The Grain Milling
And
Oilseed Processing Industry
Cluster Report

for
State of Minnesota Regions 9 & 10

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Executive Summary

The Grain Milling and Oilseed Processing industry has a long history of economic importance to Minnesota. The Minnesota impact of this industry reaches many industries. Examples: Food product manufacturers, processing manufacturers, agriculture, transportation, fuel, printing, chemical manufacturers and markets, to name a few.

The new excitement in Minnesota for renewables is a great opportunity for the industry. This creates a potential economic advantage for the State. The momentum being generated will reshape the future of Minnesota in the industry.

Minnesota is home to several large corporations, smaller companies, milling and processing manufacturers, and post processing companies of this industry.

The industry’s relationship with Minnesota thrives due to the availability of raw materials, supplies, lower costs of utilities and the access to the industry’s major transportation areas of rail, truck and barge. This cluster is affected by the policies in the areas of workforce, education, transportation, agriculture, R&D, and government. The industry produces the food, feed, fuel, industrial and value added bi-products. The demand for these industry’s products are local, regional, national and international. The market demand is of huge importance to the Minnesota economy. The global export opportunities for this industry has extreme potential that needs to be pursued. Several of Minnesota’s markets place great value on relationships. Minnesota needs to continue to develop relationships and establish new relationships with China and other key countries with market export opportunities for the industry products. The Governor, Minnesota Trade Office, Industries and Trade Associations have been instrumental in doing trade mission visits to several countries and arranging country group visits to Minnesota to nurture relationships and create increased economic opportunities.

The Grain Milling and Oilseed Processing industries are interdependent to other clusters in food, feed, fuel and industrial products. This is of significant importance to Minnesota’s economy.

So what does this mean to Minnesota?

Minnesota needs this industry to flourish, provide jobs, and keep the economy strong. The challenges present opportunities for the industry and Minnesota. The challenges, industry issues, and the in-depth analysis of this industry are in the research team’s report.

The following are recommendations to address the issues identified in our research project:

- **Qualified Workforce** – Strengthen the industry led incumbent worker training and new entrants into the workplace by leading an initiative of collaborative partners from the industry, industry associations, high schools, educational institutions, Minnesota Center for Engineering and Manufacturing Excellence, economic development professionals, and DEED to develop training programs and a career laddering process for these industries. In addition, DEED and the industry needs to strengthen their relationships with area high schools and industry leaders to promote Project Lead the Way or similar efforts to introduce high school students to viable career opportunities within the industries and to educate the educational institutions and high school students regarding the required skills needed to be successful within the industry.

- **Education** – There appears to be a conflict within the MnSCU system that creates a barrier that limits program availability based on geographic areas. This issue needs to be reviewed by DEED, educational institutions, industries and related departments and agencies to make appropriate recommendations and take action.

- **Transportation** – The State of Minnesota needs to continue to prioritize the transportation infrastructure and policies in Minnesota i.e., truck, rail, and barge, to keep the industry and Minnesota competitive.

- **Increase funding, support and focus on Research & Development through education and industry associations.**

- **Government policies must be timely and less cumbersome to take advantage of windows of opportunity due to the competitive nature of the industry.**
The Grain and Oilseed Processing Industry is a large part of the overall Food Manufacturing Industry cluster in Minnesota (See appendix 1). The Flour Milling and Oilseed Processing industry’s generate business, income and jobs for thousands of Minnesotans and is the glue for rural communities. They mill flour and meal from various grains and extract and process oil.

The combined 2006 employment of Region 9 and 10 were roughly 338,000. Jobs in the private sector totaled 292,000 or about 86% of total employment. When examined at the 3-digit NAIC industry level, regional employment is spread across 85 industries with 54 industries employing more than 1,000 workers. Of the 54 largest industries, 12 industries appear to be the major exporters of the region, having disproportionately high shares of the nation’s corresponding industry employment.

These export base industries employed roughly 100,000 workers in 2006 or about one-third of the region’s wage and salary workforce. The food manufacturing industry payroll accounted for 14,600 of the export base jobs in 2006 with employment in the grain and oilseed milling industry, one of eight 4-digit food manufacturing industries with the region, accounting for 1908 jobs in 2006.

The impact that this industry has is very important to the overall economic health of the State’s Regions 9 and 10.

Minnesota’s producers are among the most productive of the world. The Minnesota prairie soils are second to none in the production of crops. The Martin County area is recognized as a leader in the State and afar. Much of the industry was originally located in and still exists in Regions 9 and 10. As a result of this productivity, the supply of grain and other agricultural products far exceeds Minnesota’s own demand. This impressive production capacity means that Minnesota must find new markets and uses if it is to maintain its supply-demand balance.

Minnesota is the third largest producer of soybeans in the nation. Soybeans are in strong demand for human consumption products, animal feeds, industrial products and biodiesel products (See appendix 2). The emerging renewable fuel industry in Minnesota is a benefit to both the producers and the environment. Producers have another market and the environment reduces exhaust emissions and this Nation’s use of imported fossil fuels as result. Money spent on fueling engines with biodiesel is money that stays in our Minnesota economy. Biodiesel represents Minnesota fuel, made from Minnesota feedstocks, produced by Minnesotans.

The soybean has numerous uses in the oils, flour, meal and other value added products.

The Minnesota Flour Milling Industry is a vital food source to Minnesota and the World. The United States remains the World’s leading exporter of flour and grain milled products. Minnesota continues to remain a key contributor in this industry despite several changes and issues within the industry.

The flour milling industry products include a variety of winter and spring wheat flour, custom blend products, and standard midds.

Minnesota is a leader in the research and development of this industry. Home to the University of Minnesota research institutes which are instrumental to new developments in the industry.

The end result is for the industry to be profitable, provide jobs and for Minnesota to prosper. This industry is Minnesota and Minnesota will always be vital to the industry.
Statistical data and Overview of the Industry Cluster – Regions 9 & 10

The South Central region of Minnesota, also known as Economic Development Region 9, encompasses nine counties: Blue Earth, Brown, Faribault, LeSueur, Martin, Nicollet, Sibley, Waseca and Watonwan. The South Eastern region of Minnesota encompasses 11 counties: Dodge, Fillmore, Freeborn, Goodhue, Houston, Mower, Olmstead, Rice, Steele, Wabasha and Winona.

The regional labor market is characterized by a solid industry base, built largely on Food Manufacturing, Healthcare/Social Assistance, Computer and Electronic Production and Printing & Related Industries (See Appendix 3).

The location quotient is a measure of an industry’s concentration in an area relative to the rest of the nation. A location quotient greater than one implies that the industry is producing more goods and services than are consumed locally. Thus, the industry is exporting the goods or services out of the area and, in the process, bringing new dollars into the area. Industries that bring dollars into the area help the local economy grow.

Another way to use location quotients is to look at how they have changed over a period of time. This comparison will give you an idea of whether each industry is increasing or decreasing its concentration and importance in your area relative to other areas.

<table>
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<th>NAICS Code</th>
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<td>Food Mfg.</td>
<td>4.0</td>
<td>3.8</td>
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<td>3112</td>
<td>Grain &amp; Oilseed Milling</td>
<td>12.8</td>
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Employment at the region’s food manufacturing companies has slipped over the last six years falling from 16,209 in 2000 to 14,600 in 2006 but the industry’s location quotient has remained high despite the 10.0 percent job loss. The 3.8 location quotient for the region’s food manufacturing industry in 2006, down only slightly from 4.0 in 2000, indicates that the industry remains a vital source of income from outside of the region. The region’s food manufacturing employment slide over the last six years closely matches the 10.9 percent decline recorded statewide over the same time period but was higher than the 5.6 percent national decline (See Appendix 4).

Employment in the region’s grain milling and oilseed processing industry has also been trending downwards over the last six years falling from 2,157 in 2000 to 1,908 in 2006, a decline of 10.9 percent. The region’s share of total statewide grain milling and oil processing jobs increased, however, over the last six years as statewide grain milling and oilseed processing employment declined 18.1 percent between 2000 and 2006. Since the region’s grain milling and oilseed processing employment has declined slower than the state’s grain and oilseed milling employment over the last six years, the regions share of Minnesota’s grain milling and oilseed processing workforce has increased from 63 to 68 percent. At the national level, grain milling and oilseed processing jobs slipped 7.1 percent between 2000 and 2006. (See Appendix 5).

The industry’s regional location quotient remained relatively flat over the last six years however, inching down from 12.8 in 2000 to 12.2 in 2006. The high location quotient for the region’s grain and oilseed milling industry reflects the highly competitive position of the industry as while as its importance to the regional economy.

The average annual wages in the Grain and Oilseed Milling industries exceeds that of the overall Food Manufacturing and the overall annual average wage in Minnesota (See Appendix 6).

The regional educational requirements in the Grain and Oilseed industry is comparable to the educational requirements of the regional food manufacturing industry with only a slight variance (See Appendix 7)
History of the Oilseed Processing Industry
Oil Seed Processing has become a major industry throughout the world economy as food producers continue to develop more uses for edible oils. Oil can be derived from such seeds as soybean, corn, cotton, canola, peanut, sunflower and flaxseed.

Soybeans are the world’s dominant oilseed, accounting for more than nearly 60% of today’s production, up from 50% in 1990. The U.S. leads the world in oilseed production and processing, but other nations such as Brazil, Argentina and China are expanding their production and processing capacity.

Illinois, Iowa, Arkansas, Missouri, Indiana, Mississippi, Minnesota, Ohio, Louisiana, and Tennessee are the major soybean producers in the U.S. Minnesota is the third largest soybean-producing state behind Illinois and Iowa and sixth in the percentage of National Grain & Oilseed milling employment (See Appendix 8). Soybeans make up more than 99 percent of all the oilseeds ground here. Acreage is growing rapidly in northwestern Minnesota, replacing other oilseed crops and grains. 7,300,000 acres of soybeans are planted in Minnesota.

The soybean processing industry in the U.S. is dominated by ADM (31%), Bunge (23%), Cargill (21%), and AGP (11%). All other account for 14%. ADM, Cargill and Bunge also dominate the industry worldwide.

Trends in the Oilseed Processing Industry
- Industry changing from supply-production driven to demand-consumption driven.
- GMO – genetic engineering is creating new product opportunities for the industry
- Greater production capacity – larger facilities, mergers, joint ventures and greater automation
- Bio-energy opportunities
- Worldwide trade opportunity potentials
- Increased soybean production per acre
- Larger farms, less farmers and the trend to corporate farms
- Within the last few years, the emphasis of the oilseed oil producer has changed from stand-alone independent operations toward the integrated manufacturing facility, producing a more complete range of value-added products from the raw seed to the dinner table. End products such as salad oil, shortening, mayonnaise, and margarine are commonly produced from these process plants.
- Argentina, Brazil, USA and India accounted for 94% of soybean meal exports in 1996 and 2006 respectively. USA soybean meal exports increased by 2 million tons between 1996 and 2006, during this same period, soybean meal exports by the rest of the world increased by 23 million tons. Of the total increase of 25 million tons of world trade in soybean meal between 1996 and 2006, Argentina accounted for 18 million tons or 72%. USA accounted for 2 million tons (8%), India accounted for 1.5 million tons (6%) and Brazil accounted for 1 million tons (2%). This trend is expected to continue, with Argentina claiming a larger and larger share of world soybean meal trade.

Current Conditions & Opportunities
There are five major oilseed processing plants in Minnesota – ADM at Mankato (soybeans) and Red Wing (flaxseed and canola) AGP at Dawson (soybeans) and CHS, Inc. at Mankato and Fairmont (soybeans).

Mankato, Minnesota is the largest soybean processing city in North America. The ADM and CHS plants at Mankato both have large refineries, capable of refining 150% of the soybean oil produced in the state, and five times as much as is consumed in the state. Thus, Minnesota imports crude soybean oil (mostly from South Dakota Soybean Processors in Volga, SD) and exports a large amount of refined soybean oil. However, some of this is later returned to Minnesota in the form of finished products containing soybean oil – cooking oil, margarine, shortening, salad oil, sauces, mayonnaise and fried foods.

Global demand for food, feed and fuel have made farmers ever eager to squeeze more yield from an acre of dirt. With $4 corn prices last spring, we saw a massive shift of acreage out of soybeans into corn. Soybean
acres in the U.S. dropped by 11.4 million acres while corn acres increased by 14.6 million. This happened as many farmers planted corn on corn instead of normal corn on beans rotation. It is very unlikely farmers will plant corn on the same land three years in a row. This fact alone has most analysts expecting a 5-6 million acre increase in soybean acres in 2008. With 2008 soybean futures trading well above $9.00 and 2008 corn under 4.00, soybeans should have little trouble attracting acres in the U.S. this year.

The situation in Minnesota is similar to that in the USA in general, except more so. The five major soybean crush plants in Minnesota (ADM at Mankato, CHS at Fairmont and Mankato, AGP at Dawson and Minnesota Soybean Processors at Brewster) are capable of crushing about 180 million bushels/year, which is 60% of Minnesota’s normal annual soybean crop of about 300 million bushels. So there is no shortage of soybeans to process. But a crush of 180 million bushels produces about 4 million tons of soybean meal, while consumption within the state is about half this amount. So Minnesota processors need to find homes outside of the state for about half the meal they produce. This can be difficult to do, given Minnesota’s location and traditionally low protein content of its soybean crop, meaning that meal produced in Minnesota must compete with meal produced in other states that has 1-1.5% higher protein content.

**Demand for Product**

**Soybean oil** is one of the most versatile vegetable oils available. It can be used to power diesel equipment as soy biodiesel; it can be used as a substitute for expensive petroleum for making plastics; and it’s edible to. As the uses for soybean oil increase, so does the demand. Besides increasing demand for uses such as biodiesel or plastics production, 96% of soybean oil is still used by the food industry, making it the largest consumer of soybean oil. To ensure that edible soybean oil remains a driver of profits, they need trans-fat solutions. GM (Genetically Modified) Low linolenic soybeans have provided the industry with answers for some applications. The Kellogg Company recently announced it would use oil from low-lin beans in many of its products, which would reduce trans fats.

The advent of trans-fat labeling on nutritional labels makes it important to find soy-based alternatives that don’t require partial hydrogenation. Options include low-lin beans and beans with higher levels of oleic acid, which increase the stability of the oil.

Low-lin soybean varieties are available, and the acreage being planted is increasing. To encourage low-lin acreage, Monsanto has committed to keeping its low-lin technology in the U.S. as long as farmers continue to grow enough of these varieties to meet the demand of food manufacturers.

**Canola**

In addition to soybeans, Minnesota also plants and process flaxseed, canola and sunflower seed. Minnesota is the second largest producer of canola in the U.S. The acreage planted in Minnesota has increased from 8,000 to 250,000 in the last 10 years, primarily in NW Minnesota. In total, 650,000 acres are planted in Minnesota and North Dakota, and 2 million acres of canola are planted in the US. Canola provides an alternative crop to wheat and potatoes in that region and has the added advantage of being a “double crop,” being planted in the fall and harvested in the spring. In the United States, the demand for canola outpaces production almost three to one, requiring a substantial amount of product being imported. Worldwide production of canola has reached 38 million tons annually, ranking it third among all edible oils. China and Europe together produce more than 22 tons annually.

Canola oil is ideal for use as a bio-diesel and for cooking purposes as it holds up well to high cooking and frying temperatures. It is also the lowest in saturated fats (7%) of all the vegetable oils and contains significant amounts of essential fatty acids (oleic acid) and linoleum acids, which have proven health benefits. In the U.S., 45 % of margarines, 60 % of shortenings, and 80 % of salad dressings contain canola oil. Canola’s makeup is 40 % oil and 20 % protein, yielding a high-quality meal for livestock feed.
Genetically engineered high-laurate canola oil is less expensive than tropical oils such as coconut and palm oil and has a sudsing quality that makes it useful in shampoos, soaps and detergents. The creamy texture is suitable for chocolate flavored candy coatings, frostings and as a coffee creamer.

Areas of opportunity for canola include use in both bio-diesel and motor oil, gourmet cooking oil (substitute for imported olive oil). GMO canola oil (Lauric oil) has the possibility or replacing some of the tropical oil imported annually from the Philippines, Malaysia and Indonesia. Demand from China, SE Asia and Eastern Europe and Latin America is expected to increase as those economies improve.

**Flax - Linseed Oil**

Approximately 8,000 acres of flaxseed is planted in NW Minnesota each year, making the state fourth in total acres planted annually in the US. North Dakota leads the nation in total acres planted annually (750,000), followed by Montana (35,000) and South Dakota (20,000). In the 1980’s, demand for flaxseed oil was adversely impacted by advent of latex paint which virtually replaced oil based paints, one of the key areas where linseed oil was used.

At one time there were 40 flaxseed oil processing plants in the U.S. Currently there are two major processing plants remaining in the Midwest - ADM in Red Wing and Cargill in Fargo, ND. There are four smaller processing facilities that have sprung up in Minnesota and North Dakota, serving niche markets.

**Areas of opportunity**

Flaxseed oil is 57% omega-3 fatty acids, more that any other seed or fish oil. It is also rich in omega-6 and omega-9 essential fatty acids, B vitamins, fiber, protein, potassium, lecithin, magnesium and zinc. It is claimed to reduce high blood pressure, reduce cholesterol and the rise of heart disease. Additionally, some claim it can assist in treatment of eczema, psoriasis, arthritis and menstrual pains. Flax meal is 35% crude protein, optimal for livestock feed.

Areas of opportunity for flaxseed oil include various health and food markets, for organic based animal farming, and new industrial uses.

**Value Through Protein**

Greater demand for soybean oil means that more beans will be crushed, resulting in surplus soybean meal. And our two largest customers both demand soybean meal with adequate protein.

Our number one export customer for U.S. soybeans is China, and buyers there demand protein levels, along with adequate oil levels, that are necessary to produce high-protein meal for livestock. A drop in export demand from our Asian buyers could perhaps trigger a drop in soybean prices. In addition, since most soybean meal consumed in the U.S. goes to feed livestock and poultry making them our number one domestic customer, it only makes sense that meal quality addresses the specialized needs of this market. Research is underway to improve the amino acid profiles of U.S. soybean meal to increase animal efficiencies in animal agriculture. Advancements in this could make U.S. soybean meal the only supplemental protein source needed for swine and poultry production.

**Value Through Change**

Some processors have premium programs for specific quality traits that allow farmers to directly profit by raising certain varieties. However, over the long run, all farmers benefit by raising the overall average protein and oil content of U.S. soybeans. Other compositional traits such as low-lin beans and future improvements of soybeans for animal feed help ensure profitability far into the future, and ensure that the good reputation of the U.S. soybeans continues.

Worldwide vegetable oil consumption (of which soybean oil represents 28%) is growing at a faster rate than population – 4.1% compared to 1.3% compounded over the past 5 years. As the developing world continues to improve its standard of living, this trend will continue. Per capita vegetable oil consumption is a good measure of a country’s prosperity.
Check off Connection
The soybean check off is a mandatory assessment and is a pool of dollars collected from 30,000 Minnesota soybean producers at the rate of .5% of the market price per bushel of soybeans sold and is authorized by the Federal legislation and a majority vote of a farmer referendum. The money is invested in projects, promotion and research to help the growers stay competitive. Half of all the check off dollars remains in the State where they are collected. The other half goes to the United Soybean Board and is invested in four areas: International Marketing, Domestic Marketing, New Uses, and Production. Minnesota Soybean Research and Promotion Council direct the investment in soybean check off dollars in international and domestic marketing programs, research projects, education and technology programs all designed to increase the profitability and opportunities of soybean production.
The soybean check off addresses domestic and export customer demands by providing farmers with information about high protein and oil seed varieties and varieties with desirable compositional traits. To meet export demands, farmers are encouraged to select seed varieties based first on yield, and then on the highest available oil and protein levels in the particular area. The check off also partners with industry leaders on research to determine other compositional traits such as low-lin beans and additional quality components that will allow farmers to get more value from their meal and oil in the future.

Industrial Uses of Soybeans
Among some of the industrial uses of soybeans are; fertilizers, sprays, paper coating, board coating, yeast, plastics, soy ink, paints, waxes, solvents, cleaners, adhesives, building materials and medicines. Only soy ink has made significant inroads into the market for products made from conventional materials.

Biodiesel
Biodiesel is being made from soybean oil due to high petroleum prices, emissions benefits coupled with the renewability of the crop and, its lubrication properties. The lubrication property of biodiesel and its ability to function as a sulfur replacement provides a realistic alternative as the Environmental Protection Agency continues to require sulfur reduction in petrochemical diesel. With the rapid expansion of the biodiesel industry in the U.S. over the past few years, particularly that segment of the industry that plans to use soybean oil as its primary feedstock (which is most of the industry), the demand for soybean oil soon could outstrip the domestic soybean crushing industry’s production capacity. The USDA, in their May 2007 WASDE report, identified biodiesel separately for the first time in their bean oil usage number. In the September WASDE numbers the USDA raised their 2007/2008 biodiesel use projection by 500 million pounds to 4 billion pounds. In 2005-2006 soybean oil used for biodiesel totaled 1.555 billion pounds. This is an increase of 157% in just two growing seasons. The USDA is estimating that consumption of soybean oil will exceed production in the U.S. by 885 million pounds or 4%.

Workforce
Engineers, Commodity Traders, Lab Technicians, Maintenance Technicians, Electricians, Pipe fitters, Boiler Operators and Buyers are in demand in this industry due in part to the increase in the ethanol and biodiesel facilities being constructed throughout the State. This has caused bidding wars between facilities to recruit for these positions. The shortage of employees within the industry has caused wages in this industry to increase. Due to automation, this industry is having greater needs for semi-skilled positions rather than the general laborers of the past. The general laborer is now a precision skilled employee needing basic math, mechanical skills, computer skills, industrial maintenance skills, PLC related skills, and able to document processes including inventory management skills. Some of the industry’s interviewed felt that there was a disconnect with the K-12 school system and that there is too much focus on students getting a 4 year college degree and not addressing students entering into the workforce directly out of High School. There needs to be more emphasis put on good paying jobs available in the region that require minimal education (2 year technical degree) or no education for those that a 4 year degree is not an option. This would increase enrollments in technical programs at our colleges bringing those educational opportunities back to our regional technical schools. Many employees in this industry have been with their companies for many years in mid to higher level positions resulting in higher numbers in the aging workforce. Companies interviewed indicated that the lower skilled level employee is more difficult to recruit and retain due to the 24/7 rotating shifts, working holidays, environmental conditions, and just the overall generational issues (work ethic).
Internships and apprenticeships are also utilized by the companies within this study.

**Education**

The industries interviewed recruit from various colleges in the area and out of state. Professional level positions normally require a B.A. or other advanced degrees. Colleges mentioned were University of Minnesota, South Dakota State University, Iowa State University, Riverland Community College, South Central Community College and wherever they can pull them from throughout the U.S. In addition, there was mention of using recruitment search firms if needed. It was noted that one of the weaknesses in Region 9 was that there were no technical agriculture programs for trade related professions within the immediate area of Mankato due to the 100 mile competition rule within MnSCU.

**Training**

Much of the training done in this industry is in-house due to the nature of the positions. One company indicated that due to quality requirements and regulatory issues they do all in house training. Others mentioned that due to the unavailability of trade related training provided in the local area they have had to look at providers from a distance for specific trade related training however, they noted that they have had to weigh the cost of having a provider travel to their facility for the training from a distance vs. the cost of sending the employees to the provider resulting in the cost of downtime and being able to run the 24/7 shift. Some in this industry have developed a apprenticeship programs to address their needs.

CHS and the CHS Foundation and Agriculture Future of America, a collegiate organization that provides career development for students planning a career in agriculture have formed an expanded partnership. CHS & CHS Foundation are making a $40,000 contribution that will help AFA provide programs for college students. The partnership will assist in the identification of college men and women who are interested in careers in the agriculture and rural America. ADM and other companies have developed similar career development relationships and provide scholarship dollars also.

**History of the Flour Milling Industry**

Historians estimate that wheat cultivation began between 10,000 and 15,000 years ago which marks the beginning of civilization. As the U.S. was settled, mills were constructed in almost every town. Typically the mill relied on water power and was, therefore, located near a source of running water. During the 1870’s, the first roller mills in the U.S. were constructed. Roller mills possessed several advantages: they eliminated the need of dressing millstones; they were able to produce flour through a more gradual extraction process, which enabled millers to yield a larger percentage of better grade flour; and they lent themselves to greater efficiency, thereby making the construction of larger mills more feasible. As Americans moved west, milling centers moved with them. Mills became larger in size but fewer in number. In 1870, an estimated 22,000 mills served the nation’s population of about 30 million. One hundred and ten years later, the nation’s population of 220 million was served by an estimated 150 to 250 mills. In Michigan, for instance, the number of mills fell from 534 around 1900 to only 6 in 1990.

**Trends in the Flour Milling Industry**

- Millers began to offer a wider variety of products during the early 1900’s.
- During the middle of the twentieth century, fundamental changes occurred in the primary location of mills. Prior to the 1950’s, the cost of shipping wheat and the cost of shipping flour were approximately equal; and mills were frequently built close to wheat fields. During the 1960’s, the cost of shipping grain decreased following the introduction of hopper rail cars. At the same time, costs surrounding sanitation requirements increased the price of shipping flour. As a result, mills were constructed in close proximity to end markets rather than near the wheat fields (Origination mills to Destination mills).
- During the 1970’s sales of household flour declined as society moved away from home baking and homemakers demonstrated a preference for the convenience and consistency of prepared mixes. Although overall flour consumption dipped somewhat during the early 1970s, annual per capita flour consumption grew dramatically in the final three decades of the twentieth century. A healthy economy favorable to the baking industry, especially noted in the wild proliferation of specialty baking stores such as bagel shops, further fueled robust growth. Several factors contributed to
this, including the surge in consumption of fast foods and other flour-based convenience foods such as sandwiches and pizzas. However, growing environmental and health concerns, along with a sluggish global economy, contributed to a decline in consumption in the early 2000’s. Per capita flour consumption fell from 146 pounds in 2000 to 143 pounds in 2001.

- According to the U.S. Census Bureau’s Economic Census, there were 340 reporting mills in the U.S. in 2002, down from 385 in the late 1990’s. However, this reflected the trend of prior few decades to fewer mills, and highlighted milling companies’ optimistic investment patterns. The industry employed approximately 11,600 people in 2002.

- Consolidation is perhaps the most consistent trend in flour milling. Since the 1980s, the number of mills declined, while market shares of the top companies escalated rapidly. Flour mills are continuing to consolidate and form joint ventures in order to reduce labor, transportation costs and increase profits. The cluster once a supply driven industry has evolved into a demand driven industry due to a variety of competitiveness factors. In addition, in order to maintain a competitive position, businesses are striving to stay at the top in technological advances, new product development, value added services and marketing specialized products for particular market niches with an objective to differentiate products and increase profits.

Current Conditions & Opportunities

- Per capita consumption of wheat flour was down to 136 pounds in 2003, from 147 pounds in 1997. Numerous factors have contributed to this decline, including the high-protein, low carbohydrate (“low-carb”) diet fads of the 2000s, as well as a nutritional shift from refined bread and pasta products to whole grain products.

- U.S. wheat plantings in the last three years were the lowest since 1972. The area planted to wheat dropped by 18 million acres, or 24%, in just 10 years. This is due largely to the genetic advances in corn and soybeans that are now grown in the traditional wheat-growing plains regions. Each passing year, that lag becomes more pronounced.

- The President has proposed a mandate for the U.S. to produce 35 billion gallons of ethanol by 2017. With government mandates and incentives, the biofuels industry will increasingly compete with the milling industry and others for crop acres. The competition will impact cropping patterns, prices, and transportation.

- Genetic engineering and biochemical advances hold promise for new advances in wheat crop production and meeting consumer demands. Genetically modified products have created greater opportunity within the global markets. GMO’s have proven their value over time contrary to earlier resistance and concerns.

- A key factor affecting companies’ survival in the flour industry is the ability to compete within the fluid conditions of wheat production and consumption. Companies must maintain the structural and financial stability to weather fluctuations in national currencies, weather-induced wheat shortages, and socioeconomic realities that figure so prominently in the industry. Many companies struggling to reinforce their market foothold attempt to expand their flour-based operations by acquiring new products or tapping in new investment sources. Insufficient knowledge of consumer tastes and failure to take a long-term approach invariably lead to costly lessons for some companies, particularly those attempting to penetrate foreign flour markets.

- The industry is becoming customer oriented and driven to address customer needs by adding value added services and also have labs available for customer product development.

- Demand for whole wheat products in response to health craze.

- Energy Saving Green Initiatives

- In order for grain production to keep up with growth in processing, research programs are vital to sustaining, and increasing production in the U.S. Many companies continue to invest in processing capacity in U.S. research.

- Members of the wheat chain from farm to table are working together to restore competitiveness in the wheat industry. They organized a Wheat Summit to unite the industry behind broad initiatives that include, domestic farm policies, domestic competitiveness, research and technology and exports, transportation and infrastructure.
Demand for Product
Of those flour milling industries interviewed, demand for flour varies locally, regionally, nationally and internationally due to distribution locations. They vary from 5% locally, 15% regionally, 70% nationally and 10% internationally to 5% locally, 75% regionally and 20% nationally and none internationally. The raw commodity (wheat) is drawn from 5 states, North Dakota, South Dakota, Nebraska, Canada, N.W., & Southwest Minnesota.

Workforce
Some businesses interviewed have developed an in-house strategy to groom current and new workforce into key positions to replace aging workforce so as not to loose key institutional knowledge. Increasing automation has heightened the skill level required for many positions within the industry, including entry level positions. However, due to the need to run a 24/7 rotating shift, it has been increasingly difficult to find and retain new entrants into the industry. Due to the work conditions, some companies have had to remain competitive in wages to attract new workers.

Education
Minnesota educational institutions do not offer flour milling industry specific degreed programs. The industry relies on filling professional positions by recruiting graduates from Kansas State University and Purdue University. The lack of professional candidates does impact the industry.

The absence of educational programs in flour milling in Minnesota contributes to a general lack of awareness of the industry and the career opportunities it offers. (A miller can expect to earn $45,000 to $50,000 per year to start. Some positions pay up to $100,000).

Several businesses indicated they were successfully accessing training through their area Technical Colleges in areas such as welding, PLC, forklift, electrical and mechanical maintenance. Where successful, this relationship could be even developed further and in regions where that relationship does not exist, the models could be duplicated, as needed.

Training
Vendor sponsored training, including on-site, locally, regionally, nationally and internationally, is utilized as an important means for the industry to train mid-level to higher level employees as well as equipment operators. The industry also utilizes International Association of Operative Millers (IAOM) to access educational resources and training. IAOM provides conferences, workshops, and correspondence courses, short courses to assist in training and continued education.

Industry and IFC Snapshots
ADM (Archer Daniels Midland Co.) – Mankato, Mn.
Archer-Daniels-Midland Company (ADM) headquartered in Decatur, Ill., is one of the world’s leading agriculture processors. The company processes soybeans, corn, wheat and cocoa. ADM is also a leader in the production of soy meal and oil, ethanol, biodiesel, corn sweeteners and flour. ADM utilizes both corn and soybeans as sources of co-products, by-products and processed materials. In addition, ADM produces food ingredients, animal nutrition and industrial products. The ADM soybean solvent extraction plant in Mankato, Minnesota went into operation in 1950. This plant consists of emission units related to soybean receiving, storage processing, solvent extraction/recovery, meal processing, oil refining, and steam production. The soybean crushing and refining plant operates a 24/7 rotating shift, around the clock year round and employs 85 employees. The products produced at this facility are fully refined and hydrogenated soybean oil & soybean meal (protein for animal consumption).

ADM (Archer Daniels Midland Co.) – Red Wing, Mn.
Archer-Daniels-Midland Company in Red Wing, Minnesota fills a “Niche” market in the agriculture industry. It began operating in 1902, processing sunflower oil and canola oil. Over 3 years ago, the plant
began the transition towards processing primarily flaxseed (linseed oil) and canola. Due to acquisitions, the decision was made to move the sunflower processing to two plants out of state. The Red Wing plant operates on a 24/7 rotating shift, round the clock year round and employs 50 people. Meal and oil is sold direct out of the Red Wing plant and is transported in bulk by barge, rail and some truck. Product is used in the feed industry (meal), paint, varnish, ink and composite industries.

Bay State – Winona, Mn.
Bay State Milling is a Rothwell family owned & operated company that has been milling flour in Winona since 1899. They are one of the largest milling companies in the U.S. For over a century the company has supplied superior flour and grain products to customers ranging from the largest multinational companies to local independently owned and operated businesses. Customers include retail and commercial bakers, instore bakeries, food manufacturers, foodservice operators and broadline, bakery, pizza and system distributors. The company also serves key segments of the feed industry that uses wheat co-products for pet food formulas, feed mills and integrated animal protein products.

CHS Inc. – Mankato, Mn. and Fairmont Mn.
CHS Inc. operates a soybean crushing plant in Fairmont, Mn., which began operating in 2003. This plant can store up to 3.25 million bushels of soybeans. The extra year round storage lets CHS buy beans when the market is favorable and hold them until they are needed for refining into soy oil. CHS Inc. also operates a soybean crushing and refining plant in Mankato, Mn. The plant in Mankato refines more than 1 billion pounds of soybean oil annually and both plants process nearly 90 million bushels of soybeans annually, equivalent of 2 million acres. Some of their products today are soybean meal and edible flour, fully refined and hydrogenated soybean oil, soy ink, lecithin and soap stock. CHS markets soy flour in bulk and bags domestically and abroad and is distributed under the Honeysoy ® brand name. International distribution is predominantly to eastern European countries where bread, not meat, is the diet mainstay. These two plants operate 24/7 rotating shifts around the clock, year round. The Mankato plant employs 208 employees while the Fairmont plant employs 50 employees. CHS serves the packaged oil and related products through Ventura Foods, LLC, a food production joint venture with Mitsui & Co. Ltd., in which they own 50%. In 2001 CHS formed a joint venture, Horizon Milling, LLC., in flour milling with Cargill, Inc., with a total of 21 mills. CHS producers are the primary supplier of wheat for the alliance, which serves the bakery and other flour customers nationwide. CHS Inc., is owned by farmers, ranchers and cooperatives, along with thousands of preferred stock holders, from the Great Lakes to the Pacific N.W. and from the Canadian border to Texas and headquarters are located in Inver Grove Heights, Minnesota.

Horizon Milling LLC – Lake City, Mn. (A Cargill Foods Affilate & Joint Venture with CHS)
Horizon Milling LLC is an origination flour mill located in Lake City, MN. The primary product produced is wheat flour and standard midds as a co-product. The co-product is sold to feed mixers as a filler for animal feed. The plant began operation as Tennant and Hoyt in 1901. It was purchased by Pillsbury in 1987 and in 1991 Cargill acquired four Pillsbury flour mills, including the Lake City processing facility. In 2001 Cargill and Harvest States Milling announced their intent to form a limited liability company combining their flour milling businesses. On January 11th, 2002 Horizon Milling, LLC was officially formed, including the Mankato Mn, Lake City, Mn., and Rush City, Mn., flour milling operations. Cargill is a privately held international provider of food, agriculture and risk management products and services. The company operates in 63 countries and is headquartered in Wayzata, Minnesota and employs 158,000 people. Cargill’s immense size helps it in achieving economies of scale and also acts as a cushion against any financial crisis. In addition, the company’s scale of operations gives it significant competitive advantages over smaller industry players and helps in acquiring large customers. Horizon Milling LLC’s customers in the US include large bakeries in the Chicago area and on the East coast. They supply customers locally, regionally, nationally and internationally. This plant operates on a 24/7 rotating shift and employs 33 staff.

Horizon Milling LLC – Mankato, Mn. (A Cargill Foods Affiliate and Joint Venture with CHS)
Horizon Milling LLC is an origination flour mill located in Mankato, Mn. The primary product produced is wheat flour and standard midds as a co-product, which is ground up bran that is sold to feed mixers as a
filler for animal feed. This plant started out as Hubbard Milling Company in 1879 and was owned and operated as Hubbard Milling Company until August of 1984 at which time Cargill entered a joint venture with CHS (Cenex Harvest States Inc.) and purchased the domestic flour milling operations of Hubbard Milling Company which included the Mankato, Mn., Lake City, Mn., and Rush City, Mn., flour milling operations. Cargill is a privately held international provider of food, agricultural and risk management products and services. The company operates in 63 countries and is headquartered in Wayzata, Minnesota and employs 158,000 people. Cargill’s huge size helps it in achieving economies of scale and also acts as a cushion against any financial crisis. In addition, the company’s scale of operations gives it significant competitive advantages over smaller industry players and helps in acquiring large customers. Horizon Milling LLC’s customers are local, regional, national & international. This plant operates a 24/7 rotating shift operation and employs 30 employees.

**Tri-State Grease & Tallow Co. Inc. – New Ulm, Mn.**

Tri-State Grease & Tallow Co. Inc., is a local family owned business located in New Ulm, Mn., and has been in business for over 40 years. Larry Hippert an engineer who started the company was a self-taught engineer who started developing products out of waste oil, which mostly came from restaurants and rendering plants. Some of their products today include Tri-State Blend livestock & Poultry Free Flowing Fat, which contains a by-product of the caustic refining process of soybean oil. This product replaces soybean oil and is used in animal feed to increase feed conversions, stimulate palatability and put on gains. It is also being used by many construction companies to coat the beds of their truck boxes as a releasing agent for tar products and is being used for controlling dust on roads. Another product produced is Supercharger Granulated Dry Fat. This product is custom blended and used in animal feed to increase milk & butterfat yield, improve body condition & reproductive performance, highly digestible for more energy intake and inert in the rumen. Enterprise North, another local company in New Ulm does the labeling of their dry fat product. This product is sold to elevators, Cargill, Meriks and other companies. Their customers and suppliers are within a 5 state region; Iowa, North and South Dakota, Wisconsin and Minnesota. About 5% of their product is sold locally, 20% regionally, 30% in the State of Minnesota and 45% to the other states listed above. In 2000 Larry Hippert passed away, his two sons and spouse continue to run the business and employ 11 employees at their facility. They have seen a significant increase in demand for their product which has doubled in the last 5 years and do not foresee it declining.

**Ventura Foods, LLC – Albert Lea, Mn. (A Joint Venture with CHS & Mitsui & Co LTD)**

Ventura Foods is a leading manufacturer, packager, and marketer of edible oil based products including margarine and butter blends, salad dressings, sauces and vegetable oils with annual sales of more than $2 billion and purchases of more than 2.2 billion pounds of oils annually. Makers of Marie’s® and Dean’s® brand refrigerated salad dressings and dips for the consumer market, and Hidden Valley® dressings and other products for the food service sector. Ventura Foods operates 13 plants, utilizes more than 2,900 distribution points nationwide and employs more than 2,400 people. The plant in Albert Lea, Mn, was founded in 1965 and employs 180 employees.

**Institutions for Collaboration (IFC’s)**

**Agriculture Utilization Research Institute (AURI)**

AURI is a nonprofit corporation, funded by the Minnesota State Legislature, and was created to improve the economy of rural Minnesota through the development of new uses and new markets for the state’s abundant agriculture commodities and is considered the research arm of Minnesota’s agriculture. AURI assists commodity groups, agri-processors, farmers, farmer-owned cooperatives and entrepreneurs in the development of innovative and value-added uses for agricultural products. The institute builds working relationships with business innovators, agricultural groups and researchers, and provides technical support to clients conducting new product research and development. Their programs are available to legally organized businesses or cooperatives with projects that have the potential to create new uses or new markets for Minnesota agricultural commodities. AURI assistance is designed for the early stages of a product’s life cycle, while an element of feasibility is yet to be determined.

**The American Soybean Association (ASA)**
ASA is a membership driven, grassroots policy organization that represents the U.S. soybean farmer. ASA has worked on meeting the agriculture demands of the growing word for 85 years and has been the collective voice for the 27,000 + U.S. soybean producers. The primary focus is policy development and implementation. ASA testifies before Congress, lobbying Congress and the Administration, and meets with the media to accomplish the policy goals established by the farmers, members and delegates.

International Association of Operative Millers (IAOM)
IOAM has been the leading provider of educational resources and training for the milling industry since it foundation in 1896. Through conferences, workshops, correspondence courses, short courses and publications, IOAM has played an integral role in the continued education and training of the professionals in this industry for 110 years. IOAM is an individual-based member organization with a membership that represents some 70 countries worldwide. The association works solely to improve the profitability, efficiency and safety of grain mills and is a network of millers, who are able to share their professional insights on the technical and operational aspects of milling.

Minnesota Association of Wheat Growers (MAWG)
MAWG is a voluntary grass-roots organization that derives its direction from the membership and works to improve wheat profits. It is a commodity-specific, non-partisan political lobbying organization.

Minnesota Soybean Growers Association (MSGA)
MSGA is the lobbying arm of the soybean producer. MSGA is a non-profit, farmer controlled membership organization established in 1962. Its goal is to assure profitable soybean farming by monitoring government policies and supporting research and market development activities.

North American Miller’s Association (NAMA)
NAMA is a trade association of the wheat, corn, oat and rye milling industry. It is comprised of milling member companies operating mills in the U.S. and Canada and associate member companies representing the industries providing products and services to the mills. The aggregate production capacity of NAMA milling members is more than 160 million pounds of product daily, which is about 95% of the total U.S. capacity.

National Oilseed Processors Association (NOPA)
Organized as the National Soybean Processors Association (NSPA) in 1929, it was renamed in 1989, as the National Oilseed Processors Association (NOPA). NOPA now represents oilseed crushers of canola, flaxseed, safflower, soybeans and sunflower. NOPA represents thirteen regular member firms engaged in the actual processing of oilseeds, and twelve associate member firms who are consumers of vegetable oil or oilseed meal, including some refiners and mixed feed manufacturers. Through its various committees, the Association cooperates with the U.S. Departments of Agriculture, State and Commerce, as well as other independent and private organizations, both national and international, concerned with oilseed products.

Rural Advantage
Established in 2003, Rural Advantage is a nonprofit corporation. The mission of this corporation is to promote the connections between agriculture, the environment and rural communities in order to improve the ecological health, economic viability and rural vitality.
Challenges in the Flour Milling & Oilseed Processing Cluster

Workforce:
Industry participants reported a shortage of workers at some or all levels. Most companies in this industry run a 24/7 rotating shift operation that is undesirable to the new generation of workers. Maintaining a regional pool of qualified production employees and attracting experienced managerial staff to rural locales is difficult. Emphasis was often placed on math, computer literacy and soft skills, starting with K-12 achievement. In the face of increased global competition, regional firms unable to compete simply on cost must rely on skilled productive, self-sufficient employees to maintain competitiveness.

This industry is continually implementing new automation and food safety processes. The professional, semi-skilled and less skilled workers that are in high demand in this industry are listed below and require at a minimum a four (4) year degree, a two (2) year technical degree and for the less skilled, a GED or less.

**Industrial Engineers** – Plan equipment lay-out and workflow in manufacturing plants emphasizing efficiency and safety.

**Mechanical Engineers** – Plan, design and oversee the installation of tools, equipment and machines.

**Commodity Traders** – Buy and sell commodities in the cash market, as well as make and coordinate arrangements for the transportation of the product.

**Sales Representatives** – Identify new markets and business opportunities and negotiate the terms of an agreement and closing sales.

**Lab Technicians** – Work in research labs or on production lines to develop new products, test current ones, and control food quality, including minimizing food bourne pathogens.

**Procurement Clerks** – Keep track of the food products going into and out of the plant.

**Class 1A Boiler Operators** – Maintain high and low pressure steam, electric and other types of boilers.

**Maintenance Technicians** – Performs a variety of semi-skilled construction maintenance, modification and repair activities.

Less skilled positions in high demand are production workers, including skilled precision workers and less skilled machine operators and laborers. The industry as a whole is impacted by a workforce lacking basic math skills, computer skills and soft skills. In addition, industrial maintenance/mechanical skills are in short supply.

**Government and Regulatory Compliance:**

Some industry participants noted that Minnesota’s worker’s compensation, redundant safety standards, inflexible waste management regulations, trucking regulations, lock and dam regulatory issues and the “ever-changing“ environmental permitting regulations create excessive burdens on conducting business in Minnesota. A few participants believe that Minnesota Pollution Control and other state agencies duplicate the work of the federal Environmental Protection Agency and create unnecessary regulatory hurdles. Companies wish to form a collaborative rather than adversarial relationship with Minnesota regulatory agencies. Industry participants state that collaborative efforts allow firms to more quickly remedy environmental concerns and avoid litigation delays. Inconsistency in regulations and ordinances at the various levels of government – national, state, county, and township- make successful industry navigation, sound capital investment and profitability increasing difficult and reported increasing frustrations with cumbersome administrative paperwork and duplicative or unclear regulations.
Proposed Action Plan

Future Strategy for Workforce Development – Recommendations

Workforce issues have been the most critical concern for the participating industries. Aging workforce issues, turnover in lower skilled positions, difficulty in recruiting for professional and semi-skilled positions, low employment rates and low population densities contribute to a shortage of workers. Minnesota must renew its commitment to workforce and educational quality by investing appropriately throughout the spectrum of education, and training, including engaging K-12, higher education, private training vendors and industry in bold efforts to ensure Minnesota’s competitive advantage in workforce quality, flexibility and innovation.

- Strengthen industry led incumbent worker training by leading an initiative of collaborative partners from the industry, industry associations, high schools, educational institutions, Minnesota Center for Engineering and Manufacturing Excellence, economic development professionals, and DEED to develop training programs and a career laddering process for these industries.

- The supply and demand issue for boiler operators in this industry other industries surfaced in Region 9 in April of 2007. Sondra Rademacher, DEED Business Service Specialist, Mankato, Mn., collaborated and held an open forum meeting in September of 2007 to address the supply and demand issue industry wide. DEED, Legislative members, Department of Labor and Industry, supporting industry associations (AURI & MSGA) and 132 employers attended from various industries and regions. The ending result was positive the DOLI formed and is heading a Boiler Operator Advisory Committee that includes members from all industries, i.e., forestry, ethanol, energy, food manufacturing, labor unions, educational institutions and private placement agencies. The goal of the committee is to assess the educational requirements, regulations and current statutes, and make recommendations to the legislature for regulation and statute changes to meet the supply and demand for workforce in this occupation. It will be presented to the legislature in February 2008. More of this collaboration needs to take place with those mentioned above in order to meet workforce demand and communicate business needs.

- DEED needs to strengthen their relationship with area high schools and industry leaders to promote Project Lead the Way or similar efforts to introduce high school students to viable career opportunities within the industries and to educate the educational institutions and high school students regarding the required skills needed to be successful within the industry.

- There appears to be a conflict within the MnSCU system that creates a barrier that limits program availability based on geographic areas. We are recommending that this issue be reviewed by DEED, educational institutions, industries and related departments and agencies to make appropriate recommendations and take action.

Future Strategy for Addressing Regulatory Issues – Recommendations

Cumbersome and inconsistent regulations at all levels of government make profitability in this cluster and processing increasingly difficult. Regulatory instabilities constrain new capital investment in the region, limiting its ability to remain strong and competitive in a national and international environment. The cluster should work together to address regulatory improvements. By working cooperatively, cluster initiatives can influence policy makers, communities and other stakeholders in addressing current inefficiencies and provide solutions for streamlining complicated industry processes. Improvements can achieve the goals of clarity, consistency and appropriateness while respecting the intent of safety, land use and public controls.

- Identify the issues and present to the various legislative areas.

Moving the cluster study forward into action

Distribute copies of this report to Industry participants and other interested parties as appropriate
Presentation to the Cluster Study groups and DEED Commissioner
Partner discussion with the industry leaders as to the actions the industry desires to take.
Inform educational institutions of Industry training needs/issues
### Flour Milling & Oilseed Processing

#### Key Stakeholders & IFC’s Interviewed

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<th>Region 9</th>
<th>Organization</th>
<th>Name</th>
<th>Title</th>
<th>Location</th>
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<tr>
<td>CHS Inc.</td>
<td></td>
<td>David Schostad, V.P. – Kyle Gahlon</td>
<td>HR Manager</td>
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<td>CHS Inc.</td>
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<td>ADM</td>
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<td>Ken Campbell, Commercial Manager</td>
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<td>Horizon Milling</td>
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<td>Bruce Carlson, Special Projects Manager</td>
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<td>Mankato, MN</td>
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<td>Tri-State Grease and Tallow</td>
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<td>Sharon Donay, Office Manager</td>
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<td>Bay State</td>
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<td>Tony Wasinger, Plant Manager</td>
<td>Travis Akin, Plant Superintendent</td>
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<td>Deb Roschen, Office Manager</td>
<td>Will Baeder, Plant Manager</td>
<td>Lake City, MN</td>
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<td>Ventura Foods LLC</td>
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<td>Gary Walker, Operations Manager</td>
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<td>Albert Lea, MN</td>
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<th>Organization</th>
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<td>AURI</td>
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<td>Dan Lemke, Communications Director</td>
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<td>Alan Doering, Associate Scientist/Co-Products</td>
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<td>Mn. Soybean Growers Assoc.</td>
<td></td>
<td>Lawrence Sukalski, MSGA Treasurer</td>
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<td>Fairmont, MN</td>
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<tr>
<td>MN. Rural Advantage</td>
<td></td>
<td>Linda Meschke, President &amp; Owner</td>
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<td>Fairmont, MN</td>
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Diamond of Advantage

Conditions in the industry can be described using Michael Porter’s Diamond of Advantage, as described in The Competitive Advantage of Nations and On Competition. The following pages summarize the five components of the Diamond analysis: factor conditions, demand conditions, context for firm strategy and rivalry, related and supporting industries, chance and government. Attachment A depicts the Grain & Oilseed industry graphically using the model shown as below.

FACTOR CONDITIONS

- The industry has a relationship with the food, feed and fuel industries that directly impact the industry.
- Proximity to the raw commodities is especially critical to the area primary processors and the historical reason for the location of these industries. In addition, the industry’s location opens up regional and global markets.
- Transportation infrastructure (rail, truck and barge) are vital to both industries.
- Technology advances in automation, communication, computerization and data processing infrastructure are critical to the industry to remain competitive in the industry. Due to technological advances in equipment and computers, the industry has been able to achieve larger economies of scale in all other processes.
- The lack of qualified workforce availability is a critical issue for the industry. Due to increasing automation, the workforce needs have shifted from labor intense to semi-skilled. Educational programs within some areas do not meet the educational needs of the industry. Workers with good technical and basic skills can be trained on the job.
- The industry is very sensitive to environmental issues, i.e., (air, water, soil, energy, chemicals and green initiatives) because the government requires it and their customers and consumers demand it.

STRATEGY AND RIVALRY

- Value added products and services are constantly being developed in these industries to add new markets to the industry locally, regionally, nationally and internationally.
- Many companies are investing substantial sums in research aimed at improving quality control. Quality control and quality assurance are vital to this industry.
- Fierce competition has led these industries to invest in technologically advanced machinery to be more productive and less labor intensive. Computer and automation technology is constantly being updated throughout the industry, reducing employment growth of some positions but increasing the demand for workers with excellent technical skills.
Some of the industries interviewed compete with the ethanol and biodiesel industries for workers. Many of the skills needed are of the same, i.e., boiler operators, commodity traders, engineers, maintenance technicians etc.

Many of the industries interviewed have research and development divisions located within or at their headquarters. Both these industries invest and relies heavily on R&D activities and also work with various industry associations and institutes for new product development.

A number of companies are using a Global Strategic Sourcing System to make it easier for suppliers and customers to work seamlessly across the geographies of the industry. This system benefits them by reducing overall costs and greater economies of scale.

Marketing and branding are essential to this industry due to the competitive nature of both industries. Advertising and Media perceptions play a huge role in the processing industry. Negative advertising can impact processes through the whole supply chain.

The industries are highly regulated and have made a very conscientious effort to work with all governmental agencies on all the numerous regulatory mandates and hurdles. These industries invest millions to meet the regulatory requirements of the industry.

Mergers, acquisitions and joint ventures are common in this industry. By having large scale operations, it gives significant competitive advantages over smaller industry players and helps in acquiring large customers but also acts as a cushion against any financial crisis.

Supplier relationships and supplier diversity are very important to these industries.

**DEMAND CONDITIONS**

- There is a growing demand and competition for land to grow raw commodities in both these industry’s and more so now with an increasing demand from the biofuel and ethanol industries.
- Local, regional, national and global demand for grain and oilseed products.
- Consumer demand for healthy food alternatives and other industry value added co-products.
- Supply and demand for quality and new products from the feed, food, fuel and industrial markets.
- Research development for product improvement due to customer demand and economies of scale.

**RELATED AND SUPPORTING INDUSTRIES**

- Most of the industries interviewed have research and development divisions located within or at their headquarters. Both these industries invest and relies heavily on R&D activities and also work with various industry associations and institutes for new product development.
- The flour milling industry sources operation and processing equipment mainly through international channels and the soybean processing industry purchases regionally, nationally and internationally.
- The flour and soybean meal processing industries ship most of their product out in bulk, thus relying on packaging manufacturers to package the end product. Some of the industry processor’s do bag product and ship product under private and customer labeling.
- The majority of the industry products go to other industry processing manufacturers as an ingredient blended or added to their product.
- The industry relies upon inbound and outbound storage and warehousing facilities.
- Both industries rely on rail, truck, and water modes of transportation. Rail and truck being the most widely used.

*The suppliers mentioned above are local, state, regional, national and international

**GOVERNMENT**

- Both industries are heavily regulated and invest significant time and resources to complying with the myriad of local, regional, state and federal safety and environmental rules and regulations i.e., food quality, FDA, USDA, Safety-OSHA, Homeland Security, U.S. Coast Guard, U.S. Army Corp of Engineer, EPA.
- This industry is greatly impacted by federal and state agriculture check-off programs, ag subsidy programs, and tax incentives. The industry also relies on numerous governmental financial incentives and programs.
- The industry is subjected to State, Federal and International policies.
The industries are impacted by weather variables which in turn affect the supply and quality of raw commodities. This causes an increase in demand and prices. In good years there may be an abundant supply and conversely in years where there are shortages of moisture and adverse weather conditions there may be a shortage of raw commodities. This has a direct correlation to the pricing structure.

* Please see (Attachment A) for Porter Diamond of Advantage for the Grain Milling & Oilseed Processing Industry’s
Attachment A
Porter Diamond of Advantage for the Grain Milling & Oilseed Processing Cluster

Firm Strategy and Rivalry
- Value Added Products & Services
- Quality Control & Quality Assurance
- Automation & Technology Advances
- Competition for workforce
- Global Strategic Sourcing
- Marketing/Branding
- Advertising
- Program Subsidies
- Regulations
- Mergers/Acquisitions/Joint Ventures
- Supplier Relationships/Supplier Diversity

Chance
- Weather

Factor (Input) Conditions
- Southeast and South Central Minnesota Grain and Oilseed Milling Cluster
  - Food, Feed, Fuel (Bi-products)
  - Raw Materials & Acreage use
  - Transportation: Rail, Truck & Barge
  - Technology: Automation, Communication, Computerization, Data Processing
  - Mergers, Acquisitions, Joint Ventures
  - Workforce skills & availability
  - Educational Services - public & private and in-house training
  - Environmental Conditions

Demand Conditions
- Food, Feed, Fuel
- Raw Materials/Crops
- Food Alternatives/Value Added Products
  - (Consumer demand)
  - Quality products and R&D
    - (Consumer demand & competition)

Related and Supporting Industries
- R&D Centers
- Equipment Manufacturers
- Packaging manufacturers
- Ingredient Manufacturers
- Distribution/Warehousing/Cooperatives
- Transportation industries
- Domestic Farm Market
- Food Processing Markets
- Industrial Markets
- Export Markets

Government
- Local, State, Regional and Federal
- U.S. army corps of Engineers
- U.S. Coast Guard
- Food Quality - FDA, USDA
- Safety - OSHA
- Environmental
- Emission (EPA)
- Gov't Financial Incentives
- Homeland Security
- Zoning
- Import/Export Policies
- Legislative policies
- Laws and Regulations
- State & Fed ag check-off programs
- Ag subsidy programs
- Tax Incentives
Minnesota’s food manufacturers are located in all 13 economic development regions of the state but are principally located in the southern part of the state. The food manufacturing industry processes a large share of Minnesota farm output, such as raw vegetables, grains, meats, and dairy products, into either intermediate goods which are used as inputs in some other manufacturing process or finished goods ready for the grocer or wholesaler to sell to households, restaurants, or institutional food. Region 11, the Twin Cities metro area, had the highest concentration of food manufacturing plants and the largest food manufacturing employment base, with 10,400 workers in 2006. Southeast Minnesota (Region 10) had the next largest food manufacturing workforce in 2006 with 8,900 workers.

Grain and oilseed milling companies are also located throughout the state but employment wise the industry is concentrated in South Central (Region 9) and Southeast (Region 10) regions of the state. These two regions were home to 68 percent (1,900 jobs) of Minnesota’s 2,800 grain and oilseed milling jobs in 2006.
Appendix 2
Grain Milling and Oilseed Processing Cluster

Suppliers
- Flaxseed Farmers
  (NW MN, ND, Canada)
- Wheat Farmers
  (MN, ND, SD, NE, Canada)
- Soybean Farmers
  (MN, ND, SD, IA)
- Grain Elevators
  Storage Facilities
- Management of Companies
  (Wayzata, MN, Decatur, IL, Quincy, MA, Brea, CA, New Ulm, MN, Inver Grove Heights, MN)
- Utilities
- Equipment Manufacturers
- Other Food Manufacturing
- Paper Manufacturers
- Professional, Scientific, and Technical Services
  (R&D, Education)

Grain and Oilseed Milling Cluster
(16 Companies - 1,900 Employees)
- Transportation - Rail, Truck, and Water
- Transportation Policy
  Army Corps of Engineers
  State Transportation Depts.
  U.S. Coast Guard
- Trade and Lobby Associations
  NOPA
  NAMA
  NAWG
  IOAM
  ASA
  MSGA
  AURI
  FCC
  BioBusiness Alliance of MN
  Rural Advantage
- Agricultural Policies
  U.S. Department of Ag
  (Check offs, Farm Programs)
  State Department of Ag
  (Ethanol Subsidies)

Markets
- Domestic Byproduct Farm Market
  Midwest Poultry Producers
  California and Midwest Dairies
  Midwest Beef Producers
  Midwest Pork Producers
  Aquaculture Farms
- Food Processing Markets
  Dog and Cat Foods
  Cookies, Crackers, Pastas, Snacks
  Breakfast Cereals, Frozen Foods
  Tortillas, Ice Creams, Candies,
  Cooking Oils, Bakery Products
  Food Spreads, Infant Foods, Cheeses,
  Shortenings
  Salad Dressings, Beverages
- Industrial Markets
  Fertilizers, Paper Coatings Adhesives,
  Plastics, Drying Oils Waxes, Polishes,
  Paints, Soaps, Putty, Inks
  Water Repellents, Lotions, Sprays,
  Medicines, Resins, Dust Suppressants,
  Biodiesel
- Export Markets
  (Oil, Meal, Flour, Paints, Inks, Linoleum)
  Europe, China, Japan, Korea, Brazil,
  Singapore, Iraq, Canada, Afghanistan

Flaxseed Farmers
(MN, ND, Canada)
Wheat Farmers
(MN, ND, SD, NE, Canada)
Soybean Farmers
(MN, ND, SD, IA)
Grain Elevators
Storage Facilities
Management of Companies
(Wayzata, MN, Decatur, IL, Quincy, MA, Brea, CA, New Ulm, MN, Inver Grove Heights, MN)
Utilities
Equipment Manufacturers
Other Food Manufacturing
Paper Manufacturers
Professional, Scientific, and Technical Services
(R&D, Education)

Transport Policy
- Army Corps of Engineers
- State Transportation Depts.
- U.S. Coast Guard

Trade and Lobby Associations
- NOPA
- NAMA
- NAWG
- IOAM
- ASA
- MSGA
- AURI
- FCC
- BioBusiness Alliance of MN
- Rural Advantage

Agricultural Policies
- U.S. Department of Ag
- (Check offs, Farm Programs)
- State Department of Ag
- (Ethanol Subsidies)
Appendix 3
Southeast and South Central Minnesota Export Base

2006 Location Quotient

Note: 2006 industry employment is represented by the size of the balls. 2006 industry employment ranged from 28,200 in the ambulatory health care industry to 1,020 in the leather products industry.

The combined 2006 employment of Region 10 and 9 was roughly 338,000. Jobs in the private sector totaled 292,000 or about 86 percent of total employment. When examined at the 3-digit NAIC industry level, regional employment was spread across 85 industries with 54 industries employing more than 1,000 workers. Of the 54 largest industries, 12 industries appear to be the major exporters of the region, having disproportionately high shares of the nation’s corresponding industry employment (location quotients higher than 1.5).

These export base industries employed roughly 100,000 workers in 2006 or about one-third all the region’s wage and salary workforce. The ambulatory health care industry had the largest workforce in 2006 with 28,200 workers. Payroll numbers in the health care industry climbed 19.7 percent between 2000 and 2006. The food manufacturing industry payroll accounted for 14,600 of export base jobs in 2006 with employment in the grain and oilseed milling industry, one of eight 4-digit food manufacturing industries with the region, accounting for 1,900 jobs in 2006. Jobs in food manufacturing and in another large export base industry, computer and electronic products manufacturing, have declined over the last six years but remain vital sources of economic base for the region. Jobs in both of these industries pay significantly more than the regional average.
Food manufacturing employment declined nationally, statewide and in the region between 2000 and 2006 as fierce competition among companies led to increased automation and widespread computer technology upgrades. The technological advancements allowed manufacturers to increase production while cutting jobs as productivity increased. Consolidations, mergers, and acquisitions within the industry have also impacted the workforce level of the food manufacturing industry.

Minnesota’s share of the food manufacturing jobs declined from 3.1 to 2.9 percent between 2000 and 2006 as the state’s food manufacturers cut jobs faster than the national pace. Minnesota’s food processing job decline has been heaviest at dairy product plants and fruit and vegetable processing companies. Payroll numbers in animal foods, sugar and confectionery, grain and oilseed, and bakeries industries have also slipped in Minnesota over the last six years.

Almost two-thirds of the food manufacturing job loss in Southeast/South Central Minnesota over the last six years occurred within the animal slaughtering and processing industry. Most of the remaining job loss occurred at dairy processing and grain and oilseed milling plants.
Appendix 5
Grain and Oilseed Milling Employment Change, 2000 - 2006

Employment in the U.S. grain and oilseed milling industry declined by roughly 5,000 jobs from 65,000 in 2000 to 60,000 in 2006 as advancements in technology increased productivity. This industry is dominated by a handful of Fortune 500 companies (Cenex Harvest States (CHS), Archer Daniels Midland (ADM), and Cargill) operate milling facilities across the U.S. and in other parts of the world. Consolidations, mergers, and acquisitions by these large agricultural conglomerates have increased the size of milling operations leading to economies of scales and increased productivity. The result has been higher output with reduced workforce numbers.

Minnesota’s share of the national grain and oilseed milling employment fell from 5.3 to 4.6 percent between 2000 and 2006 as jobs within the industry in Minnesota fell to 2,800 in 2006 from 3,400 in 2000. Employment in the industry in Southeast/South Central Minnesota also declined over the last six years but at a slower rate than statewide. As a result, regional grain and oilseed milling employment now accounts for nearly 70 percent of the industry’s statewide employment base.
Paychecks in the grain and oilseed milling industry in Southeast and South Central Minnesota are, just like statewide and nationally, significantly higher than average paychecks across all industries. In 2006, the annual average pay for grain and oilseed milling workers was $54,300 and $50,000 in Southeast and South Central Minnesota respectively compared to the average annual pay of all jobs of $36,800 in Southeast Minnesota and $30,800 in South Central Minnesota.

Grain and oilseed milling workers in the region made 48 and 59 percent more, respectively, than the average regional worker in 2006. Nationally, the pay premium for grain and oilseed milling workers was roughly 32 percent. The pay premium in Minnesota was 23 percent statewide, with the average annual wage in the grain and oilseed milling industry reaching $51,200 in 2006 compared to the state’s average annual wage of $42,200.

Average annual wages for food manufacturing workers are higher than the regional average annual wages in four of Minnesota’s six planning regions. The two regions where annual average wages are higher than average annual wages in the food manufacturing industry is in the Twin Cities area and up in Northeast Minnesota.
Almost 60 percent of all employment in the grain and oilseed milling industry is concentrated in four occupations: food batchmakers, crushing and grinding machine setters, operators, and tenders, packaging and filling machine operators and tenders, and all other production workers. Most workers hired for the production occupations have high school diplomas and receive on-the-job training. With the increase in automation the skills required for production workers have increased. Other jobs, like boiler operators and industrial machinery mechanics, require post-secondary training. Other key occupations such as industrial engineers, mechanical engineers, commodity traders, and sales representatives require college degrees.

The above chart shows the educational profile or background of the workforces for the grain and oilseed milling industry in the region. Roughly 66 percent of workers have a high school background, 23 percent have some postsecondary training or and 11 percent have college degrees. The grain and oilseed milling industry’s workforce in Southeast/South Central Minnesota is more specialized than the food manufacturing workforce in general, requiring more specialized training and a slightly higher level of educational credentials.
Note: Each state’s share of U.S. grain and oilseed industry employment over six years, from 2000 – 2006, are displayed above.

The grain and oilseed milling industry combines three 5-digit NAICs industries: flour milling and malt manufacturing (NAICs 31121), starch and vegetable fats and oils manufacturing (NAICs 31122), and breakfast cereal manufacturing (NAICs 31123). At the national level, flour milling and malt manufacturing companies accounted for 30 percent of total industry jobs, starch and vegetable fats and oils manufacturing accounted for 45 percent of jobs, and breakfast cereal manufacturing accounted for the remaining 25 percent of jobs. Minnesota has a higher percent of grain and oilseed milling employment at breakfast manufacturers (37 percent) than nationwide. The state’s flour milling and malt manufacturers accounted for 23 percent of total grain and oilseed milling employment while the state’s starch and vegetable fats and oils manufacturers employed 40 percent of Minnesota’s grain and oilseed milling workers.

Minnesota share of U.S. grain and oilseed milling employment has slipped over the last few years declining from 5.3 percent to 4.6 percent. Minnesota hasn’t been alone among leading grain and oilseed milling states in job cutbacks as Illinois, California, Texas, and Ohio have also lost ground over the last six years. Minnesota’s grain and oilseed milling workforce was the sixth largest in 2006 the same relative size as in 2000. Illinois, with 9,600 grain and oilseed milling jobs in 2006, is by far the leader followed by Iowa with 6,500 jobs and California with 4,700 jobs.