Technology and innovation analysis of agricultural biotech company Monsanto.
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Executive Summary

Company Background
Monsanto is an agricultural biotechnology company with operations in over 80. In 1945 Monsanto first began production of agricultural chemicals. In 1982 Monsanto scientists were the first to genetically modify a plant cell. Today’s Monsanto was split off from the original Monsanto Company, now Pharmacia Corporation and a subsidiary of Pfizer since 2003, in 2000. The firm has two major business segments seeds and traits, and agricultural productivity. Since its first genetic modification of plants in the 1980’s the firm has focused on genetic modification to produce corn, soybean, cotton, and other seeds for sale all over the world.

Value Proposition
Monsanto’s value proposition is higher yields, primarily from large acre crops, through genetic traits, seed, and herbicide products. Monsanto’s products also provide the benefits of lower costs and higher nutrition to end consumers of Monsanto crop brands. In its vegetable seeds segment Monsanto primarily focuses on improving flavor and nutrition.

Porter’s Five Forces Industry Analysis
Monsanto’s major industry competitors are Syngenta and Bayer AG CropScience. Both companies have more diverse product portfolios than Monsanto. The customers of products in this industry are primarily farmers, not individual end consumers making the industry predominantly B2B. Major suppliers in this industry organic and inorganic chemical manufacturers, and medical instruments and supplies manufacturers. The biotechnology industry is highly regulated and has very highly valued intellectual property making substitute products difficult to produce. Barriers to entry in this industry are medium and increasing. The agriculture biotech industry is a rich ground for complementary products, chiefly companies producing pesticides that are complementary to their crop seed.

Strategy
Monsanto was able to achieve the market penetration by offering steep discounts to small seed producers who entered contracts to keep Monsanto as their primary supplier. Monsanto’s intent is to continue to gain market share globally in the agriculture biotech industry. Monsanto’s product strategy focuses on grain yield, quality, environmental stress tolerance, pest control, herbicide tolerance, disease resistance, etc. The company has a strategy of closed innovation as the industry is highly competitive and knowledge-based.

Recommendations
Monsanto should aggressively expand its product portfolio by entering new industries in biofuels and pharmaceuticals. Another recommendation Monsanto cannot ignore is to bolster its PR efforts. Litigation cannot be ignored and Monsanto should put more stringent technical and business practices standards in place in order to avoid legal issues.
Background

Monsanto is an agricultural biotechnology company with operations in over 80 countries that is a subsidiary of Pharmacia Corporation, a subsidiary of Pfizer (Monsanto, 2010). Monsanto holds 4.1% of the market share in the U.S. biotechnology industry, which includes major players such as Genentech (IBISWorld, 2010). Monsanto was originally founded in 1901 and its first product was saccharine, an artificial sweetener which the company successfully sold to Coca Cola.

In 1945 Monsanto first began production of agricultural chemicals. In 1982 Monsanto scientists were the first to genetically modify a plant cell. The agriculture division continued growing through acquisition and innovative research through 1998. Today’s Monsanto was split off from the original Monsanto Company, now Pharmacia Corporation and a subsidiary of Pfizer since 2003, in 2000. Monsanto Company is a major player in several sectors of industry such as corn farming (with 6.4% market share), fertilizers and agricultural chemicals (3.5% market share), phosphate and other mineral mining (3.5% market share), and pesticide manufacturing (12% market share) (IBIS World).

The firm has two major business segments. The first segment is Agricultural Productivity, which consists of Monsanto’s glyphosate products. One of its early products, Monsanto’s glyphosate includes commercial herbicide Roundup as well as many other herbicides. Monsanto’s second major segment is Seeds and Genomics. Since its first genetic modification of plants in the 1980’s the firm has focused on genetic modification to produce corn, soybean, cotton, and other seeds for sale all over the world. Its major seed products include Roundup and other glyphosate herbicide-resistant corn, canola, soybean, and cotton seeds.

Business

With the exception of commercially available Roundup herbicide Monsanto sells almost exclusively wholesale seeds and chemicals. The company has two business segments: Seeds and Traits and Agricultural Productivity (Monsanto Company, 2010). Monsanto also licenses the use of its patented genes by other seed companies. Monsanto’s patented genes are found in 95% of soybeans and 80% of corn grown in the U.S. (Leonard, 2009). Monsanto is able to generate significant revenues due primarily to its innovations in patenting genes and traits found in its seeds. Though now off patent and available in generic form Roundup was one of Monsanto’s key products for many years. The powerful defoliant herbicide was one of Monsanto’s strongest brands and a significant source of revenue. Now that competitors are able to use the same technology and inputs to make similar herbicides Monsanto has had to lower prices on Roundup products significantly. Today Monsanto relies on its crop plant genes and traits for the majority
of its revenues. These products include traits that make crops resistant to insects, adverse climate, and herbicides. In fact Roundup Ready is now Monsato’s most popular brand because it makes crop plants resistant to the defoliating effects of Roundup at all stages of growth.

**Products and Services**

Monsanto has various brands within its two product segments. In its seeds and traits segment Monsanto’s products include genetic traits that protect plants from pests and weeds, commercial crop seeds including corn and soy, and vegetable seeds (Monsanto Company, 2010). Monsanto’s top seed and trait brands include Acceleron, Asgrow, Dekalb, Deltapine, De Ruiter Seeds, Genuity, Roundup Ready, Seminis, Vistive, and YieldGard. Through these brands Monsanto sells corn, cotton, soy, canola, wheat, and vegetable seeds and seed traits. Monsanto’s agricultural productivity business segment sells industrial herbicides for agricultural and turf and ornamental applications (such as in parks) as well as the popular consumer herbicide Roundup. Monsanto’s different products and brands are designed to work together, for example Roundup herbicides with Roundup Ready seeds, designed to be resistant to the defoliating effects of Roundup.

Monsanto also licenses its genes and traits to smaller companies that produce seeds and have established distribution channels to farmers. Licensing genes and traits is a strategy not pursued by any other major competitors in the industry. Monsanto is able to safely license technologies due to extremely strong intellectual property rights protection. Monsanto allows license holding partners to sell competing traits, for example the first and second generations of a Roundup Ready trait (Monsanto Company, 2010). Monsanto’s traits are in high demand among farmers so licenses benefit licensees by allowing them to insert desired traits into their own seed products.

**Performance Trends**

In the last five years Monsato’s stock price rose dramatically from the period 2005 to late 2008 then fell slightly and has remained fairly stable until the present. Monsanto’s revenue grew 44% from 2007 to 2008, and 9% from 2008 to 2009 while its net income grew by 103% from 2007 to 2008 and 4% from 2008 to 2009. The firm’s operating income increased 91% from 2007 to 2008 and by 14% from 2008 to 2009. Though the rate of growth from 2007 to 2008 for most indicators was much greater than the rates for the period from 2008 to 2009 all indicators show positive trends (see Appendix exhibit A) (Yahoo! Finance, 2010). Employment, imports, exports, and revenue in the industry are all projected to continue to increase in 2010, while revenue growth rate has slowly declined since 2008 (IBISWorld, 2010).
**Value Proposition**

Monsanto’s value proposition is higher yields, primarily from large acre crops, through genetic traits, seed, and herbicide products. Monsanto’s products benefit farmers by providing higher yields from crops that are resistant to pests, herbicides, environmental factors and need fewer resources to grow. One of the key brands of traits is Roundup Ready, which makes crops resistant to Roundup herbicide. This allows farmers to use both Roundup and Monsanto’s other products (seeds) together for maximum benefits. Monsanto’s products also provide the benefits of lower costs and higher nutrition to end consumers of Monsanto crop brands. In its vegetable seeds segment Monsanto primarily focuses on improving flavor and nutrition. Monsanto has also increased nutritional benefits by making soybeans that produce omega-3, a beneficial fatty acid, to be used as an input in processed foods.

Monsanto also provides value to other seed producers who license its trait technology. In exchange for licensing fees seed producers are able to use Monsanto-developed traits into their own seeds. Due to the immense popularity of Monsanto crop genes among farmers small seed producers are able to profit from incorporating these genes into their products.

**Value Chain**

Monsanto is part of a long and critical value chain that is the foundation of the world’s food supply. Monsanto operates at the beginning of this value chain so its suppliers are also close to the raw materials processing of their industries, particularly chemical manufacturing firms.
Monsanto adds value to the inputs it receives from suppliers by converting R&D knowledge to crop protection and seed products. Next in the value chain distributors and retailers form relationships with Monsanto and with commercial clients who will purchase products. Distributors sell not only to farmers but also to import/export firm that have distributor relationships with farmers and organizations world-wide. Farmers add arguably the greatest amount of value in the value chain, and materials spend the most time in this stage of processing. Here resources such as fertilizers, farm land, and water are combined with Monsanto’s seed products to produce grains, beans, oilseeds, and fruits. These food products are then passed along the value chain to processors who use them as inputs for numerous food products, from bread to oil to flour to fruit preserves, to name some applications. Finally, individual consumers purchase processed food products at myriad grocery retail locations every day.

**Value Net**

Given the diversity of activities in Monsanto’s value chain the value net that encompasses the firm is complex and far-reaching. Monsanto’s suppliers are scientific machine manufacturers and chemical manufacturers. These firms are in turn supplied by many types of suppliers including mining firms, semiconductor manufacturers, lens manufacturers, laboratory supply firms, computer and processor makers, and more. Once products are transferred from Monsanto to its distributors the value net expands to include industrial property managers, warehouse building and rental, transportation and supply chain logistics firms, and many other firms that supply retailers and distributors with personnel, equipment, and infrastructure. Many similar, or even the same, firms also supply importers/exporters with transport, logistic, and other resources. Farmers are connected to the value chain through their numerous suppliers which include fertilizer manufacturers, farming equipment and machine manufacturers, financial institutions, and others. In addition to being part of the basic value chain food processors are also connected to distributors, supply chain logistics firms, grocery retailers, and others. Processors sell to grocery retailers, or intermediary brokers, who are also connected to supply chain logistics firms and other service providers as well as to institutions that provide infrastructure, retail space, and equipment to retailers. Finally all these firms and processes come together to deliver value in the form of packaged processed foods or produce to individual consumers all over the world.

**Core Values**

Monsanto pledges integrity to its customers and the global community, including integrity, dialogue, and transparency (Monsanto, 2010). Monsanto also pledges to share knowledge and technology in order to help farmers and to deliver benefits in high quality products to its
customers. The firm also promises to respect its diverse employees, customers, and communities, and to create a positive and productive professional environment. Monsanto’s Vision Statement is: "We will deliver high-quality products that are beneficial to our customers and for the environment, through sound and innovative science, thoughtful and effective stewardship, and a commitment to safety and health in everything we do."
Monsanto has an extensive and detailed business code of conduct that addresses all aspects of its business, from treating employees fairly to prohibiting bribes.

Business Model

Monsanto generates revenues in two ways, selling its products including seeds and chemicals, and licensing its genes and technologies to smaller seed producers. R&D and licensing are huge components of Monsanto’s business model. Through research and development Monsanto is able to discover, and later patent, valuable plant genes that can be engineered into crop seeds. These genetically engineered seeds are very valuable to farmers and Monsanto’s strategy and business model require that these seeds be priced at a premium. Monsanto argues that the value and savings these seeds deliver in the form of cost savings on herbicides, pesticides, and other resources make their premium pricing fair and reasonable. Also key to Monsanto’s business model is licensing traits and genes to small seed producers. Monsanto benefits from these deals with immediate revenues as well as long-term partnerships. Monsanto has also acquired many of these small seed producers over the last several years thus growing the company.

Porter’s Five Forces Industry Analysis with Complementors

Porter’s five forces for industry analysis are competition, suppliers, customers, substitutes, and new entrants. Threats to a company’s performance in the market can come from any or all of these sources.

Competitive rivalry:
There are several large players and many smaller firms in the biotech industry, specifically in agriculture products including seeds, genetics, and herbicides. Agriculture comprises 20% of the biotech industry in the U.S. Syngenta holds 5.5% of the biotech industry market share and is Monsanto’s largest competitor (IBISWorld, 2010). Over 62% of the industry consists of smaller companies, diverse in products and sizes. Notable among the firms that are not the largest players is Bayer AG CropScience whose products compete directly with Monsanto’s seeds and traits segment. Bayer CropScience has 19,000 employees and operates in 120 countries but there are many more competitors in the industry, many as small as fewer than ten employees.
Power of customers:
The customers of products in this industry are primarily farmers, not individual end consumers making the industry predominantly B2B. However demand for products depends on public acceptance of genetically modified foodstuffs, a highly regulated and controversial topic. The force exerted by any individual customer, even large industrial farms, is relatively small due to the global expanse of the industry (IBISWorld, 2010).

Power of suppliers:
Major suppliers in this industry that specifically impact Monsanto include organic and inorganic chemical manufacturers, and medical instruments and supplies manufacturers. The chemical manufacturing industry is not very concentrated, with many firms having fewer than 20 employees. Therefore the power of suppliers is limited by the number of suppliers in the industry, if one supplier is no longer desirable others can easily be found. In the medical supply industry competition is increasing, again lowering the power suppliers have over their clients, such as Monsanto (IBIS World, 2010).

Threat from substitutes:
The biotechnology industry is highly regulated and has very highly valued intellectual property making substitute products difficult to produce. Competitors are a much more significant threat than substitutes as substitute products could not perform at the same level as industry products.

Threat from new entrants:
Barriers to entry in this industry are medium and increasing. The barriers to entry are currently medium, rather than high, because of the high level of innovation and potential for new technologies in the industry and the ability of small firms to compete successfully with major players. Barriers to entry are increasing as the industry matures and more regulations come about (IBISWorld, 2010).

Complementors:
The agriculture biotech industry is a rich ground for complementary products, chiefly companies producing pesticides that are complementary to their crop seed. Within Monsanto an excellent example is Roundup herbicide pairing with Roundup Ready seeds, crop seeds genetically engineered to be tolerant to the defoliating effects of Roundup. Customers who buy both products get both the benefits of enhanced seeds as well as of an herbicide that will kill weeds but not crops. Another type of complementary product to Monsanto’s products is fertilizers as these enhance the growth of crop seeds. Similarly, for some type of seeds, greenhouses, growing lamps, irrigation systems, and containers are also complementary products.
Key Competitors and Technologies

In the agriculture biotech industry Monsanto’s major competitor is Syngenta, with Bayer CropScience a being a smaller competitor. Unknown players in the industry may be numerous due to the nature of the industry.

Syngenta
Syngenta is the result of the merging of the agribusiness segments of Novartis and AstraZeneca in 2000 and its tag line is “grow more from less” (Syngenta, 2010). The company has three major segments: Crop Protection, Seeds, and Plant Science. Syngenta’s product portfolio is more diverse than Monsanto’s. Its crop protection segment produces herbicides, fungicides, and insecticides. Syngenta’s seed business segment produces crop, vegetable, and flower seeds and its plant science segment produces seed care, lawn and garden, and home care products, including commercial pesticides for exterminators and consumer fertilizers and pesticides (Syngenta, 2010).

Syngenta’s herbicide technologies include selective and non-selective herbicides. Non-selective herbicides affect the leaves of any type of plant. These can be contact herbicides, which affect only the area on which they are sprayed and act quickly, and systemic herbicides, which act more slowly and move within a plant from the point of contact to destroy the plant. Selective herbicides can be applied directly to crops without damaging them while still controlling undesirable weeds and can act by affecting enzymes and hormones in plants other than the specific crop they are used with (Syngenta, 2010). Syngenta’s latest active ingredient in fungicides is strobilurin, which disrupts fungus metabolism and inhibiting growth. Syngenta’s insecticides are diverse and act in various ways, from affecting the brains of insects to affecting feeding mechanisms. Some insecticides can be used to control hundreds of pests in over 100 types of crops and are typically used in fruit, vegetable, corn, and cotton farming (Syngenta, 2010). Syngenta’s professional insecticides for home and commercial care act primarily on contact with pests. Syngenta’s crop seed products include cereal, sugar beet, corn, sorghum, soy, alfalfa, and sunflower seeds. These seeds are bred to be adapted to different climates and regions and be high yielding, and some are genetically engineered to be insect or herbicide-resistant (Syngenta, 2010).

Bayer CropScience
Bayer is one of the world’s oldest and established firms and its Crop Protection research division was established in 1924 and Bayer CropScience came from Bayer’s acquisition of Aventis CropScience in 2002 (Bayer CropScience, 2010). Bayer CropScience has over 19,000 and operates in 120 countries from its headquarters in Germany (IBISWorld, 2010). Bayer’s three business segments are Crop Protection, Environmental Science, and BioScience. In 2009 over
83% of Bayer CropScience’s revenue was generated by its crop protection business, while 9% and 8% came from environmental science and bioscience respectively.

Bayer’s crop protection business produces insecticides, fungicides, herbicides, seed treatments, and plant growth regulators. Bayer’s insecticides function primarily by inhibiting receptors, inhibiting, and affecting cellular chemical reactions in pests. Similarly its fungicides and herbicides act by affecting respiration and other reactions, including photosynthesis, in fungal and plant cells. Bayer CropScience specializes in seed protection using film coating to protect seeds during packaging, transport, and sowing. Plant growth regulator products act primarily by introducing chemicals into plants that can be broken down into naturally occurring compounds necessary for plant growth. Bayer focuses on three strategic crops: rice, canola, and cotton. Bayer’s Arize brand consists of hybrid rice seeds, which are hardier and higher-yield than non-hybrid rice. Bayer’s InVigor brand consists of hybridized and herbicide tolerant canola seeds based on its SeedLink and LibertyLink technologies. FiberMax is Bayer’s cotton seed brand and is engineered to be insect and herbicide resistant. Interestingly one of the herbicide resistance technologies used in FiberMax seeds is Monsanto’s RoundupReady (Bayer CropScience, 2010).

**Unknown Players**

There are myriad unknown, small, and upcoming firms due to the innovation volatility of the industry. New technologies can emerge at any time and be successfully brought to market by small companies. Furthermore as more genes are mapped and discovered they are also patented ensuring that any company at who makes a valuable discovery can have an enormous competitive advantage (IBISWorld, 2010).

**Resource Based Industry Structure**

Resources for competitive advantage must be valuable, rare, inimitable, and non-substitutable. The biotechnology industry is supplied by chemical manufacturers and medical and scientific machine and instrument companies, however the human resources and R&D organizations are key resources for competitive advantage in the industry. Having a highly skilled labor force is a basic requirement in this industry (IBISWorld, 2010). Adequate legal staff is a subset of the workforce in this industry and is critical to obtaining patents and understanding legal regulations. Human resources are a key limiting factor in this industry because the level of education and experience required for most industry jobs is extremely high. At the last U.S. Census just over 25% of the U.S. population over 25 years old had at least an undergraduate degree (Minneapolis Federal Reserve Bank, 2010).
Other important resources in the industry include organic chemicals and laboratory and scientific equipment and supplies. Revenues in both industries have remained stable for years, indicating both industries are mature (IBIS World, 2010). Therefore raw materials and research and production equipment are readily available and prices are stable and predictable. This provides the industry with the fundamental physical products and infrastructure necessary for value creation.

Monsanto’s relative market value is: Relative market value = market capitalization/annual revenue = $35.82B/$10.63B = 3.37 (Yahoo! Finance, 2010). This means that for every dollar Monsanto spends it creates $3.37 of value to customers. This is evidence of the firm’s competitive advantage because it is able to create value.

**Business Strategy**

Monsanto’s brands and crop plant genes are virtually ubiquitous. Its genes are found in the majority of soybean and corn grown in the U.S. Monsanto was able to achieve this market penetration by offering steep discounts to small seed producers who entered contracts to keep Monsanto as their primary supplier. Once these seed companies had sold enough seed products to farmers and farmers valued and demand Monsanto genes Monsanto discontinued the discount for smaller producers and now charges premium prices on all its products, except Roundup which is no longer under patent protection. Monsanto’s intent is to continue to gain market share globally in the agriculture biotech industry.

Monsanto’s product strategy focuses on grain yield, quality, environmental stress tolerance, pest control, herbicide tolerance, disease resistance, etc (Monsanto Company, 2010). The company has a strategy of closed innovation as the industry is highly competitive and knowledge-based. Another key component of Monsanto’s strategy is licensing its traits and genes to other seed-producing companies. The licensing agreements are extremely rigorous to maintain control and rights over intellectual property. By licensing traits and genes Monsanto has been able to reach America’s farmers through brands they already bought and trusted (Monsanto Company, 2010). Offering seed producers incentives has been a critical factor in Monsanto’s strategy of promoting, distributing, and selling its products.

**Strategic Intent**

Strategic intent is a statement of how a firm will achieve its long term vision and goals. Monsanto’s strategic intent is to deliver value to farmers, processors, and consumers via its seeds
and traits segment (its best performing business segment in terms of sales). The benefits to farmers are increased productivity or reduced costs through higher yields achieved by protection from herbicides, pests, and environmental factors. For processors Monsanto aims to deliver value by improving quality and content of animal feed, fuel sources (biofuels), and food. Value delivered to individual consumers includes more nutrition and better taste in food crops.

**Business Design**

Monsanto Company is a subsidiary of Pharmacia Corporation, which in turn is a subsidiary of Pfizer, a top pharmaceutical firm. Monsanto has twelve executive officers, with executives heading business segments: vegetables, seeds and traits, and crop protection.

**Core Competency**

Monsanto’s core competency is the insertion of traits into crop plant genomes. Monsanto genes are found in the vast majority of soy and corn grown in the U.S. and its products are preferred by many commercial farmers. The company has an effective R&D structure that allows it to continually innovate to deliver products that customers need. Monsanto’s R&D for seeds and traits can follow two paths, breeding and biotechnology. On the breeding pathway plant genes are combined and altered by conventional cross-breeding methods as well as by technology- and computer-assisted methods. On the biotechnology development pathway genes are inserted into plant genomes through genetic engineering technologies, which Monsanto pioneered in agricultural applications.

**Value Migration**

Value migration refers to the transition of customer value from older businesses or technologies to newer ones. Currently Monsanto and the biotech industry are in the value stability stage, with relatively stable market shares and profit margins. This means that value is not currently migrating into or out of this industry or Monsanto itself. It is unlikely that value migration will occur any time in the near future because the technologies and industry are relatively new and the value derived from them is immense.

**Product Pipeline and Life Cycle**

The product life cycle follows a product from development and launch through product maturity and decline. Monsanto’s products are predominantly genetically engineered crop seeds which are products in a very young industry. One exception is the herbicide Roundup which has been
on the market for decades and is in fact now off patent, which means competitors and low-cost manufacturers can produce herbicides based on the same technology (glyphosate molecules). Roundup’s active ingredient, glyphosate, is still one of the most effective and widely used herbicides so the product is mature, but not yet in decline as no superior products are widely available on the market.

Monsanto’s traits and genes products are well established in the market, especially in corn and soybean seeds. These products are not yet mature as there is still an expansive global market where increasing sales can be achieved, in other words these products are currently in the growth stage. Monsanto also has many products in various life cycle phases, from development to growth.

Internally, Monsanto’s product pipeline consists of five phases: discovery, phase I, phase II, phase III, and phase IV. In the discovery phase genes and traits with potentially marketable and beneficial properties are investigated. Phase I is the proof of concept phase wherein discovered genes are optimized and put into crop seeds on a small scale. Phase II is the early development phase in which crop seeds are transformed with the genes being studied on a larger scale and data is gather. Advanced development happens in Phase III when traits are integrated, field testing is done, and data for regulatory compliance is gathered. Phase IV is the prelaunch phase when data is submitted to regulatory bodies, and pre-marketing begins (Monsanto Company, 2009). These phases encompass two different pathways: breeding and biotechnology. In the breeding development pathway plant genes are affected in the traditional way by cross-breeding plants with desired traits. In the biotechnology development pathway genetic engineering technologies are used to insert genes and traits into plant seeds (see Appendix exhibit B).

Within the “corn” category Monsanto has seven products in its pipeline. The first of these is Drought-Tolerant Corn and is currently in Phase IV and market introduction is planned for 2012. The second generation of this product is also currently in field testing. Nitrogen-use Efficiency Corn, Higher-Yielding Corn, YieldGard Rootworm III, and YieldGard Corn Borer III, Glyphosate-,Dicamba-, and Glufosinate-tolerant Corn are all in Phase II of the pipeline. Monsanto is also researching diseases affecting corn crops including Goss’s Wilt, Gray Leaf Spot, and Stalk Rot; products for treatment are likely in the discovery phase (Monsanto Company, 2010).

Monsanto also has seven products in the biotechnology pipeline for soybeans. Some highlights among these products include High-Yielding Soybeans (currently in Phase III), Stearidonic Acid Omega-3 Soybeans (which produce Omega-3-rich oil and have potential as an additive to other food products), Insect-Protected Genuity, Roundup Ready 2 Yield Soybeans (designed specifically to deal with the insect damage to crops in Brazil), and High Stearate Soybeans
(designed to be used in production of trans-fat-free shortenings, margarines, and spreads) (Monsanto Company, 2010).

In cotton Monsanto has two products in Phase III: Dicamba- and Glufosinate-Tolerant Cotton and Drought-Tolerant Cotton. Two other cotton products are also in the pipeline. Vegetable seed products are developed only along the breeding pathway, where Monsanto currently has nine areas of development. Monsanto also has specialty crop products in development including Genuity Roundup Ready 2 Canola (in Phase III), Higher-Yielding Canola, Insect-Protected Roundup Ready 2 Sugarcane, and plans to start developing wheat products both through breeding and biotechnology approaches (Monsanto Company, 2010).

Hypercompetition

In a hyper-competitive business environment firms can confront each other on the basis of cost and quality, timing and know-how, strongholds, or financial assets. The biotechnology industry is a very young industry (about 30 years old) so hypercompetition is an important factor for firms in this industry. Though competitor Syngenta has a greater market share in the biotech industry than Monsanto, Monsanto has leveraged licensing its intellectual property more effectively than any firm in the industry. Licensing is not only providing Monsanto more revenue but also a direct channel to its target customers, farmers. This creates a stronghold for Monsanto that few can penetrate, and is in fact the source of some of Monsanto’s legal issues as the company is currently being investigated by the U.S. Department of Justice for antitrust violations.

Game Theory Strategy

Game theory is a mathematical analysis tool used to model behavior in strategic cooperative and non-cooperative situations. Monsanto has been able to outmaneuver its competitors through its innovative process for patenting intellectual property and licensing strategy. By putting in place rigorous patents Monsanto is able to safely license technologies without risking a loss of present or future revenue. Monsanto is also currently collaborating with BASF on the development of several biotechnology products. By cooperating with a competitor Monsanto is able to participate in a win-win scenario.

Blue Ocean Strategy

The idea behind a blue ocean strategy is that firms should pursue both differentiation and low cost and create new market spaces for its products rather than compete directly with other firms
Monsanto was one of the pioneers of agricultural applications for genetic engineering so the company began by doing just that, creating a new market space for its products and product categories which were entirely new to the world. Another aspect of a blue ocean strategy is that corporate structure is based on strategy. Monsanto’s R&D approach as well as its flexible management practices come from a strategy of innovation, responsiveness to customers, and systematic development and improvement of products.

### R&D Costs and Revenue

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<td>Revenue</td>
<td>$11,724,000</td>
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<td>R&amp;D Costs</td>
<td>$1,098,000</td>
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<td>R&amp;D/Revenue</td>
<td>9.36%</td>
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(Yahoo! Finance, 2009)

Monsanto’s investment in R&D has remained stable around nine percent for the last three years. The drop between 2007 and 2008 is likely attributable to the severe and sudden economic downturn of the latter year. The proportion of revenues allocated for R&D is higher in this industry than most others because value creation and competitive advantage absolutely depend on the development of new products. This performance corresponds to the firm’s goal of achieving 9-10% of revenue spent on R&D.

### Innovative Capabilities

Monsanto operates in a high-tech industry and must be highly innovative and capable in order to remain competitive. Not only does the firm have technical innovative capabilities but also business process innovation capabilities. One of the most innovative and valuable capabilities Monsanto has demonstrated is legally protecting its intellectual property. Monsanto was the first company to patent plant genes, gaining first mover advantages over competitors and creating a whole new market. Having strong intellectual property rights protection has also allowed Monsanto to pursue its unique strategy of licensing genes and traits to competitors and other seed producers.

Monsanto also has technical capabilities in its research and development processes. One of its most innovative and valuable strategic moves was creating the Roundup Ready trait. Roundup Ready genes allow crops to be tolerant to the effects of Monsanto-developed Roundup herbicide. Though Roundup is a very mature product it is still one of the most popular and widely used
herbicides. Making crops resistant to Roundup allows farmers to use the herbicide throughout the plants’ life cycle, increasing yields by eliminating harmful weeds without killing valuable crops. By setting up two concurrent development paths, breeding and biotechnology, Monsanto is able to test and develop more products and products with different sets of benefits.

**Managerial Capabilities**

Monsanto’s management has to ensure the company has the infrastructure and culture to accomplish its strategic visions. Twelve executive officers are led by CEO Hugh Grant, who sets an example of adaptability and problem solving for the entire firm (Weitzman, 2010). When Monsanto came up short of its goals this year Grant admitted the firm will have to adapt its goals. He emphasized that Monsanto will focus on customer needs over compromising in order to meet difficult goals. Monsanto top executives meet weekly to discuss goals and performance and take action to keep the company on track. Managers are also empowered to make decisions within the strategic vision of the company, allowing for flexibility and employee loyalty.

**SWOT Analysis**

**Strengths**

Monsanto has many strengths as an organization as evidenced by its significant market share and revenues. One of Monsanto’s notable strengths is in research and development and making valuable discoveries. Roundup was one of Monsanto’s early products, based on the compound glyphosate, which Monsanto patented in the 1970’s. Another huge success came with the development of Monsanto’s Roundup Ready trait which when inserted into the genome of a plant makes that plant resistant to the herbicidal effects of Roundup. Monsanto was able to take advantage of the opportunity created by one off its successful products and created another successful brand that is highly demanded by farmers.

Licensing partnerships are another of Monsanto’s strengths. Through relationships with smaller seed producers Monsanto was able to quickly distribute and establish its brands to farmers, thus creating a huge market and gaining first mover advantages. Licensing takes advantage of brands that already have loyal customers and reliable distribution channels and allowed Monsanto to introduce its genes, traits, and brands to the market. Once these were successful and demanded by farmers Monsanto offered fewer discounts to licensing and distribution partners, maximizing its revenues.
Neither R&D or licensing would be profitable for Monsanto without its rigorous intellectual property protection standards. Monsanto’s ability to patent genes and traits are the foundation of its business and is a core competency of the firm. Monsanto values its legal work force very highly and patents are the foundation of the company’s ability to generate significant revenues.

**Weaknesses**

Monsanto often finds itself in some form of public controversy, whether from litigation or protests against genetic engineering. The company is currently being investigated for antitrust violations by the U.S. Department of Justice and is widely believed to have too strong a position in the agriculture industry. Whether these allegations end up having merit is not as relevant as what Monsanto’s response will be. A large player in a new and potentially controversial industry must follow regulations, and have an agile and effective public relations strategy. Monsanto has thus far been less than effective at curbing and diffusing the controversies that have surrounded it. It is possible that the damage that has been done to the company’s image at this point is irreversible and in the future a worse case scenario may involve rebranding the company or some other major form of reorganization.

Another weakness the company faces is its limited product portfolio compared to its competitors. While Syngenta and Bayer both have a wide range of products including herbicides, pesticides, fungicides, and environmental and sustainability applications Monsanto only has Roundup-based herbicides and this is now a liability as Roundup is off patent and prices have been lowered. Monsanto’s seed and traits products are arguably more successful than those of its competitors, but if this business segment performed poorly for any reason Monsanto would have no other products or businesses to buffer or mitigate losses.

**Opportunities**

The biotechnology industry is an extremely young industry and the potential for genetic engineering applications is huge. As the world’s oil reserves continue to be mined and oil prices rise the market opportunity for biofuels will grow and Monsanto has the capabilities necessary to fill that market need. Monsanto’s core competency of altering crop seeds can be leveraged to make a strong entrance into this industry. The popularity of biofuels like ethanol is increasing significantly as oil reserves dwindle and climate change is of increasing concern to more and more people.
Another potential market is bioplastics, the production of plastic-substitute products from biological sources. Because plastics are petroleum-based products their manufacture also depends on oil, which is a non-renewable resource. Plants that produce rubber, starch, fibrous tissues, etc. can be used to produce materials that can replace plastics in many applications. Again Monsanto’s expertise with crop plants is an asset that can be leveraged in this potential market. The company could feasibly discover desirable genes that enhance plants’ ability to produce proteins and fibers that can be used to produce durable materials. Developing genes that can allow plants to synthesize compounds they would not normally make is also a possibility.

Though Monsanto is not a pharmaceutical company it is a subsidiary of Pfizer, a major player in the pharmaceutical industry. Genetic engineering of plant seeds and cells can also be applied to produce pharmaceuticals by inserting genes into plants’ genomes that result in the production of desired compounds within plant cells. As the U.S. population ages and the global population grows there is an ever-growing market for pharmaceutical products and producing compounds with medical benefits in plant cells is a viable technology.

**Threats**

Monsanto’s genes and products can be found in a significant proportion of crops grown in the U.S. and Monsanto’s restrictive licensing contracts have landed the company in litigation for antitrust violations. Legal action is not only a threat to the firm’s structure, business, and products but also to its brand equity and image. Litigation against Monsanto is still being pursued by the U.S. Department of Justice and it could be many years before it is settled. In the meantime the company’s image will continue to lose value unless Monsanto undertakes more proactive and effective PR campaign.

Competition from other firms in the industry remains a threat to Monsanto, especially since Syngenta has a slightly larger market share and it and Bayer have a more diverse product portfolio. More product diversity allows Monsanto’s competitors to be shielded from ruinous financial losses in the event that one brand or product segment underperforms or fails.

Monsanto also faces threats from the social and physical environment. In the former there is significant controversy surrounding Monsanto’s products, motivations, and business practices. Many consumers already boycott products that contain vegetables and other foodstuff that have been genetically engineered. Though some aspects of climate change provide new opportunities and markets for Monsanto it is also a threat. Climate change will cause farmland to change and previously fertile regions may become desert. On the other hand, other geographic areas may
become usable as farm land. This change in geographies will change Monsanto’s target markets and affect existing distribution and customer relationships.

**Marketing Strategy**

Monsanto’s marketing relies not only on the quality of its products but also on branding. The company has numerous brands for selling its different products, and in different geographic areas. Because of the controversy Monsanto has faced strong branding for different product lines is critical for separating products from the image of the company while still delivering reliability, quality, and value customers can trust.

Licensing is another key component of Monsanto’s strategy. Licensing returns revenue instantly and also establishes profitable relationships with smaller companies. By licensing its traits Monsanto can reach its target market of commercial farmers while maintaining some distance from the market, thus protecting its image.

**Recommendations**

Monsanto should aggressively expand its product portfolio. A viable way to do this is to pursue new industries in biofuels and pharmaceuticals. Monsanto can readily leverage its assets and competencies to enter these fields and doing so will allow it to gain an advantage over competitors who are currently entirely focused on agriculture products. Another recommendation Monsanto cannot ignore is to bolster its PR efforts. While litigation involving the company will assuredly last for many years this does not have to cripple its brand equity. Pursuing proactive PR efforts will allow Monsanto to minimize the impact on its bottom line, now and in the future.

Though PR efforts will be critical protecting against future litigation problems cannot be ignored. In order to do this Monsanto will have to preempt issues by setting standards beyond regulatory requirements and working more closely with competitors rather than shutting all competition out. Furthermore Monsanto will have to remain aware of potential legal issues in the future and avoid entering legally questionable situations.
Appendix

A. Monsanto Stock Price History

source: http://finance.yahoo.com/echarts?s=MON+Interactive#chart4:symbol=mon;range=my;indicator=volume;charttype=line;crosshair=on;ohlcvalues=0;logscale=off;source=undefined

B. Breeding vs. Biotechnology
Bibliography


IBISWorld. (2010). *Biotechnology in the U.S.* IBIS World Inc.


