanding the revenue side of the corn and soybean industries is important to understand revenue of seed industries. Corn and soybean revenue gives the seed industry a measure or gauge of how price sensitive a farmer might be. Crop acre information from USDA-NASS provided the study with acres and historical yields. This allows for a baseline of market share by acres of both corn and soybeans.

In the management of cost for a global or regional seed company, Frank J. Dooley and Matthew M. Kurtz examined the changing product characteristics (biotech traits) that are causing the U.S. seed industry to reevaluate their inventory strategies. The life cycles of seed products are becoming shorter. What used to be a five to seven year cycle is now a three-to-five-year cycle. So, how do firms maintain an adequate supply of products to meet the customer demands without having unused inventories? The optimum is to have the right mix of genetics and traits for sale; not too little where potentially they lose sales or nor too much, resulting in large carryover costs. This article relates to the cost of the product and the financial resources needed to start a company.

An investor highlight from Don Carson with Merrill Lynch writes that corn product yields from Monsanto are performing at a higher rate than Pioneer. These results may lead to Monsanto gaining a one to two share points in 2008, and Pioneer being challenged to

stabilizing their market share. The proposed new company, CSC, would be accessing its varieties from the next tier of foundation seed companies to be discussed later.

Nicholas Kalaitzandonakes and Marvin Hayenga identified the structural change and the complexity of the seed industry. They found that (Monsanto owned) Holdens' germplasm had between 30 and 40 percent of the market. This reaffirms that corn products in the market may lack differentiation, and the importance of obtaining germplasm and biotechnology trait license from Monsanto in order to provide the best products available. Plus they suggest that product innovation may have had a slow down after the first wave of biotechnology traits hit the market.

Alan Gould explains some of the relationships large global companies are faced with when developing and marketing a newly discovered trait. Achieving critical mass in order to pay for research has caused companies to evaluate their marketing strategy. This is where collaboration can help a firm maintain one's identity, yet bring forward products through a distribution channel that has changed with the advent of biotechnology.

According to Robynne Anderson, trait providers have prospered in a very risky business. Because the cost of developing a trait and maintaining the marketing of a single trait is quite large, there is speculation that more consolidation of trait providers will occur. In view of that condition, small seed companies may start to look more like distributors. But the report did suggest that small companies with strong customer relationships will probably continue to play an important role.

Intellectual property rights and biotechnology have caused the industry to consolidate. Murray Fulton and Konstantinos Giannakas write that protected biotech traits allow firms to reap the research and development costs, but they need to gain economies of scale to really perform at an above average profit. Thus, those firms are likely to pursue mergers or acquire other seed companies to gain critical mass. The use of joint ventures and strategic alliances to gain additional market presence is also based on realizing economies of scale.

Philip Jones *et al* write of the cost not to have seed availability for customers because of difficult conditions in growing the seed crop. An alternative is to raise additional seed in South America. The average cost of wholesale corn grown in the U.S. is about \$34 dollars per unit. If the same is grown in South America that cost could be at least \$10 per unit more. This informs the partners of the potential risks and opportunities of accessing the right quantities of seed products.

Proper management of the seed corn supply chain is critical to the success of a seed business. Philip C. Jones *et al* write that managing the process is challenging due to the growth or loss of sales of individual varieties and additional traits from one year to the next. Actual demand versus forecasted needs to be analyzed to insure proper safety stocks and minimize the number of stock keeping units. CSC will need to have enough seed to maximize growth while minimizing the level of carryover inventory. It also means that CSC must have a means to accurately forecast the seed demand a year in advance.

The cost of seed from production to conditioning was part of the article from Jorge Fernandez-Cornejo. Percentages were used to identify each activity's costs. This allowed for general comparisons in creating an income and expense sheet for a new seed business. In search of benefits and risk, Jorge Fernandez-Cornejo reviews the last decade of biotech products. The seed industry, farmers and consumers may have realized benefits and risks with the biotechnology traits. Patents allow firms to protect their investments in biotechnology, and the plant variety protection law allows firms to protect their genetic research and development products. Through those two legal mechanisms firms can control the exclusivity of their products and reap the financial benefits. In order to pay for research and development, firms have sought out economies of scale, which has led to consolidation of the industry. Complementary products such as pesticides and herbicides led chemical firms to acquire or merger with seed firms. For farmers, the benefits are higher yielding varieties, more flexibility in time management, and lower pesticide costs plus safer pesticide application.

Trait suppliers have the most power in the seed industry; Sophia Murphy discusses the affect of market power concentration within the seed industry. Her use of the concentration ratio was instrumental in viewing the industry today. The four-firm concentration ratio (CR4) was 73 percent in 1996. Now it is at 68 percent. One could argue that the industry has less supplier power today, or those joint ventures and alliances through licensing are allowing small firms to survive.

Nicholas Kalaitzandonakes and Alexandre Magnier listed the US seed corn industry vertical integration characteristics or activity from 1999 to 2002 showing the number of companies in each characteristic. This shows where competition is in regards to vertical integration, inportmant information for understanding our rivals.

What sales skills are necessary to become successful in the seed industry? Nancy Ahlrichs spells out four skills of decision-making: ability to work in teams, effective project management, and customer focus. Behaviors that are important for sales people range from initiative, innovation, flexibility, and customer orientation to name a few. It is extremely important to understand skills and behaviors because those skills may be the only competitive advantage a small company may have.

Corinne Alexander, Christine Wilson and Daniel Foley suggest there are three types of buyers in agriculture: business, economic, and relationship buyers. This information will help to development a sales and marketing approach to the market.

The skills and capabilities needed to run an entrepreneurial business are intangible. Allan Gray and Associates, in an article, explain the skills needed. This information provides our investor group a metric with which to compare the skills they possess, and determine what areas they will need to improve upon in order to succeed in business.

Arie de Geus concept of “learning companies” and “financial companies” helped me consider two strategies that may play out versus each other. The quote that supported this paper was “the only real sustainable competitive advantage we have is the ability to learn faster than others.” Monsanto learned quickly. CSC will have to do the same.

This thesis is structured to develop insightful answers to positioning CSC into the seed industry. The combined information gained should provide us with a perceived or as close to accurate look at the big picture of the industry as possible.

CSC is located in central Minnesota where corn and soybean acres dominate the planted acres. Many farmers are cash crop operators, and some are livestock producers. The selection of one of the following marketing strategies will narrow our focus of entry in efforts to obtain above average profits and serve our customers well.

1. We will look at the possibility of obtaining the low cost leadership position in the industry.
2. Or is the opportunity of entry is best attempted by a differentiation strategy,
3. And/or is there a niche to fill within the seed industry.

This information gives direction to the owners and general manager in directing their company's competitive strategy.

The following seven questions provide information for a market analysis and they can be found in Thompson and Strickland, "Strategic Management".

Question one: What are the dominant economic features of the seed industry? This question will touch on many areas of interest such as the market size, product life cycle and the scope of rivalry within the industry. The study will discover who is selling products and buying products in the seed industry. I will consider the opportunity for CSC to integrate backward into the vertical chain and what types of distribution channels are available. What is the pace of technology change and how does it affect products and services? I will consider the economies of scale and scope in finding a competitive advantage. Other economic indicators are business clusters, the learning curve, low costs, the use of capital, capital requirements and the ability of firms to be profitable in the industry.

Question two: What is the nature of competitiveness in the corn and soybean seed industry?

I will use Michael Porter's competitive forces model:

- Rivalry among sellers
- Potential entry of new competitors
- Substitute products
- Suppliers bargaining power
- Buyers bargaining power

I will study these five forces in the seed industry to gain insights on the various competitive dimensions of the industry and of the interaction that creates opportunities and challenges for the players.

Question three: What factors are causing the changes in the seed industry? I will be looking for trends or developments that can create a shift in the industry. The concepts of driving forces are those trends or developments that lead or influence a new environment or structure of the industry.

Question four: Which firms are in positions of strength and which are in positions of weakness? A strategic group mapping will allow one to see different competitive market positions of each firm and/or grouping of firms.

Question five: What are the rivals' intent and what moves might they make based on their stated vision, mission, goals and objectives. Identifying their personnel capabilities, capital resources and other strength's will help us to project what they may do in the future. This allows for firms to be ready to move to an offensive or defensive strategy to meet that expected competitive pressure.

Question six: What are the key success factors of the industry, what makes the difference in a firm's success within the industry? I will look at technological positions, along with

manufacturing capabilities, distribution, and marketing skills that all play a part in a firm's success. People skills and capabilities round out the major factors that lead to key factors of success. Brand image, overall cost position, market areas, access to capital, and patent protection are other areas that can be a key success factor as well.

Question seven: What are the earnings of the companies that make up the industry? What are the prospects of earning an above average profit in the industry? For publicly held companies, stock market values and dividends paid to shareholders will be used to see what profitability level is available.

Chapter 3 addresses "The Value Proposition", which sets out the three generic marketing strategies of differentiation, low cost leadership or focus. Identifying one of those marketing strategy is critical for the firm to participate in the industry and find success.

The remaining chapters will answer the seven questions to provide perspective and sense making of what the industry is like, what it is doing now and where it is going in the future.

CHAPTER 3: THE VALUE PROPOSITION

What strategic options are available to CSC should the owners decide to enter the seed industry? According to Michael Porter, there are three basic strategies; overall cost leadership, a differentiation strategy and a focus strategy.

Table 3.1 from “Competitive Strategies” by Michael Porter shows the marketing strategies of overall cost leadership, differentiation and a focus strategy. Focus strategy can be based on a select buyer group or a segment of products or localized geographic area. In Bruce Greenwald and Judd Kahn article, “All Strategy is Local”, they state that competitive advantages are most often found in holding on to customers or ownership of proprietary technology like differentiation, or by having economies of scale which leads to cost leadership. They also argue that it’s easier to maintain a competitive advantage in a tightly drawn market verses a sprawling market, which lends itself to an area of focus.

Table 3.1 Three Common Marketing Strategies

<p>Differentiation, where there the customer perceives uniqueness from the company within the whole</p>	<p>Overall cost leadership within the whole industry</p>
<p>Focus Strategy with differentiation</p>	<p>Focus with focused cost position</p>

Source: Michael Porter, Competitive Strategy.

3.1 Overall cost leadership

Overall cost leadership is based on the ability to offer quality products while maintaining the lowest cost possible. This position provides sustaining competitive advantage due to lower cost. In order to achieve such a position a seed company would need a relatively high market share and/or favorable access to genetics and traits. CSC has neither of these.

3.2 Differentiation

Differentiation is about being unique in the market place. That uniqueness supports above average returns and gives a competitive advantage to the company. The skills needed in using this strategy are strong and creative marketing abilities, excellent quality of products based on yield performance, long-time experience in the industry, skilled sales people and a trusted distribution system. Differentiation is a strategy CSC needs to explore further.

Creative marketing ability is needed to develop awareness and a positive brand image, which encourage customers to prefer a company's product. In turn, this activity can lead to increases in market share and capture economies of scale through increased sales.

Another key for differentiation is to have researched products that excel in the market place. Products that yield, stand, and dry down are key factors to the grower's success. The development of a strong linkage between research and development, the product development group, and marketing is needed in order to provide confidence in the company and its products. CSC is not looking to be involved with basic plant breeding or researching biotechnology traits. Genetic corn products are selected in the wholesale market that includes suppliers of Seed Genetics, Thurston Genetics, Mike Brayton Seed (MBS), Holden's Foundation, and Greenleaf Genetics. Soybean products suppliers include Bio-Pant Genetics, JGL, Peterson Seeds, and MBS. Selection of genetic products is one critical component of high quality products, the other selection is biotech trait. Monsanto has YieldGard® corn borer, YieldGard® corn root worm along with Roundup Ready® traits. Dow AgroScience has Herculex1® corn borer, and Herculex-xtra® corn root worm. Syngenta has AgriSure® traits of corn borer and root worm protection. Bayer Crop

Science licenses Liberty Link® trait to the corn market. Product differentiation is based on combinations of genetic and traits.

A trusted distribution system is important in maintaining a connection to the customer. If the connection is solid year-after-year, this allows the firm to maintain and build sales for the future. In order to start the business, CSC must find that system. The hiring of a District Sales Manager (DSM) who has a loyal customer following can be part of the answer. The development of the distribution system will be a on going process of development.

Highly skilled and creative people are needed to achieve a competitive advantage within a differentiation strategy. According to an Accenture study, skills needed are good decision making, the ability to work in cross-functional teams, effective management, and customer focus. According to Nancy Ahlrichs of EOC Strategies; a few of the key behaviors that lead to success are: initiative, innovation, flexibility, and customer orientation. These skills and behaviors would be required in conjunction with leadership, general management, understanding of plant breeding, inventory management, marketing skill, sales skills, agronomy knowledge, and people skills. Compensation for these skills would need to be above average for the industry standard in order to hire the right people. Incentive plans should be compatible with the market share objective or the above average profit goals of the company.

3.3 Focus

Focus strategy is based on the idea that a the firm can be better at serving a narrow strategic target, be it a buyer group, a segment of a product lineup, or a geographic area, more effectively or efficiently than competitors who are either global or national competitors. What could make a focus strategy work for CSC would be the basic knowledge of the agronomic issues in a geographic area from soil types to cropping styles to weather patterns. This narrow strategy would allow for a competitive advantage based on the concentration of advertisements, shorter delivery routes, ease of getting to the customer, and quicker to service; all of which can lower costs.

Focus strategy that understands a certain buyer group could be another part of CSC strategy. Building a strong customer base by meeting the needs of those customers can maintain a price level that allows for an above average profit. A product lineup that is narrow in scope based on maturity allows CSC to be the experts of products within that maturity range. Their ability to manage risks of inventory is one key to lowering costs and gaining a competitive advantage.

CSC marketing strategy needs to be based on a focused strategy in Minnesota. That focus limits products to 90 day to 100 day maturity corns and 0.9 to 1.9 relative maturity soybeans. The DSM needs to develop a loyal customer base. The DSM should target a customer base that fits his abilities to sell and service those selected customers.

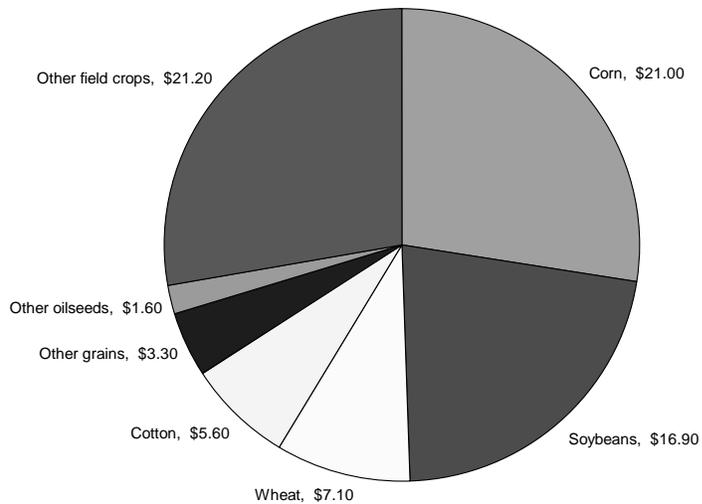
CHAPTER 4: WHAT ARE DOMINANT ECONOMIC FEATURES OF THE INDUSTRY?

4.1 The Market Size

The seed industry is one segment of the agricultural input industry. Seeds are planted to produce corn, soybeans, wheat, cotton and other grains, oil seeds, and other field crops. The dollar value of those commodities in 2005 are shown in the pie chart below (figure 4.1) as reproduced from, “Soybean Backgrounder” a report by Mark Ash, Janet Livezey, and Erik Dolhman for the Economic Research Service. This chart illustrates the different types of commodities and the earning potential of each commodity. For this study, I will concentrate on corn and soybean commodity groups and the need for seed products. Corn and soybean prices have about doubled since 2005.

Figure 4.1 Commodity Dollar Values

2005 Commodity Dollar Values among U.S Crops in \$ Billions



Source: Mark Ash, Soybean Backgrounder.

To determine the market size of the corn and soybean seed industry, I multiplied total acres planted times units of seed needed to plant an acre times an estimated average industry retail price to obtain an estimate of the seed total revenue to produce those two crops.

Table 4.1 Estimated Seed Corn Sales, 2006

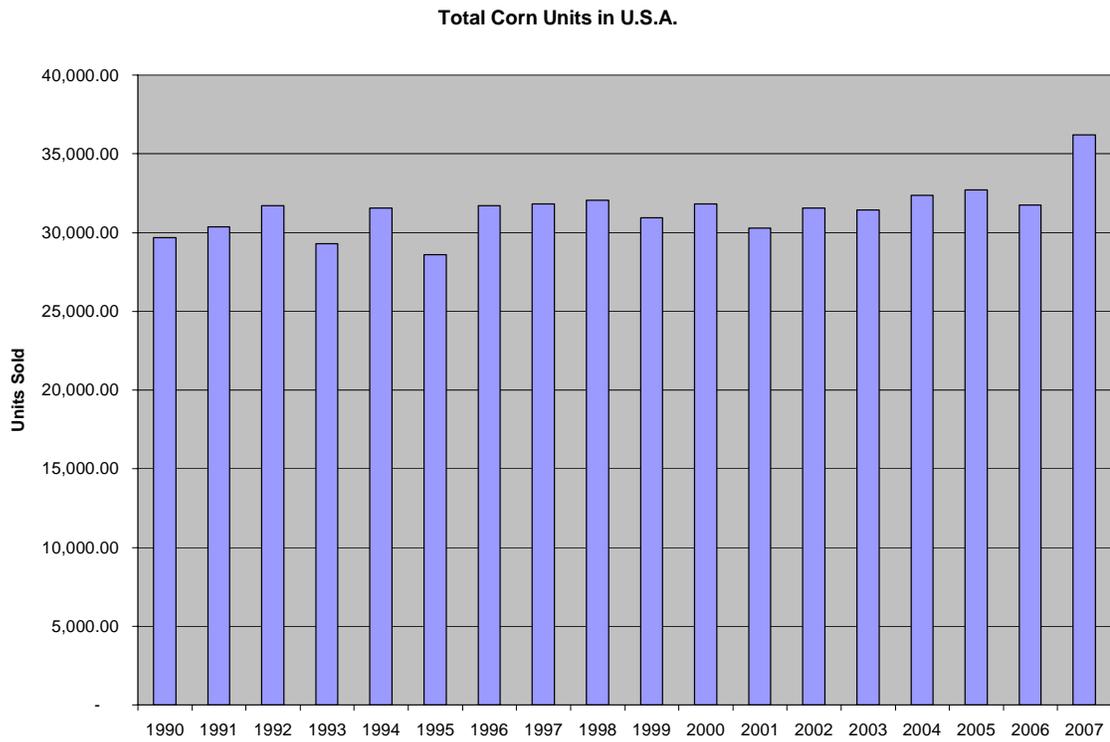
Kernels planted per Acre	32,000
Kernels per Unit of Seed	80,000
Acres planted per Unit	2.5
Total Acres in U.S.A.	81,259,000
Total Units planted in U.S.A.	32,636,800
Total Acres in Minnesota	7,300,000
Total Units planted in Minnesota	2,920,000

Source: USDA for acres, industry standard for 80,000 kernels per unit and writers assumption of average kernels per acre.

There are 80,000 corn kernels per unit. For quality purposes they are sized by shape; from large, medium and small; in both rounds and flats. Weights will vary according to the size and the growing condition the kernels were raised in. The variables I have seen have been 28 to 72 pounds per unit. The only exception to 80,000 kernels per unit is when unit weight fall below a company's set standard, say 32 pounds per unit; they may add 5,000 to 10,000 kernels per unit to entice customers to purchase small seed.

Demand for seed corn has been relatively stable for many years. As noted in Table 4.2, strong commodity price in 2007 played a factor in gaining corn acres, but often farmers maintain the same yearly crop rotation.

Figure 4.2 Total Corn Units sold in U.S. in Millions



Source: USDA

My study is based on a regional company that uses a focus strategy and markets in the geographic market area of Minnesota. For that reason I also estimate seed corn sales in Minnesota (Table 4.1), which is 7,300,000 acres planted requiring 2,920,000 units of seed. As can be seen in figure 4.3 below, Minnesota is a major corn producing state.

Source: Percent of market from Minnesota Agricultural Statistics and prices from writer assumptions.

For soybean unit sales are based on 50 pound bag units and one unit will plant one acre. I assume that each 50 pound unit has 140,000 seeds or 2,800 per pound. While seed count per pound varies, 2,800 per pound is considered a reasonable average estimate. With 7,350,000 acres planted in Minnesota in 2006, the total units of soybean seed required was 7,350,000 units. As can be seen from the map below (figure 4.4), Minnesota is a major soybean producing state. In addition, Minnesota is a major soybean producing state with a short growing season.

Figure 4.4 Soybean Acreage Map of U.S.

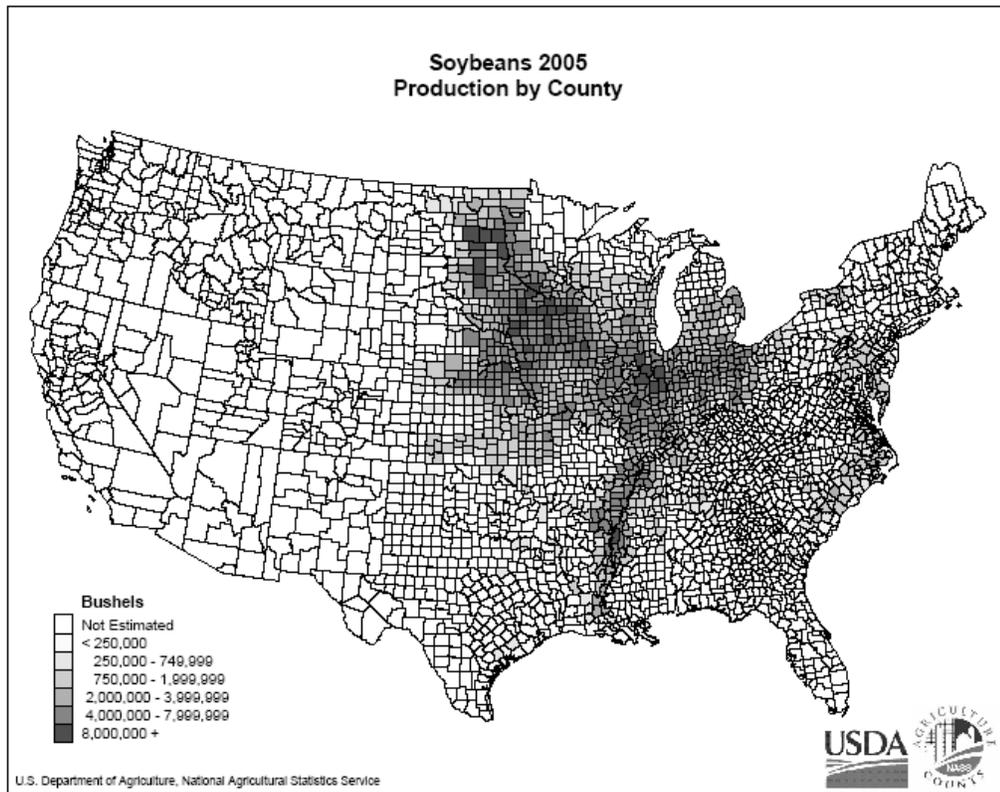


Table 4.3 2006 Soybean Revenue for Minnesota

Acres of Soybeans	Acres per Unit Sold	Number of Units	Product Price and Tech fees per unit	Total Revenue
7,350,000	1	7,350,000		
Product Revenue		7,350,000	\$17.00	\$124,950,000.00
Roundup Ready	88%	6,468,000	13.95	\$90,228,600.00
Total Soybean Revenue				\$215,178,600.00

Source: Acres from USDA and prices are writer’s assumptions.

The estimated total corn and soybean seed revenue for 2006 is \$576.7 million, \$361.5 for corn seed and \$215.2 for soybean seed.

4.2 Scope of Rivalry

Bayer CropScience, Syngenta, Monsanto, Dow AgroScience, and DuPont/Pioneer are global companies who operate and market seed around the world. Economies of scale give them competitive advantages in the industry. Their marketing and sales skill, once learned can be passed along to others geographic areas to help support marketing and sales activities. Government regulation and policies play a factor in the competitive nature of the global marketplace and can support or hinder a company’s strategy and these large companies have the infrastructure to deal with these issues. They also benefit from economies of scope, where they combine agricultural inputs of seed, pesticide or traits, herbicides for weeds or disease and seed treatment for protecting of the seed products. Their product lineups are broad in order to serve all areas of the country and the world. Rivalry among these firms has become intense since the introduction of biotechnology traits. Each has invested in the search for biotechnology traits. As will be seen later, they have acquired other regional seed companies to support their corporate strategy.

Also in the market is about two hundred sixty five regional and four small international firms. Rivalry among regionals varies across the U.S. Some regional companies focus on

a small geographic area such as a few counties, while others may focus on one or several states.

4.3 Business Life-Cycle

The seed industry is in the mature stage of the business life cycle. Below are examples:

- The major international seed companies with established brands have about 70 percent of the US market.
- Buyer behavior in a mature cycle with a saturated market is characterized as mostly repeat customers and customers tend to rely on known brands.
- Growing and processing seed is mature, too. In fact, there is some overcapacity due to shifting market share. Such share changes can lead to changing cost structures for the firms involved.
- In a mature stage, products tend to be of superior quality because of extensive experience firms have gained from their learning curves and well established research and development units along with ISO 9000 programs to assure quality and enhance efficiency and effectiveness of operations. The result is that the genetics, germination and purity of the seed continue to improve and be of high quality.
- In the growth life-cycle is the biotechnology component of the products. Companies are jockeying for market position as new traits come to the market place because these products will have a limited life-cycle until they are replaced by superior traits.
- Another indication of a mature life-cycle is that there is more market segmentation, and firms tend to broaden product lineup and increase their service as a strategy to differentiate oneself from the rest. As a result price, service, and product competition is intense. Managing brand image and the perception of the seed

products and the company's service continually rises to gain favorable customer response.

- As the large number of sellers of traditional genetics competition intensifies, margins and profits tend decline. On the other hand, margins and profits for biotechnology firms are higher, due to the power of the supplier of the biotechnology traits.

4.4 Number of Rivals

Table 4.4 illustrates the U.S. market share of international and regional seed companies. The data for table 4.4 were obtained from "Seed World" October 2007 page 12 and from conversations with industry representatives. The industry has four major international companies and approximately 265 regional companies. The four major companies are DuPont/Pioneer, Monsanto, Syngenta, and Dow AgroScience. There are approximately 265 U.S. regional companies, some national and some local, largely dependent on each one's marketing strategy.

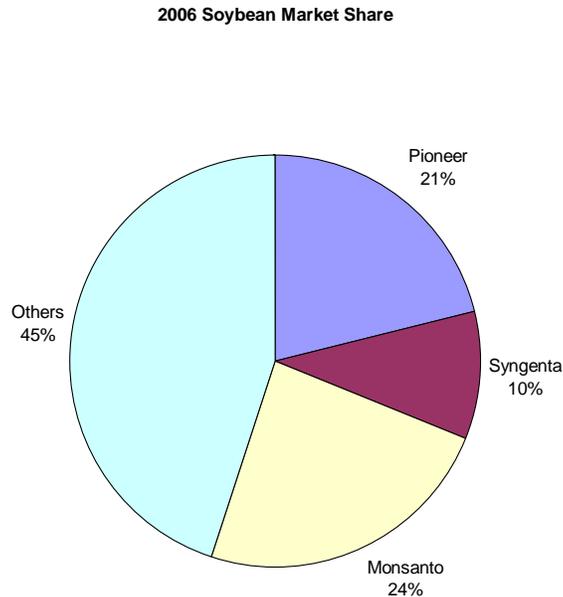
Table 4.4 provides interesting information. First notice how DuPont/Pioneer is losing market share. At one time Dupont/Pioneer was very dominant in the America seed corn market. As recently as 1995, DuPont /Pioneer had 44 percent of the seed corn market, but their share had fallen to only 25 percent in 2006. As DuPont/Pioneer lost market share it was taken over by Monsanto with its Dekalb, Asgrow, and American Seed Companies. Dekalb and Asgrow seeds are marketed as such, but American Seed Company is a collection of regional seed companies that still market under their original brand names. The other large change in market share has been the growth in market share by the remaining independent regional seed companies. In summary, one can see that DuPont/Pioneer and Monsanto are the dominant major international seed companies, and DuPont is losing its dominance to Monsanto. Furthermore, the regional seed companies are still major players in the industry. Later on we will discuss the probable causes of the shifts in market share.

Table 4.4 Corn market share from 1995 to 2006

	1995	1997	2005	2006
DuPont/Pioneer	44	42	30.5	25
Monsanto				
Dekalb/Asgrow	11	14	15.3	22
American Seed			5.5	8
Syngenta				
NK	7	9	5	4
Garst	3	3	4.5	3
Golden Harvest			4	3
Dow AgroScience				
Mycogen	4	4	3.2	3
Cargill	4	4	0	0
Farm Supply/Retail	5	5	5	5
Regional Firms	22	19	27	27
Total	100	100	100	100

Source: “Seed World”, October 2007, page 12 and conversations with industry professionals.

Figure 4.5 Soybean market share for 2006



Source: “Seed World”, October 2007, page 12.

According to the 2005 Annual Report of the Minnesota Seed Regulatory Unit, 78 firms were registered in 2005 with a total of about 3,000 hybrid corn varieties. Those same 78 firms also had between 450 and 500 registered brand labels as well.

Table 4.5 International and Regional Seed Companies in Minnesota

Major international seed companies who also develop biotechnology traits
Dow AgroScience (Mycogen), DuPont/Pioneer, Monsanto, Syngenta
Minnesota-based seed companies
Advantage Brand Soybean Seed, Albert Lee Seed House, Gold Country Seed, Heartland Hybrids, Anderson Seeds, Croplan Genetics, Circle C Seeds, Dahlco Seed Co., Dahlman Seed Co., Earthwise Processor, Enestvedt Brothers, Galena Genetics, Johnson Seed, Mallard Seed, Mid-State Genetics, Neitfeld Seed, Northland Seed & Grain Corp, Sabre Initiatives, Seeds 2000, Richland Organics, Terning Seeds, Inc., Thunder Seed, Top Farm Hybrids, Wensmen Seed, Ziller Seed
Iowa-based seed companies
Access Seed, Ag Source Seeds, Dyna-Gro, Epley Bros.Hybrids, Farm Advantage, Helena Chemical, Kruger Seed, KSC/Challenger, Latham Seed, LG Seeds, Midwest Seed, Nutech Seeds, Pattison Bros., Prairie Brand Seed, Sand Seed Service, Sansgaard Seed, Star Brand, Stine Seed Company, Wilson Seed Company
Wisconsin-based seed companies
Jung Farms Inc., Trelay, Inc., Brown Seed Co., Dairyland Seed Co., Kaltenberg Seeds, Kusselmaul Seed, Renk Seed, Spangler Seedtech
North/South Dakota-based seed companies
Peterson Seed Farm, ProSeed, Quality Seed, KayStar Seeds, Legend Seed, Mustang

Seeds, Sodak Genetic
Other/Foreign with small market share
AgVenture, Bio Gene Seeds, Crows Hybrid Corn, Fielders Choice, Great Lakes, NC+ Hybrids, Pfister Hybrid Corn, Producers Hybrids, Trisler Seed Farms, Unity Seeds, Wyffels Hybrids, Hyland Seeds (from Canada), RAGT Semences (from France), Panner (from South Africa)

Source: Charles Dale, Minnesota Department of Agriculture

4.7 Number of Buyers and Their Relative Size

One way to visual customers is to look at gross farms sales on Table 4.6.

Table 4.6 United States and Minnesota by Economic Scale Class

Gross Farm Sales	Minnesota
\$1,000 to \$9,999	34,500
\$10,000 to \$99,999	25,200
\$100,000 to \$249,999	9,900
\$250,000 to \$499,999	5,600
\$500,000 and Over	4,100
Total	79,300

(2007 Minnesota Agricultural Statistics at NASS website.)

Figure 4.6 Percent of Farm Operators in Minnesota based on Economic Class

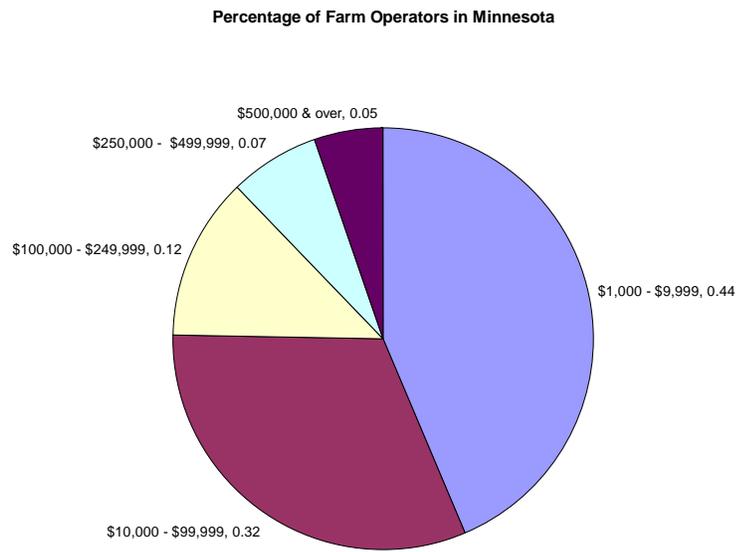


Figure 4.7 Percent of Farm Land Managed by each Economic Class

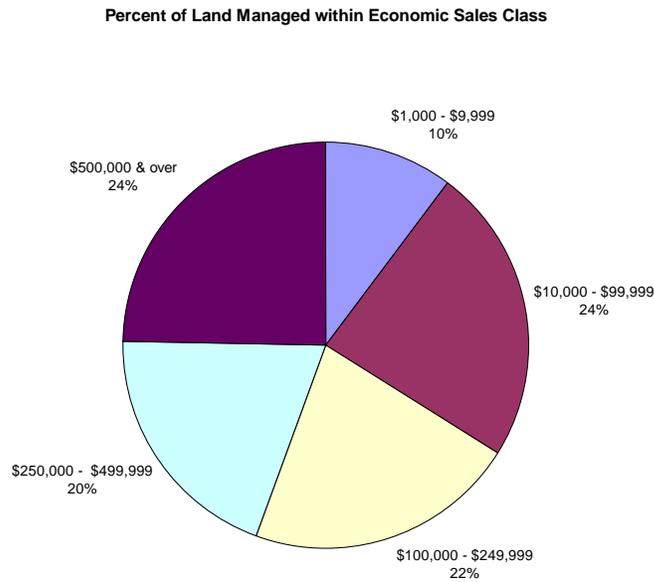


Table 4.7 Minnesota Census of Agricultural; Principal Operators of Farm Land

Economic Characteristics	Quantity
Principal operators by primary occupation	
Farming	50,808
Other	30,031
Principle operators by sex;	
Male	74,469
Female	6,370
Average age of principle operator	53
All Operators by Race:	
White	111,794
Black or African American	20
American Indian or Alaska Native	188
Native Hawaiian or Other Pacific Islander	6
Asian	100
More than one race	97
Spanish, Hispanic or Latino Origin	694

Figure 4.6 and 4.7 and Table 4.7, (2007 Minnesota Agricultural Statistics at NASS website.)

4.6 The Degree of Vertical Integration

Four large firms have vertically integrated biotechnology and traditional plant breeding genetics into a powerful force in the industry. These four have expanded or integrated by

acquiring or merging with other seed companies. For example Monsanto has acquired Dekalb and Asgrow and under the umbrella of American Seed where they have acquired 24 regional companies. They also own Holden's Foundation Seed, a major corn plant breeding company that supplies genetics to regional seed companies. DuPont acquired Pioneer. Dow AgroScience Mycogen brand is made up of many smaller acquisitions and Syngenta acquired Garst and Golden Harvest brands. With the consolidation, of these four firms now control 68 percent of the seed corn market.

Consolidation was driven by change in the coordination of the three major assets within the seed industry, intellectual patent protection, biotechnology traits, and propriety genetics (Kalaitzandonakes and Hayenga). When these three major assets are combined, the seed, chemical, and pesticide industry takes on the look of a seed-plant protection industry. According to Utterback, Abernathy, and Utterback there are basic innovation lifecycles that occur in an industry experiencing innovative change. At first many firms will become involved in the innovation process. As products gain market acceptance and innovation starts to slow, each company's focus turns to the market share potential, controlling cost, and positioning the product so that a sustaining competitive advantage can be achieved. The biotechnology portion of the seed-plant protection industry is approaching a mature life cycle.

For example, Monsanto was first to introduce a biotech trait Roundup Ready® Soybeans. Monsanto developed the trait, and then acquired Asgrow, a leading soybean genetics firm in order to combine the trait with traditional genetics. Monsanto introduced Roundup Ready® soybeans in 1996. To date no other soybean biotechnology trait has appeared. The Roundup Ready® trait is now licensed broadly to other seed companies to incorporate the trait into their genetic products. Bayer CropScience is expected to release Liberty Link® soybeans in 2009 to challenge RR®.

Fulton wrote that, "in the past ten years, the seed and pesticide industries have seen a substantial number of mergers and acquisitions and an increase in vertical and horizontal integration. The structural changes underway in the seed, pesticide and chemical industries

are due to a number of factors. Some of these factors are common to all industries and have no specific link to biotechnology. For instance, the mergers and acquisitions in the seed and chemical industries are at least in part a result of the need to consolidate costs and rationalize industry capacity, a desire by the management of the firms involved to extend their sphere of influence, and a wish by some firms to pre-empt other firms from taking over valuable assets.” Traits are substitutes for some pesticides by giving resistance or tolerance to a chemical treatment, such a trait provides the same solution as a selective herbicide or of a potent pesticide, only safer and with great efficiency. That benefit has resulted in shifting market share among seed companies.

4.7 Types of Distribution Channels

Various distribution channels are used in the market for corn and soybeans. There are retail sales and wholesale sales. With retail sales, a company may use direct marketing by the company’s own sales force or sell through its own dealer network or sell through third party retail farm stores.

The wholesale distribution channel is complex. A company’s branded corn or soybean product is based on a pedigree. The pedigreed product, depending on its exclusiveness, may be available in the wholesale market. An example of a well known pedigree is SGI 901 x SGI 905. When these two parents are crossed they produce a 95 relative maturity seed corn product. This product has been branded and sold by many companies.

Genetic suppliers, such as Holden’s, Seed Genetics, Thrustons, MBS, and Greenleaf Genetics provide pedigrees to the market. Greenleaf Genetic is owned by Syngenta and DuPont/Pioneer with equal shares and offers genetic pedigrees to other seed companies. There are brokers and production, processing companies that only participate in the wholesale channel. Transferring or reselling of pedigrees in the wholesale market is common and that reduces the potential for being short of safety stock numbers or having overstock.

Table 4.8 Industry Vertical Integration

Type of Companies	Vertical Integration
Global	Global; own genetics and traits, production, processing and distribution
Regional's	Mostly Regional; Both own and purchase genetics, owned production and distribute products
Smaller Regional's	Mostly Local; mostly purchase genetics, some own production and focus on distribution

Source: Writers table.

4.8 Pace of Technological Change

Biotechnology linked the chemical, pesticide and seed industry together as science was able to insert traits into genetics. These traits are substitutes for certain herbicides that control weeds and pesticides that control diseases and insects. At the beginning of the industry consolidation, the speed of change was extremely fast as companies merged or acquired others in order to gain economies of scale and scope and as court battles were fought by the biotechnology leaders over ownership of intellectual property rights.

First marketed in 1996, Roundup Ready® soybeans from Monsanto has provided farmers a product that is safer to manage and has a longer window of spraying time to kill weeds. That has given the farmer the ability to farm far more acres. Producers in dryer climates have benefited from RR soybeans because it gives the operator better ability to manage the soil preparations as well as to time spraying. Roundup Ready soybeans have been quickly accepted by producers as can be seen from the data in table 4.9.

Table 4.9 Soybean Market Acceptance

Herbicide-Tolerant Soybeans Only					
Percent of Acres Planted					
State	2002	2003	2004	2005	2006
Minnesota	71	79	82	87	88

Fernandez-Cornejo, Jorge. Economic Research Service.

<http://www.ers.usda.gov/data/biotechcrops/ExtentofAdoptionTable3.htm>

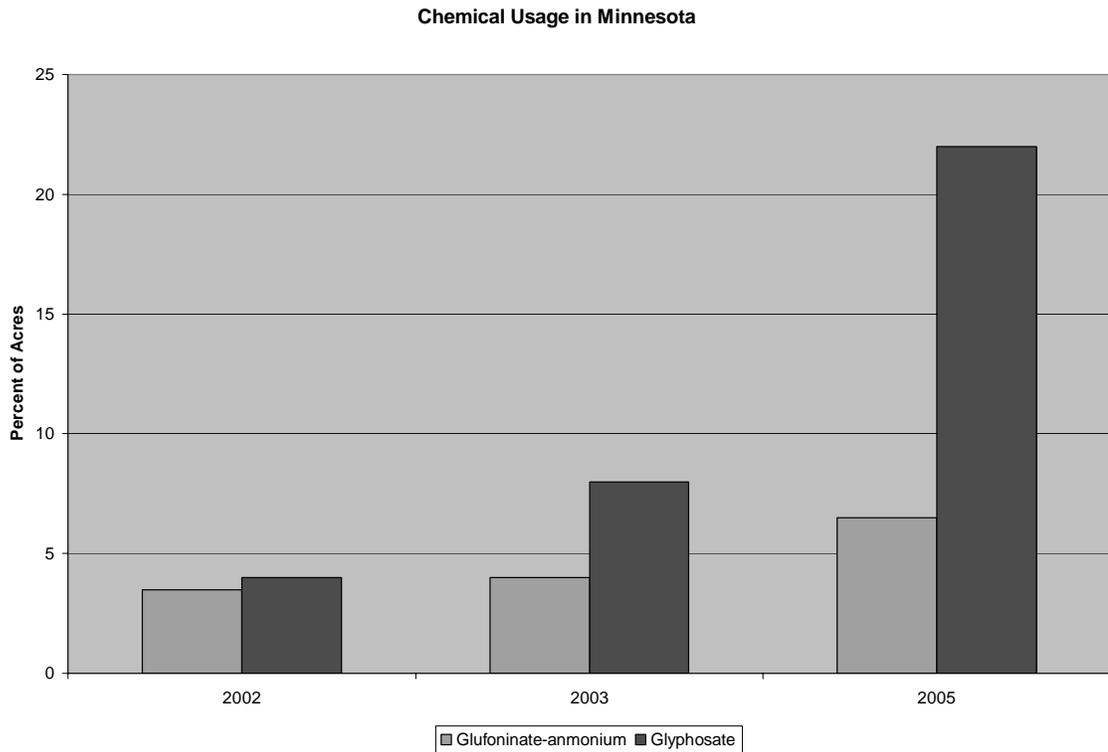
The next introduction took place in 1996-97 with “Bt” (Bacillus Thuringiensis) protection, this trait is a protein that kills the European Corn Borer, a pest that can damage the corn stalk and ear causing a yield loss. The products available today for corn borer resistance are as follows:

- YieldGard® from Monsanto
- Herculex I® from Dow AgroScience
- AgriSure Bt11 from Syngenta.

Herbicide tolerant corn products with Monsanto’s Roundup Ready® and Bayer’s Liberty Link® traits were next to being introduced. Roundup Ready® corn is tolerant to Roundup herbicide and it controls a high percent of the herbicide tolerant seed corn market. Liberty Link® corn, a biotechnology trait from Bayer CropScience makes varieties with the trait tolerant to the Liberty herbicide. Its market share is around five percent, a distance second.

Separating the market share of herbicide tolerant corn between Roundup Ready® and Liberty Link® trait technology has been difficult to obtain, but usage of chemical gives an indication of relative shares. Usage rates were available through the Annual Minnesota Agricultural Statistics at http://www.nass.usda.gov/statistics_by_state/Minnesota/index.asp and are shown in figure 4.8 below.

Figure 4.8 Chemical Usage in Minnesota; Roundup Ready versus Liberty Link



Source: www.nass.usda.gov/statistics_by_state/Minnesota/index

The comparison of Glufoninate-Anmonium (Liberty herbicide) and Glyphosate (Roundup Ready®) shows the increased usage of both with Glyphosate increasing much more rapidly. Liberty Link products have about a 5% market share, based on conversations with those in the industry.

The corn root worm trait was introduced by Monsanto as YieldGard® Plus corn rootworm resistance. The intended market for corn root worm was 15 million acres of corn in west central Iowa and Nebraska, where root worm pressure is traditionally strong. Two environmental conditions allowed the trait to gain added success. One was its unintended purpose is that the trait protects yield during dry climate conditions. Even the USDA Risk Management Agency has seen the value of the combination of the trait and genetics and developed a Biotech Yield Endorsement where premiums are reduced by 19 to 24 percent when this trait is used. The other factor is extended diapause where the corn root worm has

adjusted to a rotation of corn and soybeans use. Now the root worm has evolved by extending its diapause so that the eggs hatch later and come out two years after the field was last in corn. The corn root worm trait protects the roots from worms feeding on the roots. Feeding injures the root and opens the plant to fungus and bacteria. By keeping the plant healthy, the plant is able to efficiently extract more moisture and nutrients from the soil and produce a higher grain yield. University of Nebraska tests show up to 3 inches more soil moisture uptake with the trait. Dow AgroScience offers Herculex® Xtra and Syngenta sells AgriSure® CRW and Monsanto's VT3, a triple stack with CRW included.

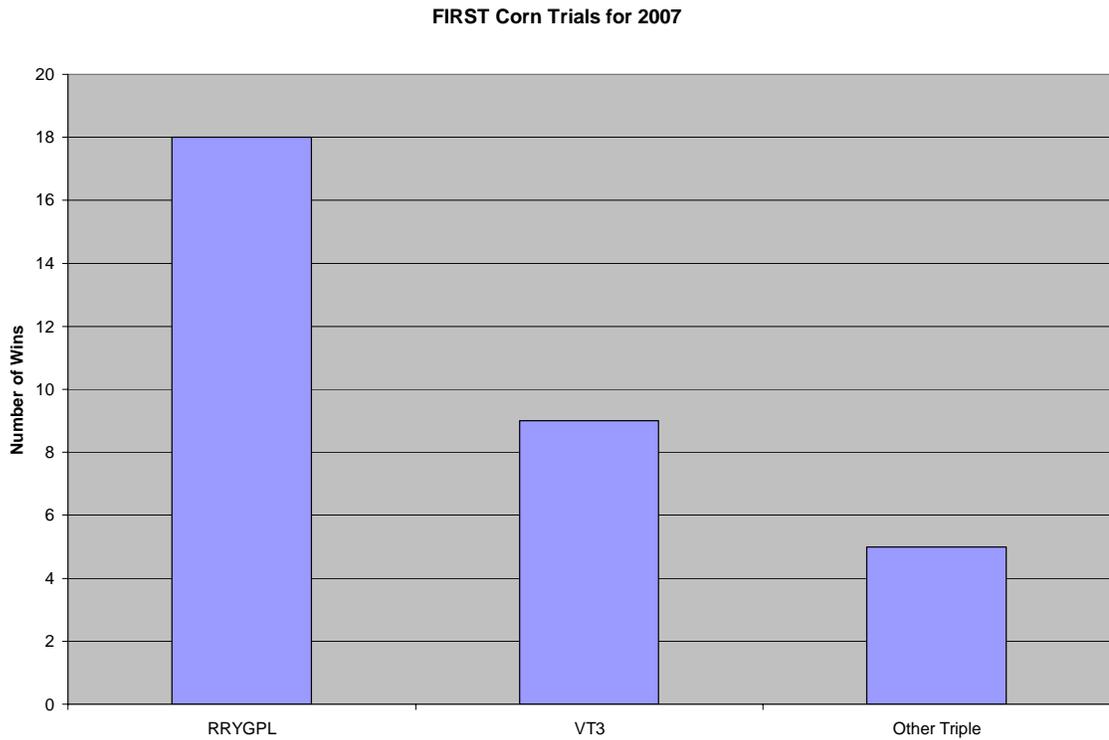
Table 4.10 2006 Biotechnology Corn Acceptance

Minnesota Biotech Corn Varieties Only					
Percent of Acres Planted					
State	2002	2003	2004	2005	2006
Insect Resistance (Bt)	29	31	35	33	28
Herbicide Tolerance	11	15	17	22	29
Stacked Genes	4	7	11	11	16
All GE Corn Varieties	44	53	63	66	73

Fernandez-Cornejo, Jorge. Economic Research Service.

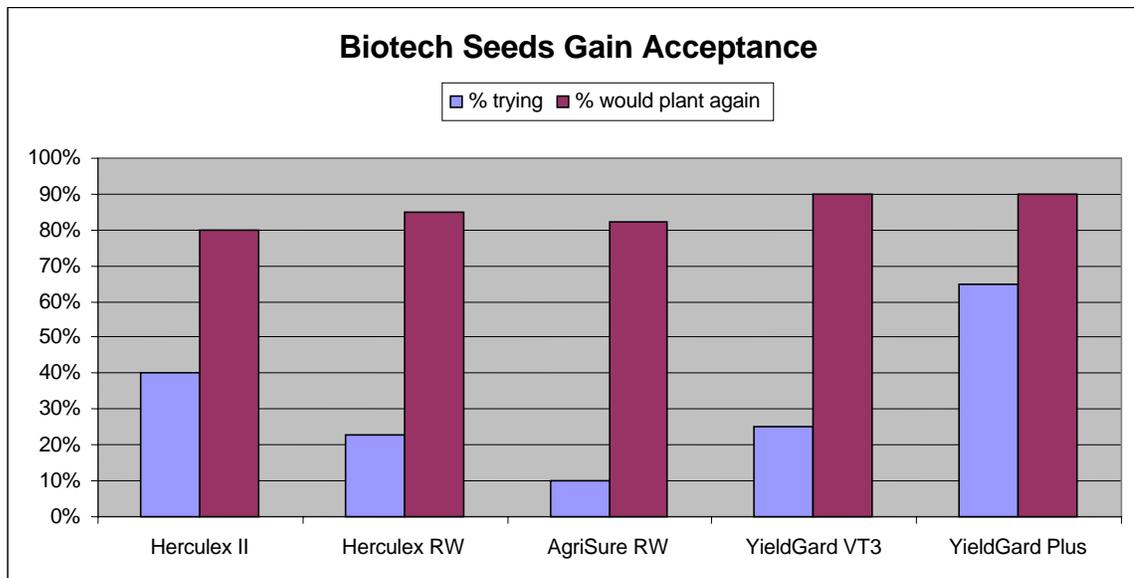
<http://www.ers.usda.gov/data/biotechcrops/ExtentofAdoptionTable1.htm>

Figure 4.9 Corn Trait PERFORMANCES in 2007, 1st Place Finishes.



From Merrill Lynch, Over-view of an Industry

Figure 4.10 Biotech Seeds Gain Acceptance



Source: Farm Futures, November/December 2007

Introduced by Monsanto in 2005, Vistive™ soybean has low linolenic to midolenic oil. The soybean oil is important because it can be used in place of trans-fat in deep fat frying and in processed foods. Trans-fat is a health concern and New York City passed an ordinance requiring chain restaurants to remove trans-fat from foods on their menus. Many restaurants are substituting with this new soybean oil. Pioneer is offering a soybean trait that is similar, and there will be some interesting market interaction between the two in the near future.

DuPont/Pioneer and Syngenta both are expected to introduce in 2009 a gene called Optimum Gap for commercial use in corn and soybeans, which gives the plant herbicide tolerance to RR and ALS herbicides. Bayer Crop Science is launching Liberty Link herbicide tolerant soybeans in 2009 and Monsanto will be bringing second generation of Roundup Ready® 2 Yield soybean to market in 2009.

Table 4.11 Future Pipeline Input and Output Trait Development

Input Traits	Monsanto	Syngenta	DuPont/Pioneer
Herbicide Tolerance	2 nd generation of herbicide tolerance	Optimum GAT™	Optimum GAT™ and Triple-Mod Herbicide Tolerance
Insect Resistance	2 nd generation of Insect resistance		
Disease Resistance			Anthracnose Stalk Rot
Other	Higher Yield Drought Tolerance	GT/CRW/ECB	
Output Traits			
Feed	High value with lysine		Improved Feed II

Bio-Based Fuels		Corn amylase	
Food	Low-lin mid oleic	High Oleic Acid	

Sources: DuPont/Pioneer, Monsanto, and Syngenta websites.

Market acceptance of biotech traits is obvious in Minnesota as shown in Table 4.9 and 4.10.

Biotechnology firms have now developed a process that stacks traits in a single plant, and are called a double stack or a triple stack. Monsanto and Dow AgroScience just signed an agreement to collaborate on joining the YieldGard® and Herculex® trait to form the SmartStac®, an eight trait combination, which they expect to introduce to the market in 2012.

4.9 Product Differentiation Possibilities

The development of genetics comes from planting breeding activities. How company's access genetics is based on their level of vertical integration. Larger companies have their own breeding programs, and some regional companies that have skill in plant breeding participate too. Their products are differentiated by the genes selected in traditional plant breeding. Other companies often acquire genetics from a small list of genetic suppliers such as Seed Genetics, Thurston Genetics, MBS, Holden's Foundation Company, and Greenleaf Genetics. Those are the names that are dominant in Minnesota. There is, however, a pecking order among seed producers in obtaining the best genetics. The large genetics buyer often is given the opportunity to select from the best genetics by selecting first and receiving exclusive marketing rights to those products. Other buyers (regional) may purchase the next set of available products. The result of this pecking order is that many regional companies have little product differentiation from their competitors.

Another component of the seed product is the biotech trait. According to the USDA, Minnesota farmers planted 73 percent of their corn acreage to a biotech corn variety (table 4.11) and 88 percent of their soybean acreage to a biotech variety (table 4.10). Therefore, only 27 percent of corn acres and 12 percent of soybean acres were planted to conventional

(non- trait) varieties. The larger percent is with traits. Licensing of traits to combine with genetics provides some more differentiation of products. I am observing increased pressure by companies to use only one company's trait and not others. To conclude, it may be hard to say that CSC would have differentiated products.

4.10 Economies of Scale

Economies of scale provide a large company with potentially higher profit due to increased market share which lowers average cost of production. These higher margins may be used to lower their selling price and gain market share. Biotech traits have high development and research costs. Recouping those costs has led firms to not only sell in combination with their own genetics but also license the traits to other companies. Furthermore, licensing traits, as Monsanto is doing, enhances Monsanto's brand image as a trait leader as well as reducing the average cost per unit for the development of the trait as the market for that trait increases. Similar to traits, research and development for traditional genetics also cost less per unit when market share increases.

Where economies of scale exist, the purchasing and procurement of products can lower the costs of goods needed. An example is the bag that holds the seed product. Greif Bros. require a certain amount of bag to be purchased at one time, 5,000 to 10,000 up to thousands at a time, the cost per bag goes down as order size increases. Economies of scale allow for lower cost as higher volume of seed is produced and processed at a time. Processing facilities that run large volumes of one lot of seed through the processing plant can reduce switching costs and ultimately lower the cost of the seed product. Seed corn is separated by hybrid and different trait combination, and by grade size. Grade size is large, medium and small, in both flat and round seed. Grade size is important for the customer's planter to run efficiently. The larger volume of seed reduces switching costs and lowers cost of production. Transportation is a fixed cost and the only economies of scale gained here is if a single buyer buys at higher levels of sale, so that the firm can deliver full semi-loads per stop.

4.11 Key Industry Participants

Major seed companies sell throughout the corn and soybean growing areas. That is not true for most regional companies. They have a market focus on a home state or areas near the location of the company. My observation is that clusters result due to the learning from one another. For example in Minnesota, 60 miles west of Minneapolis, there are now eight regional seed companies and they learned from each other. Andrew Haapala started in 1906 with Haapala Hybrids which sold out to APCO in the mid 1970s. A grower and District Sale Manager with Haapala started Payco Seed Company. Payco grew and stopped using production from local farmers. Out of that move came Top Farm Hybrids and Terning Seeds. When Payco was acquired by another firm, one of the founders of Payco, started Linco Seed which turned into Heartland Hybrids and was recently sold to American Seed, a division of Monsanto.

4.12 Learning and Experience Effects

Learning-by-doing leads to improving customer experiences by understanding their needs. Learning by doing gives added experience in distribution that can increase a firm's efficiency. Learning by managing inventory can lead to producing the right blend of safety stocks and stock keeping units, as well as, correctly handling units to minimize seed becoming obsolete. The continued learning and experience can lower costs through more efficient and effective use of skills, as Arie de Geus stated, "the ability to learn faster than your competition maybe the only sustainable competitive advantage."

4.13 Capacity Utilization

Capacity utilization applies to the production and processing of seed products. At this time, CSC is not planning on this activity. Further evaluation of capacity utilization would be needed if CSC would integrate backwards into the industry.

4.14 Ease of Entry and Exit

Depending on the degree of integration, the ease of entry or exit is higher the more vertically integrated the company. The lowest barrier is for firms that are reselling purchased seed under their own brand. Brand marketing, production and processing are the

next level of entry barrier. The barrier becomes increasingly higher as more specific assets are required to produce and process seed. Plant breeding, processing, production, and brand sales have infrastructure complexity and asset specificity that make barriers even higher. Biotech research, regulatory challenges of a global perspective, patent pending, licensing, and marketing biotech products along with the complex structure of the industry have very high barriers of entry and exit.

4.15 The Cost of the Seed Corn Product

According to Jorge Fernandez-Cornejo, the cost of seed corn prior to the biotech era includes the research and development, production, and marketing and distribution. Research cost depends on the size of program and the type of seed. Investment in corn variety research has been extensive because of the potential return on investment, while wheat research is done by public sector, because the return on wheat genetics is lower. Corn production cost represents approximately 25 percent of retail prices. Production cost includes seed conditioning and treatment at the rate of 15 percent of retail price. Finally, marketing and distribution costs are around 20 percent of the retail price, and this includes advertising, promotion and distribution with transportation, communications, and storage and interest costs. The addition of biotechnology trait license fees results in a pass-through expense, while the other costs remain unchanged (see tables 4.12 through 4.15).

Table 4.12 Cost Prior to Biotech Corn Products

	Percent	Cost per Unit
Retail Price		\$ 90.00
Research and Development	12%	\$ 10.80
Seed Production	25%	\$ 22.50
Seed Conditioning	15%	\$ 13.50
Marketing & Distribution	20%	\$ 18.00
Overhead and Personnel	13%	\$ 11.70
Above- Average Profits	15%	\$ 13.50
Total	100%	\$ 90.00

Source for Table 4.12 to 4.15; Jorge Fernandez-Cornejo; cost were found in “The Seed Industry in U.S. Agricultural, An Exploration of Data and Information on Crop Seed Markets, Regulation, Industry Structure, and Research and Development.

Table 4.13 Cost of Corn with Roundup Ready® Trait

	Percent	Cost per Unit
Retail Price		\$ 114.00
Research and Development	9%	\$ 10.80
Biotech Traits	21%	\$ 24.05
Seed Production	20%	\$ 22.50
Seed Conditioning	12%	\$ 13.50
Marketing & Distribution	16%	\$ 18.00
Overhead and Personnel	7%	\$ 8.09
Above- Average Profits	15%	\$ 17.10
Total	100%	\$ 114.05

Table 4.14 Cost of Seed Corn with YieldGard® Corn Borer and Roundup Ready® Traits

	Percent	Cost per Unit
Retail Price		\$ 142.00
Research and Development	8%	\$ 10.80
Biotech Traits	35%	\$ 49.70
Seed Production	16%	\$ 22.50
Seed Conditioning	10%	\$ 13.50
Marketing & Distribution	13%	\$ 18.00
Overhead and Personnel	4%	\$ 6.25
Above- Average Profits	15%	\$ 21.30
Total	100%	\$ 142.05

Table 4.15 Cost of Seed Corn with YieldGard® Plus; Corn Borer, Roundup Ready and Corn Root Worm Traits

	Percent	Cost per Unit
Retail Price		\$ 187.00
Research and Development	6%	\$ 10.80
Biotech Traits	47%	\$ 86.96
Seed Production	12%	\$ 22.50
Seed Conditioning	7%	\$ 13.50
Marketing & Distribution	10%	\$ 18.00
Overhead and Personnel	4%	\$ 6.55
Above- Average Profits	15%	\$ 28.05
Total	100%	\$ 186.35

4.16 Industry Profitability

Of the four major seed companies, only Monsanto is focused in the seed industry.

DuPont/Pioneer, Dow AgroScience, and Syngenta have other business segments that

contribute to their financial performance and in most cases the seed business is not the major enterprise in the company. There is more information on these companies in a later chapter. Regional seed companies' are not public corporations so their financial performance is not open to the public. My experience indicates the regional company may be willing to accept a lower return on investment if it meets the needs of other intangible, financial, and personal goals.

Table 4.16 Stock Price and P/E Ratio and Dividends

	Year Ago 4/29/06	Month 12/10/07	Difference Gain or Loss	P/E Ratio	Dividend Yield	Latest Dividend
Dow AgroScience	\$40.61	\$43.26	\$2.65	13.20	3.56%	\$0.42
DuPont/Pioneer	\$44.10	\$47.54	\$3.44	15.01	2.81%	\$0.37
Monsanto	\$83.40	\$98.29	\$14.89	35.83	.72%	\$0.125
Syngenta	\$27.78	\$50.3	\$22.52	40.96	.66%	\$0.262

Source: Website for each firm.

According to the October 2007 Seed World the annual sales needed to have critical mass and these numbers are based on assumptions of leaders in the seed industry.

Table 4.17 Sales for Critical Mass Needs

Segment	Sales to Critical Mass
Trait Providers	\$3 billion
Global Breeders	\$700 million
Regional Breeders	\$40 million
Distributors	\$18 million
Regional Retailers (multi-outlet)	\$10 million

Source: Robynne Anderson, Super Sized or Right Size? Seed World, October 2007

CHAPTER 5: FIVE COMPETITIVE FORCES

Michael Porter's five competitive forces are the underlying economic structure that yields the potential profit and long term return of invested capital for the firm. The interaction of these forces will lead to strategies designed by management to allow the firm to defend against or influence the industry to favor the CSC market position. We will evaluate strategies of other companies and seek out a competitive advantage for CSC in its proposed area of focus.

The five forces of competition include:

- Rivalry among competitors
- Substitute products
- Potential new entries into the industry
- Power of the Buyer
- Power of the Seller

5.1 Rivalry of Competitors

Rivalry has become much stronger as the firms try to gain or maintain their market share. Factors that lead to intense rivalry include: numerous competitors in the industry, slow growth in the industry, high fixed and/or storage costs, a perceived lack of switching costs, diverse competitors, and high exit barriers for some parts or activities of the vertical chain.

- Numerous competitors create rivalry. The industry has four major companies and approximately 265 regional-sized companies.

- The major companies are looking for growth of share in the market and that creates rivalry within the industry. The majors are growing their national brands and acquiring regional companies as part of their strategy.
- Regional companies have generally acted more courteous toward other regional companies prior to biotechnology. Now, in order to maintain one's market share and competitive advantage, rivalry has become more intense.
- Industry life cycle is mature where the sales are based on the planting decisions of the farmer. The farmers planting decision is based more on the price per bushel offered per commodity as compared to other factors. In 2005, approximately 81 million acres of corn were planted in the U.S. In 2006, corn planted acres were closer to 78.9 acres. The year 2007 saw 90.2 million acres planted to corn, but when corn increases, soybean acres usually decrease. In the past, the planted acres stay relatively close to the numbers listed above. To grow, a firm must take sales and market share away from another company instead of adding new customers to the industry.
- High fixed and/or storage costs create rivalry action. Fixed production and storage costs provide competitive advantages when a firm has low cost of production and the right blend of percentage of stocks keeping units and a high market share.
 - High fixed costs of processing facilities are specific assets: they grade, size, treat and package seed corn or soybean seed. When close to full capacity the firm has the opportunity of lowering their costs. In order to keep a lower cost, a company needs to sell off a high percent of SKU's in order to make use of the turn-around of assets.
 - The projection plan of production is to have 130 percent for safety stock and stock keeping units; this is needed in order to satisfy customer demand. Seed products are produced in the summer for the following spring seeding. The life cycle of a genetic product is three to five years. Finding the right

balance of the supplies produced with the demand of customer's need is challenging for all companies. When stocks are higher, companies in the industry may decide to sell off those Stock keeping units by the lowering of prices and rivalry actions follow.

- High stock keeping units use more capital and lower a company's use of capital for other important functions; from a rivalry point of view, firms need to turn over inventory which maximizes capital usage.
- Another factor is that the seed may or may not maintain the quality of germination as the unit is held over. When the unit loses germ, it is thrown away and unit costs go up. Selling the seed before it loses quality, even at a reduced amount, may reduce prices and create a rivalry within the industry.
- There are no switching costs; a seed product from one company can easily replace the seed from another company.
- Diversity of competitors: Each firm approaches the industry differently based on their strategies, origins and personalities.
 - Monsanto is an agricultural company. Their aggressive company personality helped them obtain a leadership position in the industry. They were the leader in bringing biotechnology to the market place, first with the Roundup Ready® soybeans. Being a leader has given Monsanto the opportunity to gain market share. Acquisition of Dekalb/Asgrow and the development of American Seed have given Monsanto the marketing, sales, and logistic activities to provide their products to customers effectively and efficiently. The purchase of Holden's Foundation Company has given Monsanto a great wealth of corn genetics to choose from.
 - Syngenta, a European owned company, is said to take a slightly slower approach to the development and marketing of any new technology. This

nature has put them into a follower position. Their strategy is to provide an alternative technology product to the market, and then indicate that their service and product is friendlier and provides more choices for the customer.

- DuPont/Pioneer has been a great competitor in genetics and service. Biotechnology development has been its Achilles heel. DuPont/Pioneer's share of the seed corn market has fallen from 45.6 percent in 1995 to 30.5 percent in 2005, and 25 percent in 2007. Biotechnology has made the difference. DuPont/Pioneer accesses traits through Monsanto and Dow AgroScience. Although they lost the number one position in the market, they are working at regaining their momentum; they recently invested \$100 million dollars in plant breeding. Also, DuPont/Pioneer has the highest seed prices, which is based on past performance history of Pioneer seeds. In the new environment of biotechnology traits, DuPont/Pioneer has lost market share with their high priced seeds.
- Dow AgroScience participates in the market as a trait supplier and retail sales under the trade name of Mycogen. Their technology in corn protection from corn borer and rootworm is known by their Herculex trade name. According to a former Mycogen employee, Dow always' seems to be wandering around and then all of the sudden finds a place to exist within the market place. They recently signed an agreement with Monsanto to combine traits and cross license genetics, a potential advantage for both companies.
- A minor player in the seed industry is Bayer Crop Science; their version is an herbicide tolerant seed plant that uses using Liberty® herbicide. It was the second herbicide tolerant product launched after Roundup Ready®. Low market share saturation in corn of Liberty Link® left Bayer to concentrate on other business segments and crop opportunities. Their

market share in global cotton is 16 percent and in canola/rapeseed is 19 percent. Although Bayer does not sell corn or soybean seed, they are important to note within the diversity of competitors because of the ownership of the Liberty Link® technology, which is licensed to the major and seed regional companies.

- BASF has an agricultural product division that employs 600 people in plant biotechnology. They have a stake in the market, although their presence in the seed industry is based on genetics to the wholesale market (Thurston Genetics) and development of biotech traits.
- Regional seed company owner-operators add a lot of diversity to the industry. Often these independent business people are creative and dedicated seeds-men that have spent a lifetime of involvement in the industry. They value personal relationships with their customers, they excel at product selection and development and implementation of services that meet the need of their customers. Often they become a local well known personality. They add a dimension of lowering price by the maintaining their independence and not always expecting normal or industry rates of return on their investment.
- High exit barriers exist for much of the value chain.
 - Specialized assets of proprietary technology, genetics, production facilities and carryover stocks are most useful in the seed industry, but not necessarily useful in any other industry. The fixed cost of labor agreement, technology agreements, and inventory can create high exit barriers.
 - Another barrier to exiting the industry is strategic interrelationships, where vertical integration of a company depends on each division to succeed (such as a seed division, herbicide division, and pesticide division) by working

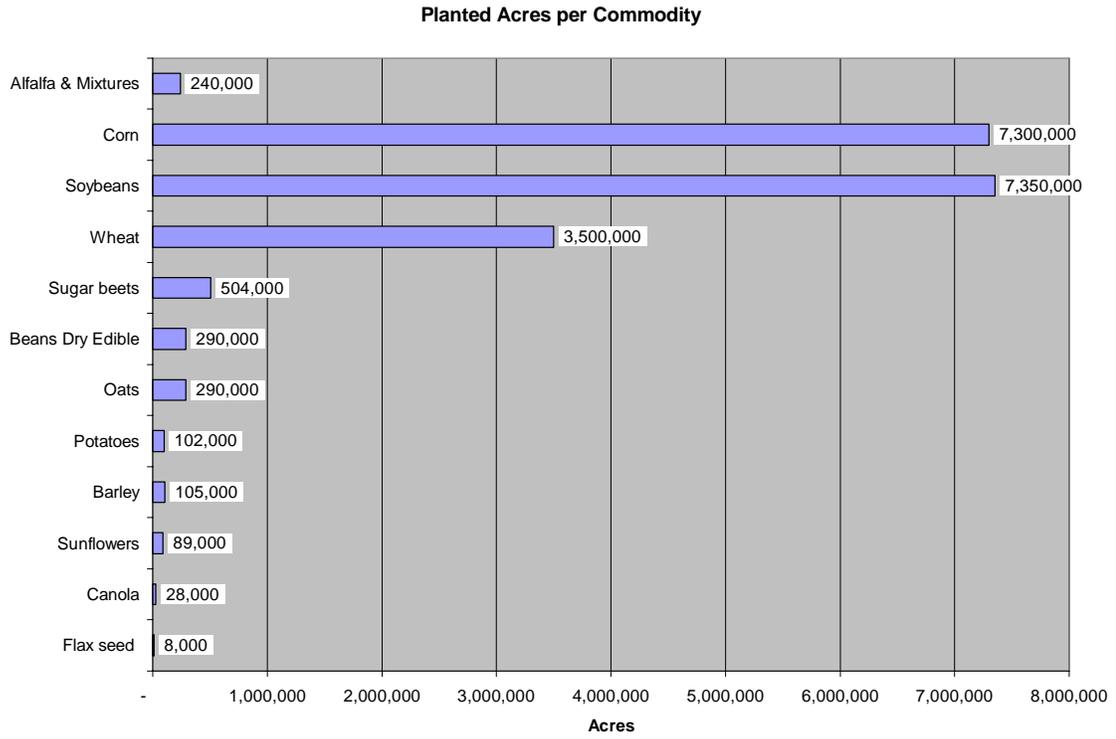
together to provide a bundled technology and genetic product to the market. When one division fails, it compromises the success of the other divisions.

- Many owners experience an emotional tie in loyalty to employees and customers, as well as pride of ownership. The identity of ownership can be a difficult emotional barrier to overcome.

5.2 Substitute Products

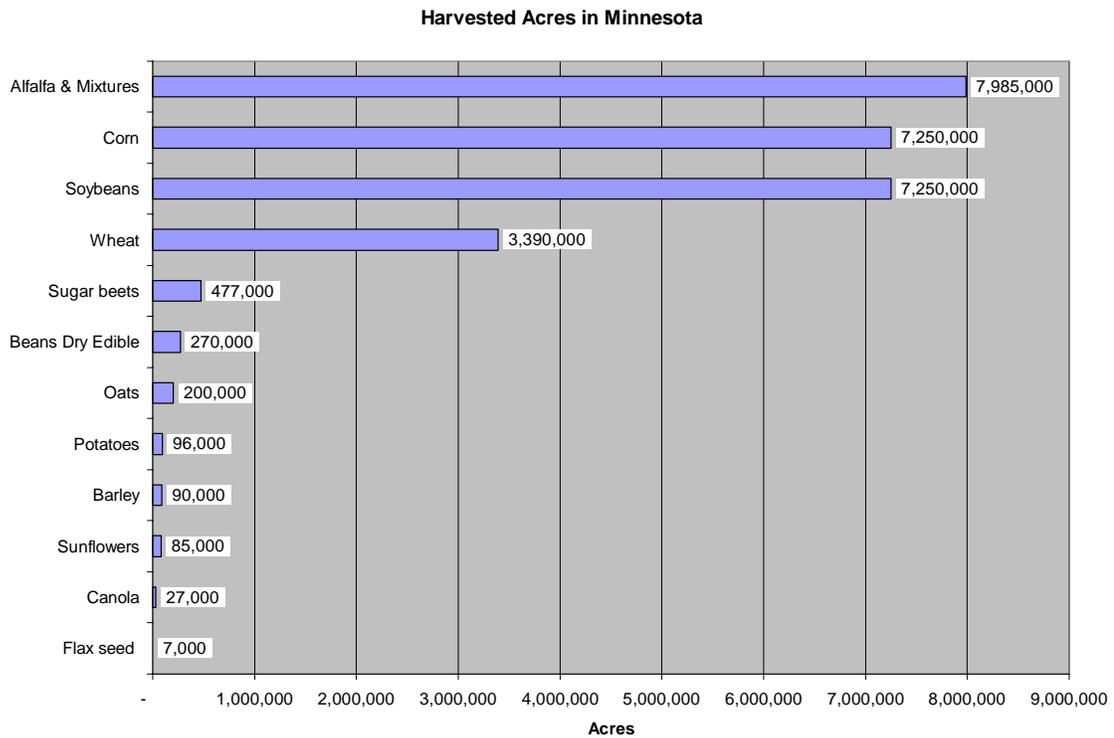
In Minnesota, a corn, soybean rotation based on 50 percent corn and 50 percent soybeans is standard, except for wheat to the north and sugar beets to the north and southwest. The base is altered if a farmer grows alfalfa for his/her livestock. Changes in base acres are affected by supply and demand of the respective commodity. In 2006, 7,700,000 acres of corn were planted and 6,900,000 acres of soybeans. In 2007, corn acres were up by 10 percent due to a growing export market and demand for corn by ethanol plants. Soybeans were down about 10 percent as a result of corn demand and excessive soybean carryover from the previous year. The risk of losing acres to a real substitute product is very low.

Figure 5.1 Planted Substitute Products in Minnesota



Source: USDA, NASS, Minnesota State Agricultural Overview - 2006

Figure 5.2 Harvested Substitute Products in Minnesota



Source: USDA, NASS, Minnesota State Agricultural Overview - 2006

5.3 New Competitors and the Potential Barriers to Entry into the Seed Industry

Possible barriers to entry are economies of scale, product differentiation, capital requirements, switching costs, access to distribution channels, cost disadvantage independent of scale, and government policy. Other concerns include the potentially aggressive offensive moves of existing competitors which include lawsuits over biotechnology, intellectual property rights and plant protection patents, aggressive advertising campaigns, and dealing with customer preference and loyalty to an existing company.

In a mature industry, a seed company that desires full integration would have extremely high barriers of entry. Vertically integration might produce high profit, but the risks

associated are also high. Monsanto, being first to the market with biotech traits, captured market share and high profits. Monsanto leveraged that leadership position by acquiring DeKalb, Asgrow, Holden’s Foundation Co, and 24 regional seed companies. Monsanto expects that position of leverage in products and distribution to propel it to greater market share. Roundup Ready® soybean trait fees was the “cash cow” that provided them with the financial resources to acquire the other firms. The result is that all other highly vertically integrated seed companies have lost market share.

Table 5.1 Monsanto Roundup Ready® Soybean Trait Fee for U.S Market

Planted Acres	Units	Roundup Ready market share usage	Trait Fee	Total Roundup Ready Trait Fee
74,000,000	74,000,000	88%	\$13.95	\$908,424,000

Source: Planted Acres and market share from USDA, units and fee are assumptions based on industry information.

So, what are the barriers to entry that CSC faces today? CSC will probably face a lack of economies of scale until they build market share high enough to gain a cost advantage.

CSC product cost per unit is made up of biotech fees, genetics cost of product and royalties.

Technology licenses from AgroScience , Monsanto, Syngenta, and Bayer can be a barrier if the suppliers do not grant a license. Syngenta’s cost per trait per unit is found in Table 5.2.

Technology fees apply for each unit sold. Information on Dow AgroScience trait fees is similar but gives volume incentives, a cost advantage to large market share holders over mid to small regional companies.

Table 5.2 AgriSure Trait Fees

2007	AgriSure CB	AgriSure GT	AgriSure GT/CB
AgriSure Trait Fee	\$25.00	\$27.00	\$52.00
Advantage Rewards (grower and reporting rewards)	-\$12.00	-\$6.00	-\$25.00
Net Due	\$13.00	\$21.00	\$27.00

Source: Conversations with industry professionals.

CSC will purchase genetics products through the wholesale market. Average purchase price of genetics products are between \$34.00 and \$40.00 dollars per unit. Large volume purchases can reduce the cost up to \$6.00 per unit. CSC will probably not qualify for discounted costs, due to low volume. Another part of seed unit cost is genetic royalties (Table 5.3).

Table 5.3 Syngenta Royalty per Unit Cost

	Base x Two	Syngenta Trait	Non-Syngenta	Total Royalty
Conventional	\$ 4.00	\$		\$ 8.00
Liberty Link	\$ 4.00	\$ 5.00		\$ 9.00
AgriSure CB or GT	\$ 4.00	\$ 6.00		\$ 10.00
A non-Syngenta	\$ 4.00	\$ 4.00	\$ 5.00	\$ 13.00

Source: Conversations with industry professionals.

Products are made up of biotechnology traits and traditional genetics. Trait and genetic products require licenses to market the product. Can CSC obtain the right licenses for the right products for their geographic area? If they can, is there product differentiation? Monsanto licenses their traits to many seed companies. New entrants need enough volume or a personal connection to obtain the license from Monsanto. Roundup Ready® and

YieldGard® traits are leading the market Monsanto can be very selective when choosing who to license. Monsanto owns Holden Foundation Company that provides genetics to the market place through the wholesale market. A license is required to purchase and sell those hybrids.

Syngenta licenses their technology traits to others in the same manner as Monsanto. Recently Syngenta formed Greenleaf Genetics, which offers Syngenta genetics and traits to the market place. DuPont/Pioneer recently acquired a 50 percent share of Greenleaf and is offering those genetics to the wholes market. Due to shrinking market share, Syngenta is more open to signing an agreement with new entrants to the industry.

Dow AgroScience licenses its traits to many other seed companies, and also cross licenses with Monsanto to make available traits of both companies. Dow AgroScience recently agreement with Monsanto to cross license traits will form the first eight trait stack as found on Dow AgroScience website.

Bayer Crop Science Liberty Link® license restriction is the firm must sell over 500 units of a Liberty Link corn product. They broadly license the trait and require no fee. Their pricing strategy is based on the sale of the patent protected herbicide product.

CSC product cost per unit is made up of biotech fees, genetics cost of product, and royalties. Technology licenses from Dow AgroScience, Monsanto, Syngenta and Bayer can be a barrier if the suppliers do not grant a license.

Table 5.4 Ownership of Genetic Suppliers

Ownership	Genetic Suppliers
Monsanto	Holden's Foundation Company
Syngenta & DuPont/Pioneer	Greenleaf Genetics, a 50 % split
Private	Seed Genetic, Inc.
BASF	Thruston Genetics, In.
Private	Mike Brayton Seed (MBS)

The listing of trait ownership of the four main biotechnology providers is shown in table 5.5 below.

Table 5.5 Technology Ownership

Companies	Monsanto	Syngenta	Dow AgroScience	Bayer
Herbicides	Roundup Ready/NK 603	Roundup Ready/GA21		Liberty/TC25
Corn Borer	YieldGard/Mon810	YieldGard/Bt11	Herculex 1.1	
Corn Root Worm	CRW	Agrisure CRW MIR 604	Herculex Xtra	
Stacked	YG/RR CRW/RR YG/CRW/RR VT3	YG/Bt11/Liberty YG/Bt11/LL/RR	Hx 1.1/Liberty	

Source: Conversation with industry professionals.

Corn and soybean products in a highly vertically integrated company have exclusive or proprietary products. Corn and soybean products offered by CSC may include products that are totally different, the same as, or a close family member to or just slightly different than the competitor's corn and soybean product.

The capital required to start CSC would have to be discovered in the financial analysis section that will come after the market study.

There is no inerrant cost of switching products in the seed industry. Seed products can be switched easily from one planter to the next. This would not be a barrier of entry for the seed industry.

The two most common retail channels of distribution are in combination of a company's direct sale to customers, and by setting up farmer to be reselling dealers, or reselling through a retail supply store. Direct selling and managing a dealer force would need to be developed or to find a district sales manager that has a loyal following of customers. My observation is that about 50 percent of the customer base follows the DSM and on the strength of the DSM or lack of service by the company, that percentage can be higher. Retail supply stores provide great access to the customer due to location and the bundling of other input products being sold and the service they provide. Large companies have

used this system to access customers, and new entries would have to compete for shelf space.

CSC would face a major cost disadvantage with the proprietary products of biotechnology, which is owned by Monsanto, Dow AgroScience, and Syngenta. The cost of Syngenta traits as seen in Table 5.2 creates a cost disadvantage due to the trait fee that applies to each unit sold.

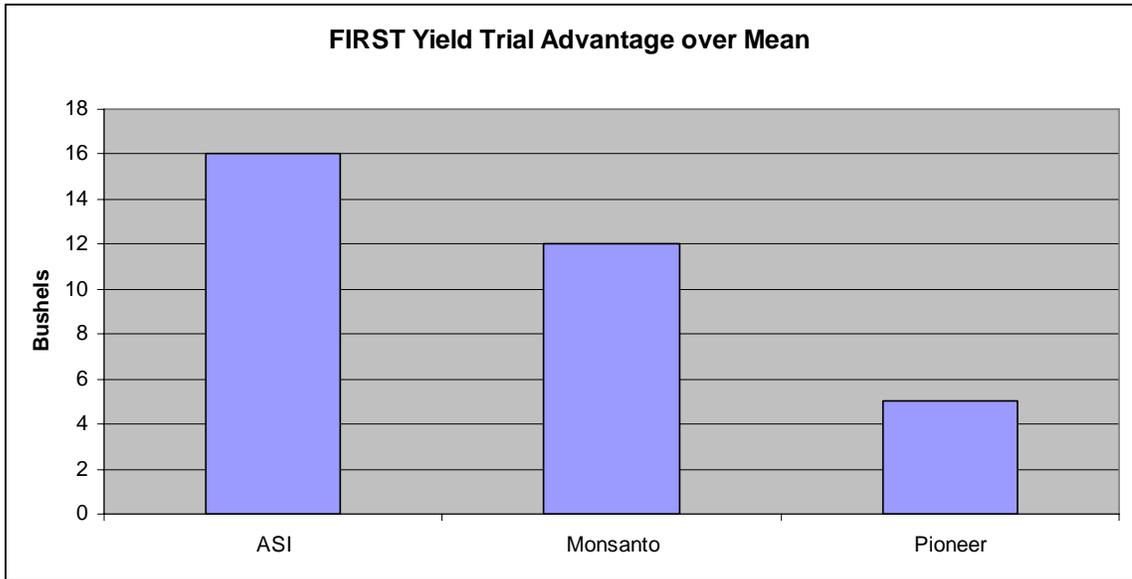
Government policy issues are a minor concern for CSC. Changes in the Farm Bill could add planted acres in the U.S. if CRP ground is released. Other issues are if compliance of the refuge program is not met, biotech traits may become unapproved and taken off the market. Biotech products must meet approval by the USDA in order to be marketed in the United States and other consuming nations.

Due to intellectual property rights and plant protection patent products, and traits are protected for the originating firm. These firms can select who they are willing to work with, usually economies of scale plays a part of the decisions in these cases

5.4 Power of the Buyer

Seed buyers are price sensitive. They expect seed products to have great yield potential and that a seed company's service is relevant to their needs. The combination of price, product, and service constitutes value to the customer. Pioneer has positioned themselves as the leader in all three categories of value, yet the market share shift indicates that value is not being received by buyers of Pioneer, and growers are purchasing more Dekalb/Asgrow and regional companies product based on performance and/or pricing. A Merrill Lynch company update document shows the differences in product performance of Dekalb and ASI companies compared to Pioneer and Syngenta (table 5.3).

Figure 5.3 Yield Differences that have led to changing market share



Source: Don Carson, Field Trials Highlight Monsanto's Yield Advantage. In a Merrill Lynch Industry Overview on November 2, 2007

Syngenta's slide in market share indicates that their value proposition of retail price, product performance and service doesn't match the perceived value that of Dekalb/Asgrow or regional companies. Dow AgroScience small market share does give indication of how their value is perceived.

The seed buyer has three components to consider: yield, costs, and price of the commodity. The seed product is one of the major production costs, along with land, machinery, and fertilizer costs. Genetics and biotech traits have increased corn and soybean yields. Costs have also risen. The price of the commodity becomes a significant factor in buyer's price sensitivity for input costs. When there is low commodity prices, farmers are more price sensitive than when price of commodities are higher. Seed and chemical costs rose 8 percent from 2000 to 2005 while yields were up 9 percent.

Table 5.6 Yield Performance and Seed Cost for Corn of 2000 to 2005

	2000	2001	2002	2003	2004	2005
Yield per acre	148	151	142	157	178	161
Price per bushel	\$1.75	\$1.80	\$2.30	\$2.10	\$2.10	\$1.77
Gross Volume per acre	\$259.36	\$273.17	\$327.93	\$331.06	\$376.17	\$286.30
Seed Cost per acre	\$30.64	\$33.00	\$31.60	\$34.89	\$37.05	\$39.72
Chemical cost per acre	\$30.51	\$26.67	\$26.22	\$26.50	\$27.11	\$27.18
Total Seed and Chemical cost per acre	\$61.15	\$59.67	\$57.82	\$61.39	\$64.16	\$66.90

Soybean yields have increased about 8 percent from 2000 to 2005 and seed and chemical cost has risen 12 percent. There is more price sensitivity when price per bushel is lower than when price is higher.

Table 5.7 Yield Performance and Seed Cost for Soybeans of 2000 to 2005

	2000	2001	2002	2003	2004	2005
Yield per acre	45	46	44	36	49	49
Price per bushel	\$4.44	\$4.16	\$5.23	\$6.57	\$5.58	\$5.70
Gross Volume per acre	\$199.80	\$189.78	\$228.34	\$237.02	\$272.08	\$282.09
Seed Cost per acre	\$18.30	\$21.72	\$23.01	\$27.78	\$29.56	\$32.50
Chemical cost per acre	\$22.58	\$22.82	\$22.73	\$17.40	\$16.61	\$14.00
Total Seed and Chemical cost per acre	\$40.88	\$44.54	\$45.74	\$45.18	\$46.17	\$46.50

Source for Table 5.6 and 5.7 is www.nass.usda.gov/Statistics_by_State/Minnesota

One reason farmers may lack power is due to the high financial requirements, skill level, and the agreements/connections needed to backward integration into the seed industry.

5.5 Power of the Seller

There are three segments of sellers within in the seed industry; biotech traits suppliers, genetic suppliers, and companies that provide seed product to the farmer. The most powerful seller is the trait supplier. Monsanto, Syngenta, and Dow AgroScience are trait suppliers. Roundup Ready® soybeans and corn, along with Liberty Link® corn is herbicide tolerant seed products that provides crop safety and a greater window of application which allows farmers a management tool that can grow there business with economies of scale. Corn borer and corn root worm resistance traits are substitutes to insecticides, traits are easier to use and more effective in performance.

Table 5.8 Cost of Traits verse Insecticide per Acre

Biotech Treatment	Price per Acre	Insecticide Treatment	Price per Acre
Roundup Ready®	\$10.80	Lower chemical cost	
Corn borer	\$10.00	One pass	\$16.00
Corn root worm	\$18.00	Regent®	\$16.00
Triple Stack	\$38.80	All of the above	\$32.00

Source: Based on personal experience and the writers assumptions of cost per acre for both biotech and insecticide.

Genetic supplier's power is not as great due to more competition in supplying genetics to the industry. Table 5.4 shows genetic suppliers; most genetic firms are open to work with seed companies through a licensing agreement. Holden's Foundation Company is the most restrictive in setting up new license agreements with others; as it stands now Holden's works with Dekalb/Asgrow, American Seed and regional companies called seed partners.

Companies that provide seed products to farmers have the least power among the sellers. They access traits and genetics from more powerful sellers than themselves and the buyer is price sensitive as they seek to balance product performance with price. There is a need by the farmer to have seed for planting and this gives the seller power, there is no substitute

product to replace seed. Government patent rights benefit the seller by protecting or restricting the use of homegrown seed from being planted and harvested.

Monsanto’s products have achieved market penetration with Roundup Ready® soybeans at 88 percent and YieldGard® corn borer and corn root worm traits. Does their seller power allow them to affect a higher industry retail price, lower their supply costs through economies of scale and thereby undermine their competition? Do they have market power?

In conclusion to Chapter 5, an ideal environment of the industry is that the buyers and suppliers are weak, there are no good substitutes, entry barriers are relatively high and there is only moderate rivalry among competitors. The seed industry shows buyer and supplier strength, no good substitutes, with entry costs varying according to vertical integration and intense rivalry for market share.

Table 5.9 Five Forces of an Ideal Environment and Seed Industry

Five Forces	Ideal Environment	Seed Industry
Rivalry	Moderate	Strong
Substitutes	None	None
New Competitors	Entry barriers are high	Deferring degrees of entry barriers depending on vertical integration
Buyer Power	Weak	Strong
Seller Power	Weak	Strong

Source: Thompson and Strickland.

CHAPTER 6: WHAT IS CAUSING THE INDUSTRY TO CHANGE?

Four driving forces in the seed industry produce a change in the competitive structure and business environment; long-term growth rate, product innovation, distribution changes, and entry or exist of major firms into the seed industry.

6.1 Lack of Long Term Growth Rate

Because the seed industry is mature, there is intense positioning among firms for maintaining or gaining market share, especially since the time of introduction of biotechnology trait products.

6.2 Product Innovation

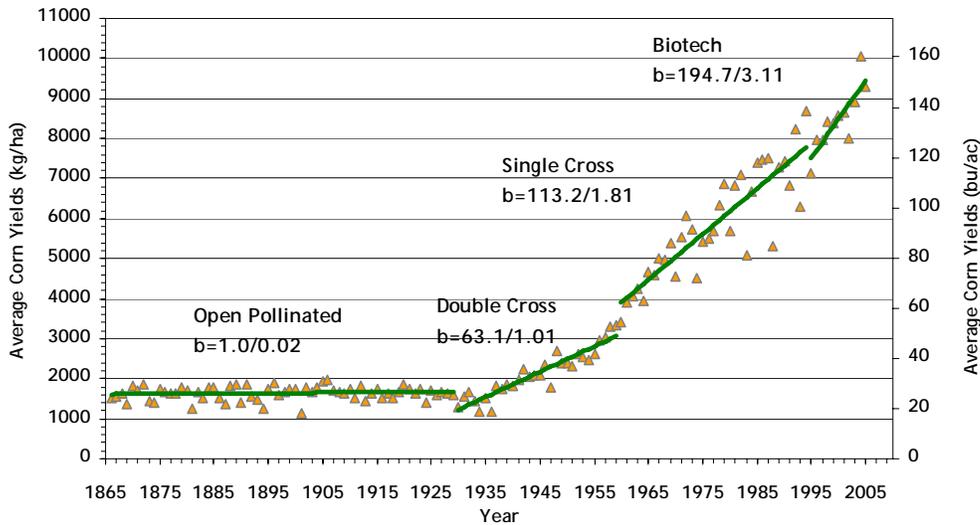
Genetic product comes from plant breeding. According to Kenneth Frey of Iowa State University in 1995 prior to the advent of biotechnology, there were 545 breeders for field corn in the public sector and private industry. Soybeans had 156 breeders. Private industry spent \$338 million while the public sector spent \$213 million.

Table 6.1 1996 and 2006 Seed Research and Development

Company	Research and Development	Annual Revenue	R & D share of Revenue
Syngenta 1996	\$122	\$970	12.6%
2006	\$232	\$1,743	13.3%
DuPont/Pioneer 1996	\$133	\$1,600	8.3%
	\$567	\$6,008	9.4%
Monsanto (1996)	\$41	\$387	10.6%
2006	\$1,021	\$7,294	14%

Source: Jorge Fernandez-Cornejo, The Seed Industry in U.S. Agricultural, An Exploration of Data and Information on Crop Seed Markets, Regulation, Industry Structure, and Research and Development. www.ers.usda.gov. And 2006 Financials of each firm.

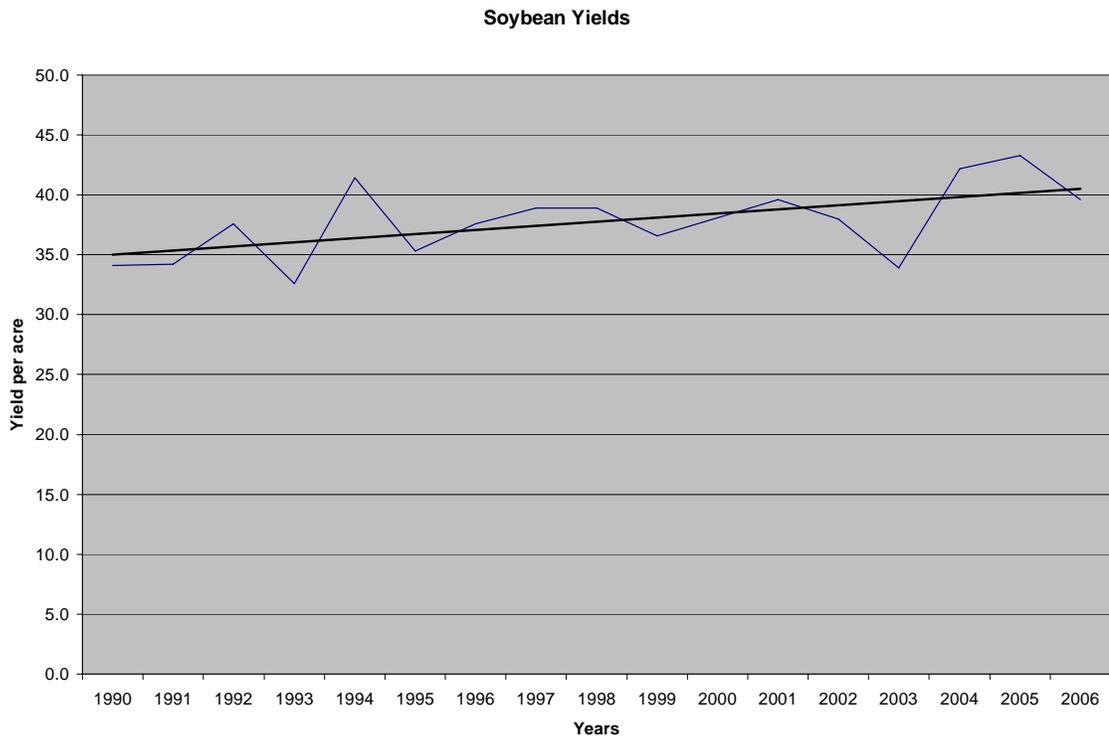
Figure 6.1 Gains Made in Corn Yields per Acre
Actual Breeding Plus Cultural Practice Gain



Source of information: Crop Science. Reference # 46-528-543. March 2006

Traditional corn plant breeding takes seven generation of crossing phenotypic selection to create a 99.2 percent pure inbred. From there, new germ-plasm was crossed to another inbred in order to make a commercial product. Today with Double Haploid method of crossing, inbreds are 100 percent pure in two generations. Along with maker-assisted selection, germ-plasm to products is further accelerated. Another stage of research and development is genomics technology assisted selection which takes germ-plasm to finished product. These methods speed genetic performance improvements for farmers. Due to the learning curve of the industry most of the major genetics firms have developed this type of breeding program. Don Carlson of Merrill Lynch states, “As Monsanto ramps up its molecular breeding capabilities in soybeans and Pioneer in corn, we expect these performance gaps to eventually narrow. Smaller independent seed companies with limited R & D budgets will in our view continue to lose share.”

Figure 6.2 Soybeans Yields per Acre



Source: www.nass.usda.gov

Table 5.5 explains the ownership of traits that are substitute for insecticides and tolerance to herbicides, these traits combined with the right genetics have provides farmers with seed products that have increased yields by reducing stress of disease, insect damage, and safety of herbicide applications. Market share for corn traits have increased from 44 to 73 percent (Table 4.10) and soybeans traits have increased 71 to 88 percent (Table 4.9). Trait acceptance has shown value to the farmer. The pipeline of new traits coming in the next years will continue to differentiate products in the future.

Table 6.2 Trait Pipeline for the Near Future

Input Traits	Monsanto	Syngenta	DuPont/Pioneer
Herbicide Tolerance	2 nd generation of herbicide tolerance	Optimum GAT™	Optimum GAT™ and Triple-Mod Herbicide Tolerance
Insect Resistance	2 nd generation of Insect resistance		
Disease Resistance			Anthracoese Stalk Rot
Other	Higher Yield Drought Tolerance	GT/CRW/ECB	
Output Traits			
Feed	High value with lysine		Improved Feed II
Bio-Based Fuels		Corn amylase	

Source: Each firms website.

For regional brands, product differentiation can be more apparent than real. The wholesale market provides a wide range of genetic products for regional companies to select from. Products may be all together different genetic package, a sister inbred line or the same genetic package as another firm in the industry. So, differentiating products is based on branding of product and service that creates value to the farmer and build brand image for the company.

Performance of products have become more consistent and higher yielding, even to the satisfaction of the Federal Crop Insurance Industry, who has accepted the performance data from Monsanto and are going to reduce premiums for farmers who use 75 to 80 percent seed from genetic and triple stack traits by Monsanto.

6.3 Process or Distribution Innovation

Two changes were happening in the agricultural industry as biotech was being accepted. Farmers who adopted biotech were able to grow in size due to the convenience of trait products. As farmers became bigger they demand more agronomic service from their seed suppliers. The distribution channels is the lifeline to the customer, and the company who owns the best system is growing market share and controlling delivery of traits to the market. As an example of this, Dow AgroScience recently signed an agreement with Monsanto to combine the traits of the two companies in order to offer the first eight stack trait product. At 3% of corn market share Dow opened their traits to a greater share of the market than when they were working with DuPont/Pioneer.

Monsanto has acquired multiple distribution channels. Their national brand of Dekalb/Asgrow distribute products by branding and promotion through fertilizer coops throughout the nation. They also have some dealer presence for their retail brand. A division of Monsanto is American Seed which was developed to acquire regional companies; there are 24 companies to date. Their sales are to become the relational marketing approach with sales people using high-touch persuasion and consultations to build relations. Monsanto also sells genetics through Holden's Foundation Company, and licenses their traits to numerous seed companies.

In response or at the same time, Syngenta acquired Golden Harvest and Garst; 4 and 4.5 percent market share respectively. Insiders in the industry felt that the purchase was more for their genetic breeding programs than market share, an effort to develop a higher performing product. In 2006, they reconfigured their distribution with NK being their national brand sold at cooperatives, Garst being a direct sale model with company sales persons and Golden Harvest managing a farmer-dealer network system. Their next distribution was in the wholesale market with Greenleaf Genetics. They license their traits to multiple firms as well.

DuPont/Pioneer was a heavy user of the farmer dealer until farmers started to demand greater service. They responded by placing a more professional force in the market, fewer

and farther apart. After Greenleaf Genetics was a year old, Pioneer acquired a 50% share of the company. This represents the first time Pioneer genetics would be available in the wholesale market.

Regional firms' distribution, for the most part, is based on relationship selling where long term customer relationships are built through personal contact.

6.4 Entry and or Exit of Major Firms

Since 1996 there have been numerous acquisitions in the seed industry. Positioning for leadership in traits and genetics has caused changes in market share. Monsanto has become the share leader in both genetics and traits; Monsanto's acquisitions gave it access to genetics, traits and distribution. The acquisition strategy has strengthened Monsanto's market position.

DuPont's acquisition of Pioneer does not look like it has paid off at this time. They lack true ownership of a proprietary trait and their genetics performance of late has caused them to lose market share. Their earning and EBIT for the agricultural segment still supports them being in the industry, but further erosion of market share may cause DuPont to reconsider its purchase.

Syngenta in an offensive move acquired Garst and Golden Harvest for market share and their genetic breeding programs. To date the acquisition has not resulted in a gain in market share.

Dow AgroScience is second in trait leadership with their Herculex I brand and have three percent of the corn market share. They recently signed an agreement with Monsanto to combine traits and to exchange germplasm. Their earning and EBIT seems to support their involvement in the industry, but with 3 percent of the market, do they have enough share to with stand stress?

Table 6.3 Entry of Major Firms into the Seed Industry

Company	Companies Acquired (Year)	Purchase Price
Syngenta	Golden Harvest (2004)	\$180 million
	Garst (2004)	\$EUR239 million
DuPont	Pioneer (1999)	\$9.4 billion
Monsanto	Asgrow (1997)	\$.22 billion
	Holden's Foundation Co. (1997)	\$1.2 billion
	Dekalb (1998)	\$3.7 billion

Source: For Syngenta, www.seedquest.com. and Jorge Fernandez-Cornejo, The Seed Industry in U.S. Agriculture, AIB Number 786.

CHAPTER 7: WHICH COMPANIES ARE IN THE STRONGEST AND WEAKEST POSITIONS?

In regards to the strongest and weakest position, I am using the ability of a company to have true product innovation and vertical integration that allows for process and distribution innovation. These two factors have led to positions of strength for Monsanto and apparent weakness to other major companies.

For purposes of strategic grouping in the seed industry and looking at product innovation and vertical integration, I would choose to map out technology leadership (products) and vertical integration (process) for this map that gives us a picture of what the industry looks like and how is competing for each of strategy grouping.

7.1 Strategic Group 1: Large Global Firms

Firms: BASF, Bayer Crop Science, Dow AgroScience, DuPont/Pioneer, Monsanto, and Syngenta

Technology and product leadership: This group has developed trait products that are in the market place. This group may or may not conduct corn and soybean breeding in order to bring forth seed products.

Degree of vertical integration: Research and development of biotechnology traits and breeding of plants. They produce and process their seed; they market through both their branded business and the wholesale market. They setup retail market sales along with maintaining a service component for the customer.

7.2 Strategic Group 2: Large Firms with Research/ Development and Production/Processing

Firms: Dairyland Seed, AgReliant Genetics, and Pannar Seed Company

Technology and product leadership: This group conducts corn and soybean breeding in order to bring forth seed products.

Degree of vertical integration: They have an emphasis on research of genetics, but may purchase some varieties on the wholesale market. They market both by retail and through system of wholesale of genetics, they produce and process their own seed, along with managing their own marketing and sales and service.

7.3 Strategic Group 3: Regional Firms with Production/Processing

Firms: Beck, Hogue Meyer, Producers, Anderson's, Brown's, Kaltenberg, Dahlco, Dallman, Johnson's and Renk's.

Technology and product leadership: This group will probably continue to access corn and soybean breeding stock from other breeder in order to bring forth seed products. They don't use resources to develop traits.

Degree of vertical integration: They may have genetics program, they have production and processing of seed, they have a retail marketing program that supports sales and service of their product lineup.

7.4 Strategic Group 4: Regional Firms with Full Service

Firms: Land o' Lakes (Croplan Genetics), Hefty

Technology and product leadership: This group will probably continues to access corn and soybean breeding stock from other breeders in order to bring forth seed products. They don't use resources to develop traits.

Degree of vertical integration: This group markets their own retail corn, soybeans and alfalfa along with being the distribution for many our brands. Their marketing and sales is complimented by bundling of other products, such as fertilizer and chemicals; that is carried out by many locations that service smaller localized areas.

7.5 Strategic Group 5: Regional Companies

Firms: AgVentures, Sabre, Mid-West Genetics, Albert Lea Seed House, Legend

Technology and product leadership: This group will probably continue to access corn and soybean breeding stock from other breeders in order to bring forth seed products. They don't use resources to develop traits.

Degree of vertical integration: Their focused activity is marketing and sales of their branded seed along with individual service they provide for their customers.

7.6 Strategic Group 6: Production/Processors

Firms: Remington and Gro-alliance

Technology and product leadership: This group will probably continue to access corn and soybean breeding stock from other breeders in order to bring forth seed products. They don't use resources to develop traits.

Degree of vertical integration: Their focused activity is on the production and processing of seed for others.

7.7 Strategic Group 7: Genetic Suppliers

Firms: Seed Genetics, Thurston Genetics, and MBS

Technology and product leadership: This group works with multiple breeders of corn and soybeans and then market genetics into the wholesale supply chain.

Degree of vertical integration: Supplier of genetics to the wholesale market.

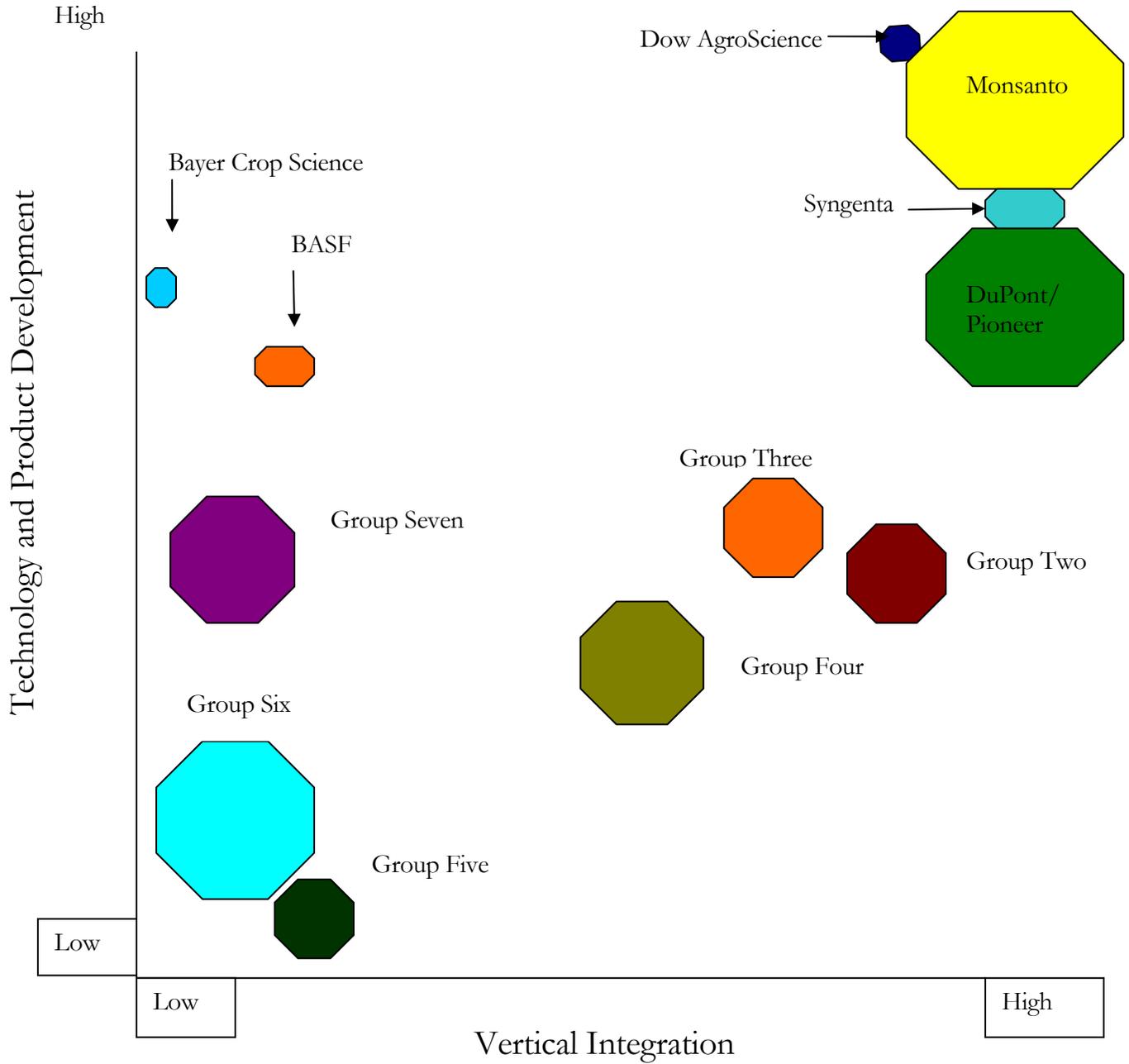
What can be learned from a strategic map of the seed industry has we place two key success factors and shows the strength of firms with biotech and genetic research and development programs. These firms become gatekeepers to the industry, because of the high usage by customers of biotech traits. Access to genetics that have high performance may also become an ever increasing concern as Holden's fills Monsanto seed needs first and Greenleaf Genetics takes care of Syngenta and Pioneers seed needs.

Sygenta's nine percent market share and Dow AgroScience three percent of market share are lower and does provide the industry with some competitive forces that may open opportunities for regional companies to have traits and genetics.

Regional firms will need to continue to find synergies and alliances with genetic and biotech trait suppliers as well as with production and processing firms. The development of a loyal customer base, in order to protect market share, will increasingly become critical to maintaining those alliances.

Medium size research and development firms may be challenged in maintaining quality of performance from their genetics as large programs increase genetic performance. Production and processing can survive with reasonable returns, but shifts in market share to large companies may pressure their capacity. Marketing companies will need to build a loyal customer base and differentiate themselves so to maintain a reasonable rate of return.

Figure 7.1 Strategic Map of the Seed Industry



CHAPTER 8: WHAT STRATEGIC MOVES ARE RIVALS LIKELY TO MAKE NEXT?

Trying to predict the moves of other companies is a challenging task, but necessary in understanding the industry as a whole. These potential moves may help us position our self to maximize opportunities that may become available.

This chapter will focus on BASF, Bayer CropScience, Dow AgroScience, DuPont/Pioneer, Monsanto and Syngenta. Also, one global company and one regional company will be analyzed for a strategic perspective.

The format is from Strategic Management by Thompson and Strickland, Table 3.3 entitled “Profiling the Objectives and Strategies of Competitors”.

8.1 BASF

BASF has a diverse mix of subsidiaries that include chemicals, polymers, automotive and industrial coatings, colorants, and agricultural products.

Competitive scope – BASF is a global company. Their sales of agricultural products for 2006 equaled EUR 3.1 billion and EBIT of EUR 460.

Figure 8.1 BASF Global Market

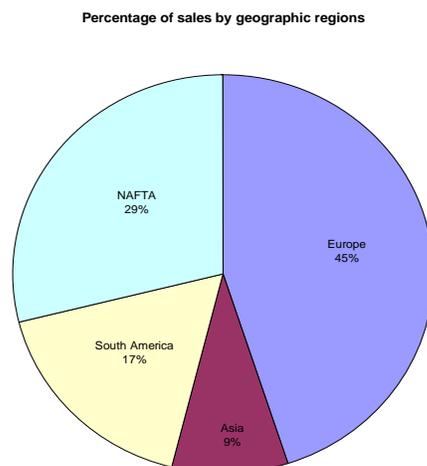
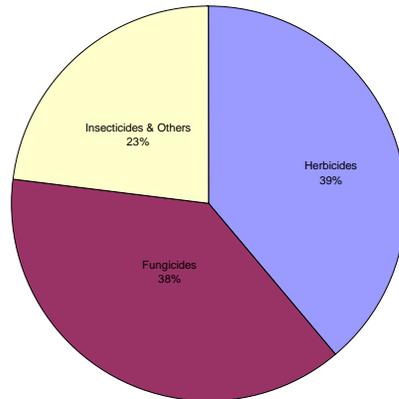


Figure 8.2 BASF Business Segments

Percentage attributed to business segments



Source: BASF website

Strategic intent - BASF intent to be a world leader in providing products that improve nutrition and quality of life through innovative products and has a strong research and development program. BASF announced on March 21, 2007, an agreement with Monsanto for a long range joint research and development and commercialization collaboration for biotechnology, using BASF strength in research and Monsanto's distribution channels.

Market share objective - Expand their share through innovative development of fungicides and insecticides. Maintain their seed presence.

Competitive position – Currently maintaining agricultural research and finding distribution for potential products.

Strategic posture – BASF is offensive in their approach based on expenditures in research and development.

Competitive strategy - Differentiation of product, technology superiority, image and brand reputation.

8.2 Bayer CropScience

Their main participation in the seed industry is with cotton, canola and rice. They do offer herbicides, insecticides, fungicide, and seed treatment for corn and soybean crops.

Competitive scope - A global company, its percent of business in the US is 25.6 percent with sales of EUR 5,700 million and EBIT of EUR 584 million.

Figure 8.3 Bayer Crop Science Business Segments

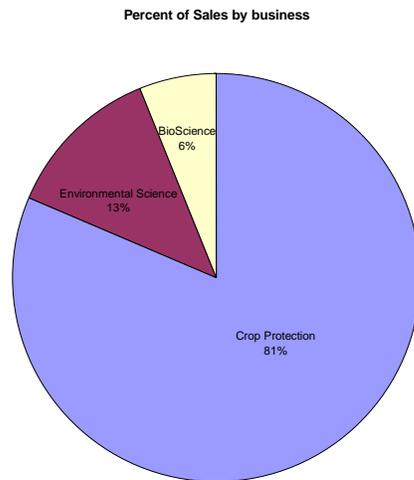
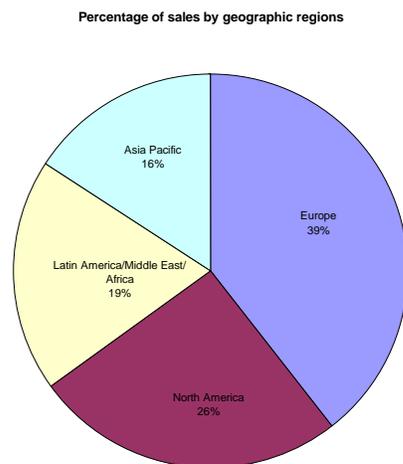


Figure 8.4 Bayer Crop Science Global Markets



Source: Bayer website.

Strategic intent - Maintain its leadership position for crop protection through innovative and high margin products. There is no change in their corn seed platform, it is based on technology of the Liberty Link where they charge nothing for a tech fee, but reap the profit from the sale of the Liberty herbicide. They are introducing Liberty Link Soybeans with hopes to launch in 2009.

Market share objective – They want to increase their leadership role in the products they market. Their research and development of products cost \$625 million yearly, improved product performance is how they are planning to grow their global and US business.

Competitive position - they are global leaders in insecticides and seed treatment, with a strong presence in herbicides. They will continue to find complementary products that support crop protection, bioscience and environmental science.

Strategic posture - They use both offensive moves such as this new product launch of Liberty Link soybean and defensive postures such as protecting their proprietary products.

Competitive strategy - Pursue differentiation based on quality, service, technology superior and image and brand reputation.

8.3 Dow AgroScience

They manufacture chemicals and plastics along with biotechnology of crops. Mycogen is their brand for selling seed products.

Competitive scope - They participate in the global industry. Dow AgroScience is a \$3.5 billion dollar company with a total EBIT of \$3,206 million and the agricultural science segment totaling \$377 million.

Figure 8.5 Dow AgroScience Global Markets

Percentage of sales by geographic regions

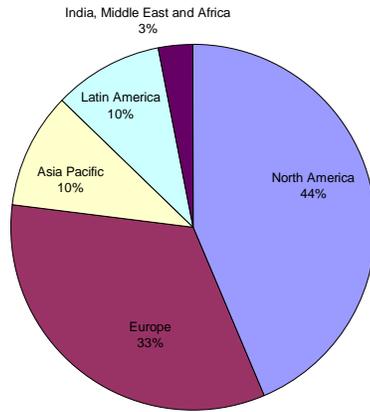
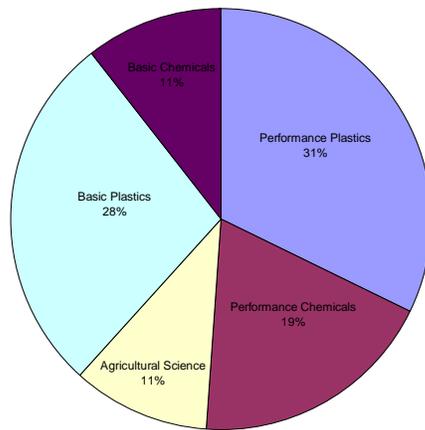


Figure 8.6 Dow AgroScience Business Segments

Dow Chemical Company and Subsidiaries by percent of EBIT by operating segments



Source: Dow AgroScience website.

Strategic intent – is to be a top tier agricultural company with innovative crop protection, seed, biotechnology traits and pest and vegetation management.

Market share objective – is to maintain and grow the seed and biotechnology divisions.

Competitive position - Retrenching their seed and biotechnology businesses to better defend and expand their market share. They had an arrangement with DuPont/Pioneer in offering their biotechnology trait of Herculex®, but with Pioneer losing market share from 44 percent to 25 percent, they have moved to a new agreement with Monsanto to exchange genetic material and join traits in order to expand their trait market share.

Strategic posture - Recent offensive move to change the marketing of their traits through another distribution channel with Monsanto. This is a defensive move as they seek to build interrelationships with others and increase their potential trait market share of Hx1®. Dow AgroScience as recently signed an agreement to work with Monsanto to combine the YieldGard® traits with Herculex 1® traits creating a trademark of SmartStac™.

Competitive strategy - Differentiation is their strategy, their advantage is based on technology products.

8.4 DuPont/Pioneer

DuPont is a science company and they operate in food and nutrition, health care, apparel, home and construction, electronics and transportation.

Competitive scope - DuPont/Pioneer's competitive scope is global. Net sales of \$27,421 million, with the Agricultural & Nutritional segment selling \$6,008 million. EBIT for the Agricultural and Nutritional segment is \$725 million.

Figure 8.7 DuPont/Pioneer Global Markets

Percentage of business by region

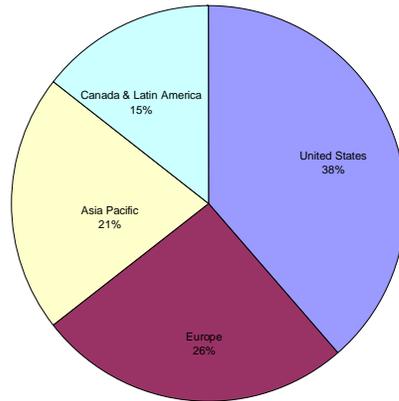
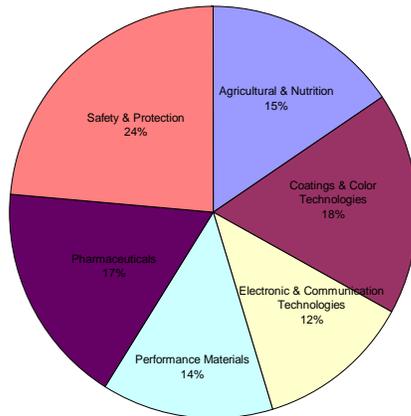


Figure 8.8 DuPont/Pioneer Business Segments

Percentage attributed to the business divisions



Source: DuPont/Pioneer website.

Strategic intent - “Our vision is to be the world’s most dynamic science company, creating sustainable solutions essential to a better, safer, healthier life for people everywhere.”

www.2dupont.com To be a dominant leader.

Market share objective - Aggressively hold on to their present market share and work towards regaining their number one position.

Competitive position - Intentions are to grow by putting science to work, go where the growth is and take advantage of the power of DuPont.

Strategic posture - Defensive due to lost market share. They have showed the industry that they can expect price retaliation, if another company tries to win business away from them. Their offensive moves include increased spending by \$100 million on research and development for biotechnology and reducing operating costs in crop protection and nutrition by that same amount. Also, they are reconfiguring their business through coalitions with Syngenta to offer genetics the wholesale market via Greenleaf Genetics.

Competitive strategy - Differentiation based on genetic performance, service of products and image and brand reputation.

8.5 Monsanto

Monsanto is an agricultural company with biotechnology, chemicals, and seed products in their product lineup.

Competitive scope – Global, Monsanto sells in North America, Europe and Africa, Asia Pacific and Latin America. Total sales equal \$7,344 million with an EBIT of \$1,095 million.

Figure 8.9 Monsanto Business Segments

Percentage attributed to business segments

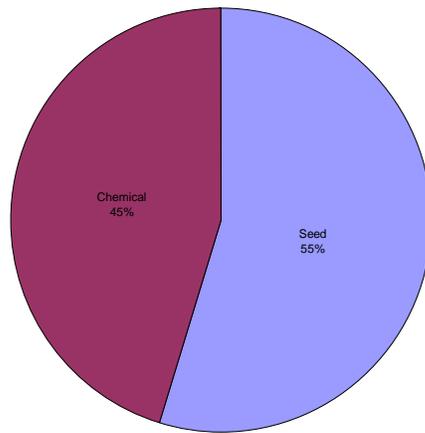
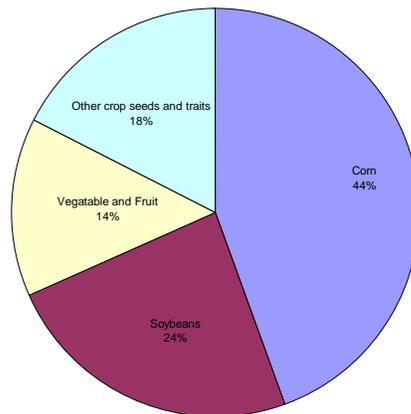


Figure 8.10 Monsanto Crop Segments

Percentage of sales to crop segment



Source: Monsanto's website.

Strategic intent – Is to be the leader in the industry with traits and genetic products.

Market share objective – Is to aggressively increase share by acquisition and internal growth.

Competitive position - Growing stronger. Monsanto was first to the market for biotechnology products. They captured market share and high profits and they leveraged that position by acquiring DeKalb, Asgrow, Holden's Foundation Co and 24 regional seed companies. They expect that leadership position of products and distribution to propel them to greater market share.

Strategic posture - Has the ability to have a sustainable competitive advantage, based on offensive moves of product and marketing changes. Defensive moves employed include tie up of sellers, raising competitor input cost of trait fees, and forming coalitions with Dow AgroScience to raise barriers or challenges for others.

Competitive strategy - Based on differentiation that combines technology and genetic quality that equals value for the customer, and brand image and reputation.

8.6 Syngenta

Their product lineup includes crop protection and seeds.

Competitive scope is global. In 2006, Syngenta had sales of \$8,046 million dollars with and EBIT of \$1,535 for all segments of the business, seed generated \$158 million towards the EBIT.

Figure 8.11 Syngenta Global Markets

Percentage of seed business by region

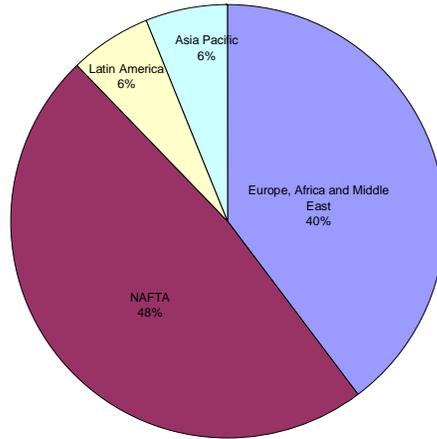
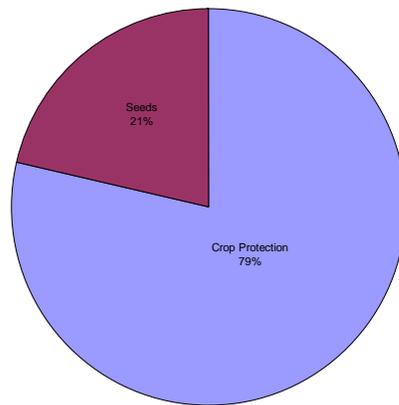


Figure 8.12 Syngenta Business Segments

Percentage of business by segments



Source: Syngenta's website.

Strategic intent – Is to be a world leader in providing innovative solutions to growers of food and the feed chain.

Market share objective - Growth through acquisition of Golden Harvest and Garst and the development of Greenleaf Genetics.

Competitive position – Is to be a major player in providing inputs for the agricultural industry.

Strategic posture – Is to reconfigure business by acquisition, changing marketing structure, and operational changes.

Competitive strategy - Differentiation based on product differences of genetics and traits, and image and reputation.

8.7 AgReliant Genetics

AgReliant Genetics is a French-owned company that has acquired Producers Hybrid, Wensmans Seed Company, LG Seeds, Great Lakes Hybrids and AgriGold Seed Company.

Competitive scope - Global with ownership base in France and Germany, along with research in North America, Puerto Rico, Chile, and Argentina.

Strategic intent – Is to increase their rank by acquisition and more recently by internal growth. Between Wensman and Producers, they have 36 salesmen in Minnesota, North and South Dakota. They state that they are number four for market share in the seed industry.

Market share objective – Is to increase market share by acquisition of the above companies for the distribution of products.

Competitive position - Well entrenched with genetic research and development keeping them free to use their own genetics, along with local brand names and a loyal customer base.

Strategic posture – is mostly offensive through acquisition.

Competitive strategy - Differentiation, with genetic differences combined with superior services.

8.8 Legend Seed Company

Legend has its origins in DeSmet, South Dakota.

Competitive scope – Is as a regional seed company.

Strategic intent - Using sales growth to build their seed business.

Market share objective – Is to expand business with internal growth. They employ 18 salesmen in the upper four state areas.

Competitive position – Their corn and soybean market share provides them a well entrenched position.

Strategic posture - Risk taker.

Competitive strategy – Legend says they are different based on customer service, superior products and creating value.

CHAPTER 9: THE KEY FACTORS OF SUCCESS AND CONCLUSION

It has been said that great questions leads to great answers and the answers, the following four question lead to what are the key factors for success. (Thompson and Strickland, “Strategic Management.”)

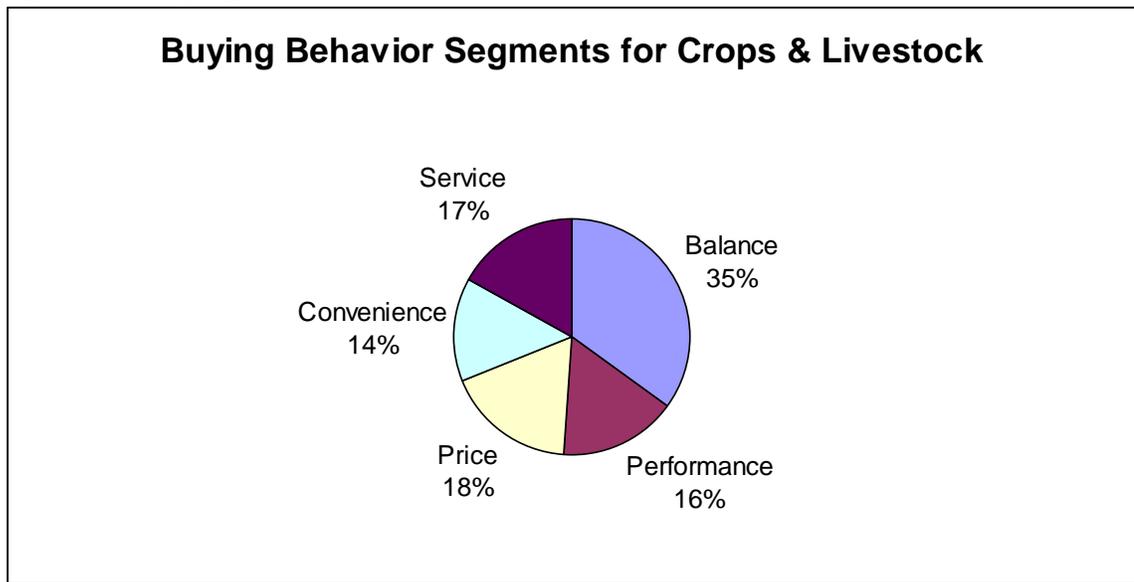
How do customers select seed products?

Farmer selects products based on:

- Product performance where data may come from University testing programs, third party trials, farmer run plots, and company generated plots.
- Expectation of higher yields when adopting biotech products.
- Value of the product, based on performance and service in relationship to price.
- Convenience for help in managing their time that allows for simplicity and flexibility of pesticide or herbicide application.
- The safety of the products being purchased for plant, people, and environment.
- The reputation of the company selling the product.
- A relationship with the person selling the product.
- The cost of the product.

The intangible art of a sale is to look at buyer type. Are they a business type buyer where they weigh all factors equally? Are they an economic buyer that purchases on cost? Are they a relational buyer where service and convenience is most important? Here is an overall view of buying behavior criteria.

Figure 9.1 Buying Behaviors



Source: Purdue University Center for Food and Agricultural Business

What characteristics of the products are most important?

According to Ohio State Extension a farmer should select corn based on relative maturity, yield, stand-ability, and resistance to disease. Penn State suggests relative maturity, disease resistance, stand-ability, and yield as the criteria to select corn products. It has been my experience that farmers select products based on yield, stand-ability, and dry down. Disease resistance is important, but if the corn yields and the plant stand until harvest, the product passes. Of course now insect and herbicide traits are additional considerations for product choice.

Corn seed is also selected on brand image, such as national brands of Pioneer or Dekalb; or some perceived value from a local company in a developed relationship with a farmer that involves trust.

For soybean products, yield, disease resistance, and stand-ability of the plant are important. Convenience of handling soybean seed is important, large bulk units or totally bulk plays a part in the decision making process of the customer. Adding seed treatment at delivery time

is another factor in the decision making process. Consideration of price per unit is a factor in the selection process.

What resources and competitive capabilities does a seller need to have to be competitively successful?

They need skill and ability to bring the right products to the market through internal plant breeding and biotechnology trait programs or by selecting products through the wholesale system. A company needs highly skilled sales people in order to begin and develop long lasting relationships with a variety of customers.

A company must be able to market themselves as a competent supplier as to develop a favorable image and gain the reputation of being that competent supplier of products. A company needs to develop a delivery system for corn and soybeans. Based on the concept that to move bulk seed far is a cost disadvantage and large customer may purchase from a local supplier that is closer by, based on convenience of pickup. An example is Ross Seed Company from Fisher, Minnesota. Steve Ross sells about 40,000 units of soybean seed within 30 miles of his processing facility. He states that farmers are willing to travel this far for the products they want, but if farther than that, they will go to a closer facility.

What are the key success factors needed for CSC to achieve a sustainable competitive advantage?

Product: Due to the high cost of plant breeding and development of traits, CSC will need to access them through the wholesale market and by gaining agreements with trait providers. Branding of products is essential to differentiate from others in the market place. Selection of genetics that work in Minnesota will be important to bring the right seed products to market. Research plots need to be more market focused to support the sales effort. A high degree of ability to select seed products will be critical. Trait products will have to be licensed through one of these firms; Syngenta, Dow AgroScience, Bayer CropScience or Monsanto.

Monsanto genetics and traits would be preferred today, due to the success their products are having in the market place. Without a Monsanto license, the challenge would be finding the right combination of genetics and traits in order to maintain a high quality of product. It appears as though the majority CSC products will come with Liberty Link and AgriSure or Herculex 1 traits. AgriSure is Syngenta's trait trade mark for their trait products, there is access to this trait through licensing and the cost of the trait is similar to the Herculex trait of \$26.00. A rebate to qualified sellers potentially brings that cost down. Dow AgroScience trait fees for Hexculex have been set at \$26.00 per unit with volume incentives. Volume incentives of 25 percent start with a sale of 2,000 units, incentives increase up to 41 percent for 80,000 units sold and additional sales maintain that 41 percent incentive. This incentive provides large volume seller a competitive advantage that over smaller volume companies, of which CSC is one of them.

Marketing - Brand Image: Skills and resources are needed to develop a positive reputation. Also, the skills and resources to put an organization together to live up to that reputation, from proper products, right people with the right presentation, followed up by great service will all factor into creating a competent supplier.

Sales: CSC would need to find personnel whose behavior pattern is one of initiative, innovation, being flexible, and customer orientated. Sales skills needs include being a good decision maker, the ability to work in cross-functional teams, an effective manager and being customer focused. For a sale negotiation, they should build a relationship, plan their sales call, ask great questions and demonstrate good presentation skills, and they must have the ability to gain commitment. The goal is to build long term customers.

Distribution: The network that is set up under a District Sales Manger (DSM) will be the distribution system. A focused area of distribution can result in a reduced cost for delivery, advertising, travel and product lineup, giving CSC lower costs for these activities. Convenience of pickup or delivery is critical for soybean sales volume.

Organizational capacity: According to Allan Gray, Michael Boehlje, Vincent Amanor-Boadu and Joan Fulton there are three internal capabilities that are needed to assist an

entrepreneur to become successful. Organizational knowledge, cognition, and social capital competences, in full measure, helps the business in finding a sustaining competitive advantage.

Organizational knowledge is the ability to develop a cut above rest system that separates one firm from another. This know-how is based on knowing what to do within the business, like when to sell, to ship products, to service customers, and ensuring quality of products to name a few.

Cognitive skill is about sense making. Sense making is the ability to foresee potential challenges and then move to position the company to meet the changing need of the customer. Because everyone perceives challenges and opportunities differently, this capability differentiates the firm against another. Arie de Geres of Dutch Shell wrote, “The ability to learn faster than your competitors may be the only sustainable competitive advantage” reminds us to be vigilante in learning about all aspect of our activities and how they correspond to present competitive advantages.

The “who you know” is called social capital; this is about the ability to develop relationships that allow the firm with some potential advantages. They could be lining up production in advance to reduce costs, and the lowering of storage due to favorable rates. It could be a great relationship with a breeder, banker, or investor that allows for greater support and that leads to a potential competitive advantage.

In an overview of the industry, this is what is seen today.

1. The seed industry is a mature industry. This usually leads to an unattractive and lower profit industry.
2. Rivalry within the industry has increased pressuring profits for non-trait suppliers lower. The concentration of large trait suppliers will continue as the battle for market share becomes more intense in the effort to gain economies of scale and lower average product costs.

3. Entry into the industry is limited by Monsanto, who has created barriers of entry by being selective in granting licenses. Bayer, Dow AgroScience and Snygenta are still open to granting new entries. Large firms will probably not leave the industry due to the asset specificity and economies of scope with other related crop production products.
4. The power of the supplier is strong and continues to grow stronger as biotech traits become more accepted in the market place. Trait fees and genetic costs have increased and these increases in cost reduce potential profit margins.
5. The power of the buyer in the seed industry is strong and that keeps the potential profit margin lower. Even though differentiation strategy and added value services can create increased revenue, buyers have choices and are price sensitive. That can be seen by two phenomena, the growth of Monsanto's market share and the growth of market share for all regional firms who price their products below the prices set by the majors.
6. From the driving forces that cause the environment to change, the attractiveness for profit in the seed industry is very good for the trait suppliers and less attractive for non-trait suppliers.
 - The lack of a long term growth rate in the seed industry in the U.S. is a driving force that will continue to create rivalry and lessen the attractiveness of the industry.
 - Product innovation will continue to provide trait companies with above average profits while seed sellers will pass along the revenue and potentially keeping less for profit.
 - Exiting the industry is hard due to the specialized biotechnology products and production facilities only usable in the industry. This causes large

companies to take offensive positions to stay in and earn above average profits, which sometimes is at the expense of industry wide profitability.

7. In evaluation of CSC strategic position in the industry, it is an uphill battle against stronger rivals. Stronger rivals meaning that their brand name, distribution and economies of scale provide them with a greater competitive advantage over CSC if it chose to enter the seed industry.
8. CSC is not in a position to alter the industry attractiveness.
9. The probability of obtaining a sustaining competitive advantage and above average profits for CSC in the seed industry is unlikely. Even though private owners may be willing to accept lower profit margins, entry into the seed industry is not attractive today.

At this time an entry into the seed industry could be filled with challenges that create lower than average profits and potential financial risks. The two main challenges are the power of the supplier and the power of the buyer.

Today, the market accepts the value of Monsanto's YieldGard® traits and genetics. To have a Monsanto license to offer those traits is important to the customer for high performance and for the firm, hopefully a fair retail price. The genetics of the product would have to be of high performance as well, but without economies of scale, I project that CSC may not have the first or even second tier of genetics. That may affect perceived value received by the customer and retail price that could be charged. At least in regards to the costs of the seed, as the study showed the higher retail price for traits did not allow for additional profit margins, it actually creates higher revenue with lower margins (Table 4.12 to 4.15).

Without a Monsanto license for genetics and biotechnology traits, CSC would need to look to Dow AgroScience and Syngenta trait products and the wholesale market for genetics. I could argue that Dow's Herculex is close in comparison in performance, and that Syngenta

Agrisure traits would be functional, but the value received by the customers as reflected by the declining market share of Pioneer and Syngenta, who use these traits, indicates average or lower performance. That prospect creates a concern relative to one's sale volume and potential profitability.

Times have changed; CSC should look for other opportunities within their scope or continue to grow their farming business through increased size to capture potential economy of scale.

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