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History, Organization and Strategies for Grain Producers and the Grain Industry in Michigan

By

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Abstract

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The grain system (grain producers and the grain industry) in Michigan finds itself in a transition period. Production (yield) and price limitations along with escalating cost factors have left producers in a situation where, without government assistance, many more would have to exit the farm. The grain industry (in this study, the industry refers to the grain handlers and processors), while in a stronger financial situation than producers, would suffer negatively if volume of grains bought and sold through their facilities decreased, and more in the industry would have to exit.

A transition is needed to increase profitability of grain producers and the grain handlers and processors in Michigan. Without a transition, the trend of decreasing farms and acres will continue, to the detriment of the Michigan grain system. But how does the system make a transition, and what kind of transition is needed? This study strives to find the strategies, through understanding the history and organization of the system, that will provide direction.

This study uses two analytical approaches to understand the grain system from the producer level and the industry level. By comparing the Industrial Organization approach and the Strategic Management approach, a clearer understanding of the problems should be ascertained. That understanding, with a background of the history of the grain system development in Michigan allows a thorough discussion of the possible solutions that can help

both producers and grain handlers and processors be more profitable and continue to be an important economic factor in the state.

The findings of the study indicate that there are several partial solutions to the problems, depending on the region of the state, the attitude of producers and companies within the industry, and the markets themselves. The situation can be improved by differentiating, coordinating, cooperating and adjusting processes in those areas that can successfully be addressed and changed by individual producers and each firm. Further research could overcome constraints of this study to find alternative and successful adaptations for the system.

Acknowledgments

The span of this economic study has taken more or less twenty five years of experience in the grain industry, from my undergraduate work that led to a Bachelor's degree in Agricultural Economics from Western Illinois University, to a prolonged graduate program accomplished by beginning in an MBA program at a non-agricultural university, and then undertaking the final stage at Michigan State University's Agricultural Economics Department while working, raising a family, and taking one class at a time for the last five years.

I thank all those in the Agricultural Economics department that allowed me to pursue this accomplishment, particularly their patience in letting me take so long to finish the program. My advisor and major professor, Dr. Chris Peterson, and the other members of my committee, Dr. Kellie Raper and Dr. Rick Ward were among those who have directed and prodded me to think academically (like an economist), which can be difficult after thinking mainly only practically for so many years.

I thank my family for their patience while I juggled the time between them, work, school and community activities during the length of the program. If they hadn't been so understanding, this would not be possible.

It has been a fun experience, going back and applying my experience to the academic foundations for economics. The progression of economic theory since the time of my undergraduate work is impressive, and the ability to use computers, particularly for econometric applications, is astounding. I hope that this study will put to full use the combination of the two realms of knowledge and that it can be useful to those involved in the grain system in Michigan.

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Chapter One

Problem Statements and Methods

1.1 Introduction

This research will provide a history and economic review of how the grain industry has developed in Michigan. The organization of the grain market, as well as strategies grain producers and grain handling and processing companies might enlist to be successful participants in the 21st century will also be discussed. The production, marketing and processing of grain covers a wide array of economic considerations. It is an integral part of the food industry chain, as well as a provider of raw resources for many industrial uses and for export. Changes in farming practices, industry organization, vertical coordination, specialization, marketing and price discovery, profitability, logistics and technology need to be considered. In addition, consideration of producer and firm strategies, government agricultural policies, land use and availability, biotechnology and environmental aspects will be needed.

The author's twenty five years of experience in the grain industry enable a unique view and interpretation of the industry's economic conditions. Many of the observations in this study are based on the author's experience. The author has worked in the grain industry in many business structures including cooperatives, partnerships, and family owned and corporate enterprises. The author has also served in various capacities such as managing grain facilities in country elevators and in major terminals, merchandising many commodities, coordinating logistics by truck, rail and barge, and involvement in mergers and acquisitions. These personal experiences are the basis for statements in the study that are not referenced. Using this experiential knowledge combined with the academic knowledge gained from the Masters of Science in Agricultural Economics program at Michigan State University, the study applies practical solutions that are based on economic theory.

Practical knowledge and theoretical knowledge can serve each other to analyze a market or industry in a way that is practical in its applications and sound in its economic conclusions. When practical knowledge and theoretical knowledge agree, a strong basis exists for action because both how and why are understood (Peterson - AEC 800). That is the goal of this research.

The main points to be discussed throughout the study will be mentioned now, with further illustrations and documentation exhibited as the study moves into the particular areas of interest.

The consolidation in the production and marketing of grain has been slower (or at least less noticeable) than in other sectors of production agriculture, in particular the broiler and pork industries. However, there are several indications that the grain system could change appreciably toward tighter vertical coordination in the next five to ten years, due to the increased consolidation.

In this study, the Michigan grain producers and the related grain industry will be shown to have characteristics that may cause coordination (also industrialization) of the grain system (grain producers with grain handlers and processors) sooner than other major Midwestern states.

The study will show that most of the reason for Michigan being quicker to coordinate is the variation of corn and soybean producer revenue that is lower compared to the national average and other major Midwestern grain states, in combination with higher expense dollars per acre (Figure 1-a) compared to the seven major Midwestern states in this study (Ohio, Indiana, Illinois, Iowa, Minnesota and Nebraska). The result is that the grain system in Michigan will be forced sooner than other major crop producing Midwestern states toward changes to ensure or prolong viability, or trend toward exit from the industry.

Figure 1-a

Revenue and Expense Comparison

	Michigan	Ohio	Indiana	Illinois	Iowa	Minn	Neb
Revenue \$ per Acre (variation to the national average, 1990-2001 average)							
Corn	-32.89	8.86	18.37	31.71	9.64	-19.53	10.73
Soybeans	-5.96	17.03	33.76	33.49	32.84	-4.56	10.77
Total	-38.85	25.89	52.10	65.20	42.48	-24.09	21.50
Expense \$ per Acre	359	318	312	232	313	296	343
Net Cash Return \$/acre	10143	11643	15982	28271	25278	18576	29556

(Expense \$ per acre from 1997 U.S. Census for Agriculture, Net Cash Return from average of 1987,1992 and 1997 Census for Agriculture)

(For more detail, see Tables 1-1 through 1-3 and Table 3 in the table appendix)

The variability in yield and price for corn and soybeans means that in most years revenues for grain producers in Michigan are less than other major Midwestern crop production states (annual details in appendix Tables 1 through 1-2). This is due to a combination of yield, price and expenses that generate less net cash returns per farm. This deficit of revenue means that grain producers as well as grain companies may need to use surplus years to retain capital instead of using the income to improve or acquire assets. It also means that competition from other uses for the land is more intense. Urbanization and industrial uses for land may show greater long term revenues than uses for agriculture. With lower revenues and higher expenses, the average net cash return per farm for Michigan is less than the other major crop producing states in the study (Table 4).

These conditions are what will make the grain system (producers, handlers and processors) in Michigan more likely to look for alternatives to organizing the way grain is produced and marketed, or alternative uses for the land. The outcome of the changes will

benefit those who can adapt to the reorganization in ways that reduce costs and risks and stabilize income while providing the marketplace with the products they need at competitive prices.

The “final cause “ (Bromley) strategy is and will continue to lead the changes. This strategic approach says that the mission and vision for the future drives current actions, which generates current and future outcomes (Boehlje). The overall goal in the food, feed and grain industry will be to coordinate the system all the way from “genetics to grocery” (Barkema) in order to reduce costs and increase profits. In the grain industry, this can be done by coordination, involving production, handling, transportation and processing or exporting within the same company system if possible, to reduce transaction costs in moving grain from production to the end consumer.

It will be helpful to understand the basic history of the grain industry in the United States, and for this study, with special concentration on Michigan. With that background, the analysis and conclusions of the economic aspects of the study will be more evident.

The study will start with a history of grain production, handling and processing in Michigan and nationally, and then work through the organizational aspects of the grain industry using an Industrial Organization approach for grain handlers and processors and then relate that to grain producers. A Strategic Management study that involves a strategic analysis and plan for grain producers and its relation to grain handlers and processors is the next step in the study. A summary, with conclusions about the solutions for problems in the system will bring all three aspects of the study together. The end goal will be a theoretically sound and practical outlook and strategy for the participants in the system.

1.2 Problem Statement and Research Questions

Michigan has lower average yields and a higher negative yield variations to the national average for corn and soybeans than any of the other states in the study. Michigan

also has a less significant amount of production compared to other major grain producing states (Table 2). The lack of correlation between supply and price (Michigan is not a significant enough producer of grains to influence price as much as other states) creates situations in poor production years where Michigan revenues are much lower than in competing states (Table 1).

On the average, when production varies in those states that have a higher percent of the total production, price adjusts to the change in the supply more closely. This is reflected in the decreased variation in revenue to the national average for those states that have a higher percent of the total production. This indicates that Michigan yields have less influence on price, so that when yields are low, price may not adjust higher, and when yields are up, prices could still be lower. In economic terms, the influence of Michigan on the change in the supply curve is less than the other states that have a higher percent of production.

The comparatively negative revenue variations for Michigan compared to the national average make it more difficult for land used in grain production to compete with other land use alternatives. It also makes it more difficult for the standard of living for grain producers to compete with other employment opportunities, and this in a state that has higher wage opportunities than surrounding states (Table 10).

Weak farm balance sheets create more income risk for those businesses in the grain industry that depend on grain production for their success. Grain handlers and processors are critically dependent on grain volume, and therefore on the success of the producers that bring their grain to the facilities.

The trend in Michigan toward less total acres farmed, less farmers and the resultant overall production decline reduces competition and compounds the problem (Table 9).

These basic problems bring about questions that are the essence of this study:

1) What can grain producers do to offset negative variability in production and price in corn and soybeans that are the essence of revenues?

2) Can producers reduce risk and/or create a high enough revenue/cost ratio per acre to reverse or slow the trend of declining farm numbers?

3) How can the grain industry, which is so vitally tied to the success of the grain producers in the state, make changes that can help both be more successful?

In order to fully understand the problem and to suggest answers, the study uses the Industrial Organization and Strategic Management approaches to delve into the problems, causes and solutions for the Michigan grain producers and the grain handlers and processors. A comparison of the analyses provides the basis for conclusions, recommendations and suggestions for further research.

1.3 Methods of Analysis

The two methods of analysis chosen for this study are the Industrial Organization approach and the Strategic Management approach. Both methods can be used to identify and discuss key areas of an industry that may be developed or changed to increase societal utility. Here, IO analysis gives the environment that firms are operating in, and Strategic Management gives the strategies for adaptations to the environment that allow firms to thrive. By using both methods, as separate studies of the same system, the study can then compare the findings of each to ascertain a clearer understanding of what changes may be possible to affect the problem.

The study views each analysis as its own separate study. There is some redundancy in the two studies, but that is a result of the analysis that is a part of each approach. In an effort to reduce the redundancy, some parts of the study are abbreviated. In the Industrial Organization analysis, the grain industry is the focus, with associations made to the producer situation. In the Strategic Management analysis, emphasis is given to the analysis of the grain producer, with an abbreviated analysis and plan for the Michigan grain industry. The

similarities found in each study give the reader a comprehensive view of the situation and help the reader better understand and evaluate the final conclusions and recommendations.

Consistent problems and consistent recommended solutions mean that the problems need to be addressed both organizationally and strategically. If the solutions for the problems are similar, then they should be applicable and be more likely successful when implemented.

1.3.1 Industrial Organization

1.3.1.1 Theory

The Industrial Organization framework of analysis is the study of the way in which the organization of buyers and sellers of a particular product affect the performance of the market and hence the nation's economic welfare. In more detail, it is the study of how productive activities are brought into harmony with society's demands for goods and services through some organizing mechanism such as the market, and how variations and imperfections in the organizing mechanism affect the degree of success achieved by producers in satisfying society's wants.

The basic model set forth by Bain (Bain 1968) hypothesized that there is a causal link from market structure to conduct to performance. This early work focused on the structure and performance linkages. Scherer's (Scherer 1980) contributions created a greater emphasis on conduct and on feedback loops (how studying reactions to conduct can lead to changes that can cause structural and performance changes also) .

The aspect of structure focuses the study on the basic conditions of the market environment. These include such things as product characteristics, market share, cost structure, capital intensity, capacity, specialization, financial characteristics and entry and exit conditions.

Conduct is more concerned about what competitors are doing, and each firm's decision environment. Pricing and cost behavior are important aspects.

Performance has been summarized as the end result: how behavior falls short of the best goal and how well it does what society expects. Efficiency, market access, progress, product characteristics and equity are important aspects.

The Industrial Organization approach used in this study gives importance to structure, conduct and performance. The study uses all three aspects to help understand how the organization of grain handlers and processors nationally and in Michigan relates to grain producer situation problems. Solutions involve the overall understanding of how grain handlers and processors are organized and what effects they have on producers. For the purposes of this study, the Industrial Organization analysis focus is on the United States grain industry and more narrowly the handlers and processors, and then specifically in Michigan, and its relationship with grain producers. Society's demand for food, feed and industrial uses of grain are relayed to producers through the grain markets. Grain is marketed from producers to end users and forward to consumers through grain handlers and processors.

Organization is important to study because it brings out aspects of the system that can be identified as problems, and solutions can then be suggested. This study finds that in general, the financial success of grain producers in Michigan is weakening. Revenues have been decreasing (Table 1) while expenses continue to rise (Table 3). Larger grain handling and processing firms have more ability to help producers be more successful, but in the author's opinion, the desire for them to do so is lacking. The author also believes consolidation of the grain industry and lack of a cooperative marketing system (membership and number of cooperative organizations has been decreasing) has left a void in the system. Imperfections in the organization of the markets due to society's need for low food costs are magnified by government intervention by way of farm bills that subsidize farming. For

Michigan in particular, disadvantages in efficiencies compared to other grain belt states makes it more difficult for the state to fit into the national organizational structure of the markets.

By analyzing the organization of grain handlers and processors and their relationship with grain producers, the study can help identify problems, causes and suggest solutions to strengthen the success of grain producers and the grain businesses in the state.

1.3.1.2 Data and Information Sources

Industrial Organization economics attempts to explain the behavior of groups (grain producers and firms in the grain industry in this study) by basic economic conditions and the competitive environment within which they operate. It concentrates largely on factors external to the firm (Marion and Mueller).

From the beginning of the Industrial Organization era through the changes in the weight of the analysis from structure and performance to an added emphasis on conduct, articles by economists and many different agricultural viewpoints that give their insight and experience to theories put forward by the most prominent economists come together for workable suggestions for solutions.

From the early work of Bain (1945) and Nicholls (1948) to Clodius and Mueller (1961), Caves (1964) and Sosnick (1964), the Industrial Organization approach progressed through work again by Bain (1968), and Scherer (1980), Cotterill and Mueller (1979), Brandow (1977), Weiss (1971 and 1974), Goldschmid et al (1974) and Marion (1979). Studies by Kelly (1969), Imel and Helmberger (1971) and Rogers (1978) have added to the understanding and methods of analysis. These readings provide much of the basis for this part of the study, and are all listed in the bibliography.

The study of the progression of this approach and its applications was the basis for the AEC 841 class at Michigan State University, taught by Dr. Kellie Raper, Dr. John Staatz and

Dr. Michael Webber. The content of the course can be viewed in outline form at www.msu.edu/course/aec/841. The reading list from this class is a basic source for the analysis in this study. The study uses Caves, Bain, Sexton and Scherer as its main sources of direction, and these are referenced in the body of the text.

1.3.2 Strategic Management

1.3.2.1 Theory

Strategic management is defined as the set of decisions and actions that result in the formulation and implementation of plans designed to achieve a company's objectives. It involves the planning, directing, organizing and controlling of a company's strategy - related decisions and actions (Pearce and Robinson). The Strategic Management framework is used in this study to understand competition for grain producers and grain handlers and processors in Michigan. With that understanding, a framework for recommending decisions that will make grain producers and grain handlers and processors in Michigan more successful can be established.

Essentially, developing a competitive strategy is developing a broad formula for how a business is going to compete, what its goals should be, and what policies will be needed to carry out those goals. It is a combination of the ends (goals) for which the firm is striving and the means (policies) by which it is seeking to get there (Porter).

Formulating the strategy involves the consideration of four key factors that determine the limits of accomplishment. The company's strengths and weaknesses, and personal values and motivations of the organization are those factors that are internal to the firm. The external factors are the opportunities and threats of the competitive environment, and the broader societal expectations. The goal is to find a position in the industry where the firm or firm can defend itself against the competitive forces or influence them in its favor (Porter).

The emphasis in this study is the competitive situation in Michigan. As a part of the world agricultural and food system, the state plays a small part, but the influences on Michigan from outside factors are significant. This study attempts to refine the external forces only to those that a strategy can effectively adjust for. The longer term trends in the world food system may be such that a Michigan strategy cannot offset.

As in the Industrial Organization analysis, this part of the study can identify problems and causes and suggest solutions to help grain producers and handlers and processors to be more successful. By comparing both methods, the study can refine the actions to those that will be the most effective in achieving the goals.

1.3.2.2 Data and Information Sources

Much of the information about the grain industry and grain producers in this section have come from experience and also the Michigan Agricultural Statistics Service and the National Agricultural Statistics Service, and data collected in the Census reports over the years.

The outline of the analysis and plan were influenced by the Strategic Management course (Peterson -AEC 857) taught in the Agricultural Economics department at Michigan State University by Dr. Chris Peterson.

1.3.3 Conclusions - How These Methods Answer the Research Questions

The Industrial Organization method allows us to study the structure of the grain business and the environment in which the grain handlers, processors and producers are operating. In this study, the emphasis is on grain handlers and processors, but it also relates

directly to producers. This analysis allows us to understand what the sources of conflict are, and what structural changes can be made to address the problem in a positive manner.

Conduct of the firms and the producers gives us insight into societal and behavioral aspects of the grain system . Recognition of how they react competitively may help us understand and be able to recommend changes that may help.

Performance analysis of the grain handlers and processors and grain producers allows us to see what the effects of the particular structure and conduct anomalies are. We are then more able to understand their consequences and then develop recommendations that will have a positive impact on future performance.

Strategic Management analysis focuses on identifying strengths, weaknesses, opportunities and threats and then synthesizing possible outcomes. Through this analysis we can develop a strategic plan that will focus on aspects of the industry that will come closest to achieving desired goals.

This analysis works with problems, sources and solutions too, but from a different angle. By identifying core strategies that are intended to lead the firm (or producer) in a progressive direction, we can make recommendations as to how that can be accomplished.

Summarizing the history of Michigan agriculture with an emphasis on grain gives the analyst a background, or setting for the two analytical frameworks used.

By then comparing the results of the two analysis studies, we can proceed to develop final recommendations that have a strong historical and analytical basis. There are certainly other ways to study this system, but the completeness of discussions presented here should allow for solid and useful recommendations.

Chapter Two

Historic Summary of the Development of the Grain Industry in Michigan

2.1 Introduction

In order to analyze the organization of the production and handling of grain in Michigan today and recommend strategies for producers, grain handlers and processors, an understanding of the history of the grain industry in the state, and nationally is helpful. The history section will encompass many aspects of the growth of agriculture in Michigan, but the emphasis and understanding is intended to help the comprehension of the current grain industry organization and strategies that producers might pursue to increase their success, and industry participants might pursue to increase their performance.

A unique circumstance in Michigan allows it to cope with change better than most states, and that is its climate and soil types. The state is more diversified in its agricultural production than the other states in the study. The percent of the value of other principal crops (such as fruits and vegetables) in Michigan over the last five years averaged 21.38 percent, compared to 1.63 percent for the other states in the study (Table 17). This diversity helps agricultural income as a whole for the state to be more consistent.

But income only from grain production has not been as consistent. Yields have increased from the development of hybrids of corn, soybeans and wheat in response to the need for increasing revenue to keep up with rising costs. But poor production years, due to climate, have resulted in less than desired revenues, and make grain production in Michigan a less competitive option for land use compared to other grain belt states. Perhaps a resurgence in diversity through development of specific varieties of both genetically modified and non genetically modified grains that grow in certain soil types in certain areas of the state, with

characteristics desired by consumers, will serve as a competitive advantage in the current and future of Michigan agriculture.

Michigan Agriculture In Transition

There are three primary transitions that have taken place in Michigan agriculture from the time pioneers were first coming into the area until present. A fourth transition may be in process now. The first three are historical, the fourth is more speculative.

The first transition came with improved transportation to the area by the opening of the water route from Detroit to New York via the Erie Canal, and the development of the railroad system. The next came with the transition from animal and human muscle power to mechanization (an industrial revolution), which includes tractors and combines as well as locomotives. The third was the use of science in production to increase yields and enhance quality characteristics. Dramatic increases in productivity have been possible only through the intensive use of machinery, fertilizers, chemicals, cultivation practices and other production and technological advances made through science.

The first transition, which includes the opening of the water route to the East Coast, and then the development of the railroads, not only increased trade, it allowed easier migration west from the East Coast and more specifically, New York. The large number of people migrating forced many changes, and made the state develop much faster than western states that were harder to access.

The second transition was an industrial revolution. It enabled much more work to be done with much less animal or human power. It freed a labor force to go to factories in the cities, and it eventually lowered the cost of production, after the depression, when farmers could afford to buy the machinery. With lower production costs came more production, and the transition caused grain surpluses that the market has had to contend with ever since.

The third transition is a scientific revolution. It has allowed constant increases in yield and quality over time that has allowed the cost of food to the population to remain low.

Without the increases in yield, the cost of production per unit would be higher and the cost of food to the consumer would be higher. Further improvements in the quality of grains through genetics will be an asset as consumers demand more specific characteristics and variety in their foods. Genetic capabilities have also helped reduce the use of chemicals, which reduces environmental and health concerns. Development of crops that are non genetically modified are also contributing to special consumer needs. The capabilities of both will be very important to the future development of grain farming in Michigan.

The fourth transition, which is yet to be fully realized, will be discussed at the end of this chapter.

2.2 History of Michigan Agriculture

Introduction

This section of the chapter is a chronological compilation of the development of Michigan agriculture. The transition from an early frontier to a top grain producing state, the shift to diversification and the continuing challenges of farming as a business are discussed in this part of the study.

The most important aspects in the early development in the state were the topography and soils, the development of transportation and what incentives settlers had to come to Michigan.

The early development of Michigan and the transitions blend together as the state grows and prospers. It has had successes and setbacks, but has forged ahead, led by economic circumstances that dictate what must change in order to arise from challenges and find new levels of success.

Just as the state has done through its history, it must now find ways to improve agricultural profitability. Through an understanding of history and economics, solutions can

be found. The study will start with the early history and how Michigan developed, and then relate the development of each transition. The changes that have taken place indicate what possible directions grain production and grain handling and processing should take now. The primary sources for this history are books located in the State of Michigan library in Lansing, authored by Bauer, Chase, Fuller, Lewis, Quaife, Skjaerlun, and Utley. Other main sources, located at Michigan State University were Duncan, Ferris, the Michigan State University Department of Geography, and the Department of Agricultural Economics (see bibliography).

Settlement and Growth of Michigan to 1900

The early settlement of Michigan was slower than some other Western frontier states. Much of the land was swampy and much of it was forest, which had to be drained or cleared before it could be farmed. It took longer to clear the land and get it ready for farming than the prairie lands, but the population (labor) and the revenue became abundant enough to make it happen.

In early surveys, the area was described as a land of “unhealthful swamps and a sandy waste that was wholly unsuitable for agriculture” (History). Michigan was also more difficult to get to compared to those regions accessible to the river systems. Lack of transportation as compared to the Ohio River area made it more difficult to bring supplies in or to send crops from it. There were only a few small settlements and the total population was less than 5,000 in 1811 (Lewis -p151).

In 1818, the same year that public land was put up for sale in Michigan, the first steamboat on Lake Erie ran from Buffalo to Detroit. These two actions made settlement land available, and also improved accessibility by water versus by land.

As settlers arrived, they found the region had a wide variety of terrain. One description was as follows; “The sag and swell topography establishes a great variety of soils. It protects areas from cold northerly winds, affects air, drainage and cloud distribution, and it

establishes wet, marsh and swamp lands. There is an extraordinary variation in soil, with clays, sands, gravels, loams, muck and marsh lands, lakes and swamps, in some localities with very narrow limits, so that a description applicable to one parcel of land would be wholly inapplicable to an adjacent tract” (Chase -p37). These conditions allow for diversity in agricultural production. It is unlike most other states, and the diversity would later be seen as an advantage for growing a variety of agricultural products.

In 1820, the U.S. Congress passed a new land law, making it possible for settlers to purchase public land at \$1.25 per acre. So, for \$100, one could own 80 acres, and for \$200, a quarter section (Lewis -p153). Even though Michigan was more difficult to get to, it had an abundance of public land, so the law increased the number of settlers willing to travel to Michigan to settle.

But the remoteness of the settlers markets still kept many farmers away.

In 1826, the general survey of Michigan lands began. The system of land survey used by the U.S. government set up the tracts in North-South and East-West squares, which organized land ownership. Government land offices were opened to dispose of land. By 1833, federal Indian policies had removed most Native Americans to the west of the Mississippi River, which increased the public lands available for settlement (History). The organization of the territory was necessary to bring order to land titles. In 1836, there were 4 million acres of public land sold for settlement (Chase - p135). Between 1820 and 1834, the population of the state increased ten-fold (History). There were 36 million acres in Michigan passed out of public (U.S. government) into private ownership all together (Chase -p135) (Michigan’s total land acreage is 36,354,432 acres).

The Homestead Act was passed by Congress in 1862. It gave a quarter section of public land, 160 acres, free to any man 21 years or older. To receive title, they had to live on it for five years and show that they were improving the property. About three million acres were claimed this way (Lewis -p414). Up to this time, most of the farms had been in the four

southern tiers of counties, but there was now a rush to the northern counties of the lower peninsula.

After the Civil War, the population of Michigan grew rapidly. Between 1860 and 1880, the population doubled. The population in 1860 was 749,113, and it grew to 1,184,059 in 1870 and then to 1,636,937 in 1880 (Utley). In 1850, there were 1,929,110 acres of farm ground on 34,089 farms. The amount of land cultivated and the number of farms grew to over six million acres on 119,769 farms by 1881 (Quaife -p250).

“By 1860, the southern part of the lower peninsula could be called a settled community. The farms were cleared. Steel plows had replaced the earlier wood plows. Threshing machines, run by horse power were beginning to replace the flail for threshing. Steel-toothed cultivators were beginning to be used, seeders or drills for planting as well” (Lewis -p206-207). The first stages of the industrial revolution were taking place. All these did much to reduce the labor required in farming as well as to greatly increase the amount of crops that one farmer could produce.

Part of the expansion in homesteading was also due to high wheat prices. In 1866, prices encouraged the planting of more than one million acres, resulting in a crop near 15 million bushels, with a price in December of \$1.77 per bushel, for an average return of \$26.55 per acre (Fuller -p477). Then, from 1867 to 1869, the price of wheat dropped about 50% (Duncan -p51). But farming in Michigan after 1869 continued on a very profitable basis continuing through the 1870's. In 1871, the average wheat yield was 19.15 bushels per acre, and the price was \$1.17 per bushel for a revenue of \$22.81 per acre (Quaife -p251). The money from exported wheat brought more money into the state than all of the other surplus crops. Michigan's average cash value per acre of principal crops was the highest of 10 Midwestern states from 1875 through 1880 (Quaife -p250). The maximum acreage for wheat was reached in 1880-82, with 1,950,000 acres producing about 30 million bushels (Fuller -p477). In 1880, Michigan ranked fourth in wheat production (Lewis -p426).

From the mid 1880's on, emphasis was on raising crops on a cash basis instead of the almost complete self-sufficiency of the pioneer era. Farming became a business. In 1884, the state census showed 157,389 farms, with a value of \$38.48 per acre (Utley).

Soil conditions, scientific selection of seed, climactic factors and marketing conditions entered into the calculations for increasing production and value (Quaife -p249).

Some of this success was attributable to the average farm size being at about 100 acres, which required little additional farm labor. Also, the number of mortgages was small with relatively few tenant farmers (Quaife -p253). In addition, hybridization was advocated by authorities at Michigan State College beginning about 1877 (Fuller -p475), which helped yields. The first stages of the scientific revolution were already taking place.

After 1880, wheat began to be less important in Michigan. Soil exhaustion, diseases and pests depleted yields. As early as 1850, there was already concern about soil fertility depletion, and diversification was suggested (Duncan -p23). In the 1830's and 40's, yields ran from 30-40 bushels per acre, but by the end of the century they were half that. It suffered seasons of quite complete failure in the late 1890's (Chase -p184). By 1888, farmers could no longer rely on wheat as their main money crop. They began to diversify. Diversification into other agricultural commodities in the state took advantage of its climate and varying soil types. This was the first answer to a challenge for Michigan agriculture.

The diversity of crops raised in Michigan are due to the fact that the soils and climate can change radically from place to place. This diversity allows the potential for a wide variety of crops to be profitably grown, such as beans, celery, onions, fruits, vegetables, mint, sugarbeets and potatoes.

There is little uniformity in the soil in the amount of elements such as minerals, lime or nitrogen. Some soils are heavy clay, most of the state is glacial till, which "has little humus, drains too easily and thus lets the minerals, so needed by plants, to be easily carried away". Some plains make good farm land, and muck lands (where the water has deposited vegetable

materials) are good for certain kinds of crops (Lewis (1969) -p.206). Because Michigan was a forest land, most of the soils were originally podsol, or very acidic.

The climate differences in the lower peninsula change growing conditions. Frost free dates vary from 60 to 180 days, elevation and the effects of winds blowing onto or from the Great Lakes allow some crops to prosper in some parts of the state and not in others.

Michigan farmers were able to establish a far-reaching market for some products because of an emphasis on quality, especially for fruits and vegetables. In 1895, the legislature passed an act “to prohibit and prevent adulteration or fraud and deception in the manufacture and sale of articles of food and drink”. Michigan was the second state to pass a food law (Fuller -p500).

By 1900, almost all the farm land in the state had been taken. The settlement aspect of the agricultural development of the state was done. Important to the settlement of the state and the development of agriculture was the improvements made in transportation. They allowed settlers to come to the state more easily and also allowed the farmers access to much larger market areas.

The First Transition - Improvements in Water and Rail Transportation

In 1825, the Erie Canal was completed. Now settlers could travel from New York City to the Great Lakes by water. To get to Michigan, “it was a short steamer run up the Hudson (River) from New York to Albany, 3-4 days on the canal to Buffalo, and 40 hours by steamer to Detroit” (Chase -p241). The water transportation system brought settlers in, and it allowed goods to be shipped back east such as wheat, corn, corn meal, and flour.

This accomplishment represents the first transition in Michigan agriculture. Due to this ease of transportation, freight rates from Buffalo to New York dropped from \$100 per ton to \$15 per ton after the canal opened (Lewis -p157).

The result of better transportation, and lower freight rates was that crops grown in the West, like Michigan, could be shipped much easier to the growing populations of cities in the East. Wheat that was grown in the Great Lakes area was sent down the canal to New York. It has been estimated that about one million bushels of wheat was produced in Michigan in 1837, mostly in the Southeast portion of the state. By 1840, it had increased to two million and by 1850 it had reached five million bushels (Lewis -p205). Prices for wheat jumped from 30 cents per bushel to \$1 per bushel (Lewis -p157). This made farming in Michigan much more attractive. The markets were no longer as remote.

In 1825, there were seven steamboats running from Detroit to Buffalo. In 1833, there were 11 steamboats and in 1845, there were 217 sailing vessels and 45 steamboats on the Great Lakes (Lewis -p162).

As the amount of settled land and agricultural production in Michigan increased, the need for transportation inland increased. The first railroads in Michigan were chartered in 1830 and the first short lines were completed in 1834 (Utley). The first locomotive came in 1837. That was the same year Michigan became a state, and the new legislature voted \$15 million for building state owned railroads (Lewis -p169-171). Also by 1837, 19 other railroad companies had been chartered. The state took on responsibility for internal improvements including the east-west canal and the railroads (Lewis).

By 1837, the (passenger) rail rate in the U.S. was about 6-8 cents per mile, and a person could go from New York to Chicago for \$74.50. By 1851, the rate from Boston to Chicago was \$16 (Chase -p243). The establishment of all rail transportation between Chicago and the ocean, by its saving of time and money, stimulated immigration into the Northwest. This and reduced freight rates increased grain production in the nation.

In 1843, it cost 15 cents a bushels to ship from Jackson to Detroit, which was considered exorbitant, and it was felt that better roads were necessary (Duncan -p33-34). More effort was put into improving the roads to avoid paying the higher rail rates. But before

roads in Michigan were improved much, increasing volume and the steam locomotives began to bring rail rates down. The greatest amount of railroad construction in Michigan took place between 1870 and 1890. In 1860 there was 779 miles of railroad, in 1870 it had grown to 1,638 and by 1890 it reached 7,243 miles. The peak was in 1902, with 8200 miles (Quaife - p243).

Expansion of the railroads nationally at this time played a key role in the access all farmers had to markets. They provided farmers with a better means of transporting their produce to market. As the railroads spread through the Midwest, the differential Michigan enjoyed in freight rates versus other states further west diminished as rail rates caught up with the rates for water routes and allowed more productive agricultural lands in Indiana and Illinois to have access to the East Coast markets as well.

By 1890, the population of the state was 2,093,889 (Utley). The railroads continued their importance for hauling people and products. There was still only about 200 miles of stone roads, and those were in urban areas. The remaining roads were mud and sand. In 1893, the state legislature passed the county road act, which gave counties authority to develop their own systems of roads (Lewis -p437).

The increase in the construction of quality roads decreased the need for the railroads, and also increased flexibility in transportation. In 1905, the state highway department was formed as more automobiles hit the roads. By 1913, there were 60,000 automobiles registered (Lewis -p438). In 1916 the federal government passed the road act to help states build roads. The tractor, the telephone, and the automobile were revolutionizing cultivation, communication and transportation.

The Second Transition - An Industrial Revolution

This time in Michigan agriculture was marked by many changes. The development of machinery, changes in farm population and society as a whole, diversification into new

agricultural products, the development of factories and the labor required for them, and government intervention into agricultural prices and production all clashed during the period from the turn of the century through 1950. The result of this period of change was that farm sizes increased, as well as diversification and productivity, mainly due to the improvement in machinery and equipment.

In 1890, threshing machines were available that “made threshing and winnowing of grain much easier and faster and saved many man hours of work” (Lewis -p419). Around 1900, small electric power units, driven by gasoline engines were purchased by many people living in small villages and farms, which made life easier. The development of the gasoline engine, which was lighter than the old steam engines, allowed further development of machinery that could more easily be used on the farm. Mowing machines for cutting hay and grain, plowing and cultivating equipment, seed drills, manure spreaders, hay loaders and the first harvesting machines and tractors were soon developed. An industrial revolution was beginning to transform agriculture from a small, self-sufficient family art to a large, mechanized, scientific industry. This marked the real beginning of the second transition in Michigan agriculture.

It also marked major changes in the farming community. In 1894, farm values were less than they were in 1884 by about \$4 per acre, and the number of farms had increased 20,000, to 177,952. The size of the average farm decreased from 76 to 68 acres (Utley). The number of farms cultivated by their owners was about 82%, and it has decreased from there. Soon after 1900 the average acre value had dropped over \$10 per acre, or 30% in just six years. The number of farms increased by 24,000 in that same time period (Utley). By 1902, the state population had grown by another 327,000 from 10 years previous, to 2.42 million people, but still only 37.3% urban (Utley). By 1920, the population shifted to 38.9% rural (Chase).

People were leaving the farms and resettling in the cities. Those that remained in farming recognized the potential of the states' many soil types for producing specialized crops. Wheat prices were decreasing, and farmers diversified this time by growing sugar beets as a substitute. They also recognized some of the lands' incapaibilities, as some land that had been cleared had serious erosion problems, and had to be returned to woodlands.

In 1906, the first full time plant breeder was hired at Michigan State College. Also, fertilizer use began to increase, with 20,000 tons applied that year (Fuller -p482-483). As the industrial mechanization was increasing, the scientific aspects of the business were gaining importance. Farmers began to organize to bring more technology to their businesses.

The first farmers cooperative elevators were established in 1912 at Ithaca and Elkton. By 1920 there were 90, and they federated as the Michigan Grain Growers Exchange, headquartered in Lansing (Fuller -p477). The legislatures of 1899 and 1905 made it illegal to pool to enhance price. Not even two farms could get together to sell their combined quantities at a better price. But they could buy products together for lower prices. By 1920, the Michigan Farm Bureau was very active. Their purchasing department handled phosphate by the train load from the south. Its dealings were with local cooperative associations and county Farm Bureaus on a contractual basis. They took orders and arranged for the products to be purchased and delivered (Chase -p283).

The Michigan legislature of 1915 authorized the State Board of Agriculture, to oversee Michigan State College and be director of markets. The director was to assist in the organization of cooperative and other associations for improving the relations among producers and consumers, and afford them such services under adequate rules and regulations as they relate to standardizing, grading, packing, handling, storage and sale of products within the state. The director was also to provide information regarding market conditions around the Union, provide auction markets for disposal of farm products and monitor transportation

service, and restraint of trade. This position was eventually allowed to become vacant, but the organization of government to help provide fair markets was evident (Chase -p262-263).

In 1915 to 1919, wheat again became a money crop because of demand caused by World War I, then prices drifted lower to a record low in 1932 (Fuller -p478).

Dry edible bean acres were increasing as well as hay, corn, rye, barley, oats and potatoes. Fertilizer use continued to increase, with 112,000 tons applied in 1920, and increasing to 153,000 tons in 1929 (Fuller -p482-483).

In the 1920's, tractors were beginning to come into practical use. Soon they were made on assembly lines in several factories. With a tractor, a farmer could plow faster and also pull many other things as well. This was important because of the lack of labor caused by World War I. It changed farming and farm production in many ways. It took fewer men and horses to do the same amount of work. The horse peak was in 1917, with about 680,000 in the state (Lewis). Before the general use of the tractor, about 1/3 of a farmers' acreage was planted to hay and oats for the horses. In the years following, hay acres declined, and corn acres increased (Lewis -p426). In 1920, there were 5500 tractors, in 1925, 16,500, in 1930, 33,000, in 1940, 62,000, and in 1945, 85,000 (Duncan -p50).

In the boom years after World War I, land values increased rapidly. The stock market crash in 1929 changed the outlook. In 1920, there were 19,000,000 farm acres. By 1930, it had decreased to 17,000,000 (Fuller -p434).

In 1932, nearly half of the state's total agricultural land area was delinquent on taxes (Skjaerlun -p2.1). Much of the land settled in the northern lower peninsula was not well suited for sustained cultivation and some was returned to forest. Unprofitable farms went bankrupt. Grain prices plummeted and the farms shifted back toward sustainable agriculture. Hay, oat and alfalfa acres continued to remain high into the 1930's. There were 2.5 million acres of hay, about 1.2 million acres of oats and almost one million acres of barley in 1933-34 (Fuller -p478).

During the depression there was a reoccupation of the land as a self-supporting activity. This slowed the progress of the second transition. The number of farms decreased, as well as the value, and the average number of acres, from 101.1 in 1930 to 93.9 in 1935 (Fuller -p482-483).

The national government led the way in road building, primarily of a military character, and in Michigan it was mainly from Detroit to Chicago, the Saginaw Bay and the Grand River valley (Chase -p238).

Changes in agriculture during the late 20's to late 30's era were varied and large. In 1928, edible beans sold for \$5 per bushel, and by 1932 they were 32 cents per bushel. From 1916 to 1935 they ranged from 2 cents to 8 cents per pound (Fuller -p480). Sugarbeet acreage increased rapidly, from virtually none in 1898 to 100,000 acres the next year. Eighteen processing plants were built. By 1931 only two were left open. At that time, a special contract was devised, giving the growers a 50% interest in the sales of sugar pulp and molasses. With that, and cheap depression labor, 11 plants were open in 1932 and 15 in 1933. Also in 1933 came the national sugar marketing agreement, where 26% of U.S. sugar consumption was allotted to beet sugar areas (Fuller -p481).

In 1933, Michigan farmers grew wheat under the domestic allotment plan provided in the agriculture adjustment act passed by Congress in that year. This was the program "that implemented some ideas that have become staples of agriculture subsidy programs, including provisions allowing the government to control production by paying farmers to reduce the number of acres in cultivation, purchase surplus products; regulate the marketing of certain crops; guarantee minimum payments to farmers for some products, and make loans to farmers using only their unharvested crops as collateral" (West's).

By 1930, only 1/5 of the population of the state was on the farm. The number of farms in Michigan has declined every year since 1933, when there were about 200,000 farms

(Lewis -p426), and the average size has been increasing. In 1940, 1/2 of the area of the state was for farming, and there were 187,589 farms (Schmid).

During the 1930's and 40's electric power lines were run, which helped in many ways, but did not aid in the fields. Other technological improvements after the great depression signaled the scientific approach that was soon to dominate farming, machinery, fertilizer and plant breeding. It became more evident in the 1950's with a rapid increase in yields and a world food economy (Skjaerlun -p2.2-2.3).

Transition Three - A Scientific Revolution

The move toward larger scale, capital intensive farming has helped shift the average size of farms upward, while decreasing the number of farms in operation. The third transition was in process. The rapid advance of technology to improve production was beginning to take place. This ranges from scientific improvements in machinery, farming practices, better seed, chemical use, fertilizer application, and to many other inventions. It has allowed the producer to increase yields on corn from 31.2 bushels per acre in 1941 to 138.2 in 2001 and decrease per bushel production costs in the meantime (NCGA).

This reduction in cost of production created surpluses of grain and decreased price so that many more left the farm to find employment in the city industries. The nation didn't need as much land to be in production to feed itself or to satisfy world demand. Marginal ground was taken out of production due to the expense/return ratio. Government programs were redesigned to reduce production.

The increase in highway construction during this time reduced the need for rail transportation and increased the amount of truck delivered goods. It has allowed producers flexibility in accessing more and new markets, and has decreased the transportation expense in the process, helping gain better returns.

From 1940 to 1974, Michigan farmland decreased by 7.5 million acres, a 41% reduction (Skjaerlun -p3.4). Michigan's farm land acreage declined 6.4 million acres, a 39% decrease, from 1954 to 1992. A 25.8% reduction in farmland occurred from 1954 to 1974, associated with a 54% reduction in farm population (Skjaerlun -piii).

The number of farms then increased from 1974 to 1982 due to commodity price increases associated with increased demand from such countries as the Soviet Union, increased fertilizer use and productivity and government support programs. Prices then leveled off, but costs continued to increase. It declined again from 1982 to 1992 (Skjaerlun -pii). The loss in the number of farms in these ten years was due mainly to urban growth.

As costs for machinery, labor and land have continued to increase, the demand for more production has intensified. Prices for grains have not kept pace with the increase in costs. The only other alternative to generate more revenue is to increase productivity. Science has been able to provide large increases in yields from 1950 to present. But, if yields would level off, there could be a major change in the way farming is done.

The capital and operating money needed to operate farms might require more than a family or small corporate farm can handle. This possibility is at the crux of this study. Anticipation of the changes and discussion of possible strategies that might be needed to cope with them are needed. By understanding the history of Michigan agriculture and what it can offer, the organization of the grain producers and the grain handlers and processors, the best possible solutions may become evident.

A Transition past Science and Michigan Agriculture in the Future

Once converted to another use or fragmented, land cannot usually be converted back to farmland. The financial situation of many older farmers is such that they might have to sell their land (much of which is sold for development) to use for retirement income. With fewer

and fewer young people willing to attempt to make a living farming, the land is either sold for development or purchased by a larger producer.

The average age of today's Michigan grain producer is in the low 50's (Table 12). The importance of this issue becomes more important if scientific improvements cannot continue to increase productivity to match the costs increases, because it will increase the rate of decrease in farm acreage, number of farms and total grain production in the state. This has major implications for the grain handlers and processors in the state, which are dependent on volume for survival.

The question of what will happen to the farms of those who are 60 plus years old , as they retire, is not a new one. From 1982 to 1992, farmers 65 years older and older increased 7%, while the number of beginning farmers under 35 decreased 55% (Skjaerlun -piii). This would indicate that the older farmers just keep farming. They may have to because they have no retirement built up. They are more likely to have their land paid for, and it might be easier for them to be profitable enough to survive. They may have no other alternative.

In 1992, only 43% of Michigan farmers reported a profit (Skjaerlun -piv). When they have retired, the farms have either been split up into smaller tracts or been absorbed by those larger farmers that want to take on more land. There hasn't been a decisive change, but a gradual move from the medium sized farms (60 - 1000 acres), to small (under 60 acres) or large (over 1000 acres) farms. Current farmland acreage is 10.4 million acres. Projected farmland acreage by 2012 ranges between 8.1 to 8.6 million acres and by 2022 at 7.3 million. By the year 2012, a core group of 10,000 farmers could produce 90% of all agriculture sales. "As much as 43% of Michigan farmland could change ownership over the next 20 years as aging farmers sell their land to finance retirement" (Skjaerlun -pvi).

In order to get younger farmers to stay, there needs to be a possibility to make a living similar to other occupations. The discussions about organization and strategy in the following

sections is intended to give those who may be interested some guidance as to what that will take and when that may happen.

The fourth transition in Michigan agriculture will arise out of these challenges. By associating the history of Michigan agriculture with the present conditions, a solution will be found. The next section will develop the background for the shape of the fourth transition.

2.3 Associating History with Present Conditions in the Grain System

If we look back over the history of Michigan agriculture, the most profitable times for grain farming in Michigan has been when the state enjoyed a competitive advantage over other regions. In the early years (1850 - 1870) the ease of transportation allowed there to be a more available supply of labor as well as a lower cost transportation into the sales markets than other states. Once that temporary advantage was lost, the Michigan grain system has struggled to keep up with the rest of the corn belt. Since the late 1800's, other states have had such advantages as better soils, and less costly transportation to markets. Michigan agriculture's advantage has been its diversity. Its ability to raise fruits, vegetables, edible beans, sugar beets and some specialty grains have helped the agriculture industry to survive.

The Fourth Transition

As for grain farming, the Michigan farmer has been at a disadvantage to other states for many years, and that will most likely continue without a transition to production geared more for the consumer, which can use the diversity of Michigan's climate and soil types to raise crops for specific purposes at higher prices than generic varieties of crops. Higher transportation costs for both materials coming in and grain going out, tax rates, land values and fewer marketing alternatives all put Michigan at a disadvantage. Until the passage in 1994 of Proposal A, farm property tax rates in Michigan were the highest in the nation, averaging 3 to 5 times higher than other states. It still ranked in the top four states in farm tax rates in 1994 (Skjaerlun)(see Table 6).

There are more considerations that could improve Michigan's competitive position such as making better use of water transportation and developing specialty crops that have certain characteristics associated with the climate. But in order for crop farming to survive in the long run, the following chapters will show that the producer will need to become less independent, and rely on help from vertical coordination down the chain to the processors and grain companies.

The history and the organizational and strategic studies will show that a transition to tighter vertical coordination will be necessary, and could come in Michigan first because of its unique circumstances. The other driving force behind the transition will be the increased importance of the domestic market as the source for a continually growing demand for food, feed, and industrial uses for grains, and the decreasing importance of exports as a price factor. This combination will make grain producers a direct beneficiary of adjusting production to meet consumer demand, drawing away from the commodity sense of production (substituting quality specifications instead of yield specifications) that has been the driving force behind grain production to date.

This fourth transition in the Michigan grain system could result in closer marketing coordination, or even contract farming for crops. Such arrangements would allow some of the risk and capital requirements of farming in Michigan to be shifted to companies in return for guaranteed volume, which would lower their per bushel costs of handling. Larger companies have more financial capabilities and better expertise in handling risk situations than individual producers.

2.4 The History of the Grain Industry on a National Basis

It is helpful at this point to be aware of the grain industry history nationally to give a more complete understanding of the background of Michigan agriculture.

The grain industry in the United States has always been an oligopsony. Previous to the westward expansion and simultaneous increase in industrialization in the 1830's and 1840's, the effects of this structure were minimized by the agrarian nature of the society. Farms produced for their families and the excess was sold. But as urban manufacturing corporations became numerous and profitable, the structure of the industry changed.

Labor began to organize, and wages improved, creating even more desire to work in the cities. This change created the need for more foods to be sold into the non-farm population centers and trade for grain expanded.

The expansion of settlements into the prairies of the Midwest created surpluses of grain there. Transportation systems via railroads were developed and grain began to move from surplus areas of the Midwest to deficit areas in the East.

This time in the 1830's and 40's was also the time of the repeal of the "Corn Laws" in Britain, which created much more demand for U.S. grains to Britain (Morgan).

Further west, in Minnesota, wheat mills were built by Pillsbury, Cargill and Peavey families, and their success concentrated the wheat milling industry.

Grain marketing firms were engaged in two primary types of operations: physical handling of product from time of production to ultimate consumption (processing), and pricing of the product at various stages in the marketing process.

But there were difficulties as a whole in the marketing of grain. Those difficulties are similar to those experienced in developing countries today, such as 1) varying grades and size of shipments, 2) varying terms of payment, 3) secret prices, 4) reliability of buyers and sellers, 5) damaged goods (or wrong quality) on arrival, and 6) difficulty in finding new buyers (Gold).

In the early 1850's the volume of grain shipped to Chicago was so heavy that many streets became completely congested with wagons. Farmers were forced to sell for whatever prices they could get (Kroll).

Contracts began to be offered to deliver a specified quantity at a designated place within a given number of days. These to-arrive contracts were a major advance in the field of marketing in the United States, providing flexibility. The burden of price risk had been shifted from the producer to the buyer. But the risk and lack of credit for buyers to hold grain inhibited the expansion and development of the industry.

The to-arrive contract became more refined and was called a futures contract. Varying grade and quality, payment terms and lack of contract compliance were standardized with the development of the futures contract.

The commodity exchanges are an effective mechanism for setting prices and so facilitate grain movement through all stages of production and distribution.

Grain marketers reduce price fluctuations risk by hedging, enabling the industry to operate on lower profit margins. Market prices are kept at more competitive levels, less risk enables better bank credit, and price information is spread efficiently to large numbers by the open outcry method.

The transportation system of rail lines and the river systems can move large quantities of grain around the country and to the export ports with unrivaled efficiency. This ability has enabled the U.S. to be the world's residual supplier of grain for the last 150 years. But this advantage may not be enough to overcome the low cost of production in other parts of the developing world.

As other countries around the world develop their own grain industries, the U.S. has lost market share of world trade (Table 15). This trend will likely continue, and will force the U.S. grain companies and producers to concentrate more on domestic use of grains. This will provide new opportunities and challenges for grain producers, handlers and processors.

Analyzing the organization and strategies of producers and the grain industry and planning and implementing sound economic strategies will be of key importance as we move

toward changes in the world marketing of grains and the increase in consumer driven production of grains.

The combination of closer vertical coordination between grain producers and grain handlers and processors, and an increase in the importance of domestic consumption for grains, along with the subsequent decrease in the importance of exports will be the fourth transition for the Michigan grain system. This transition could make Michigan more competitive as a grain state.

The challenge for Michigan grain producers and grain handlers and processors is to find ways to improve the viability of the grain produced and marketed. The relationship with the history of the grain industry nationally is that the development of organized contracts and transfer of risk to the buyers that have served the industry well over the last 150 years are the same key elements that the producers and handlers could endorse to face this challenge.

Conclusion

The historical background of Michigan and of the grain industry nationally provides an understanding of the challenges that have been present in grain production and handling since early development of the West, and what solutions have been enacted to improve the economics. The study will now proceed to the economic analysis of the current challenges in order to develop solutions for the future.

Chapter Three

Industrial Organization Framework of Analysis

3.1 Introduction to Industrial Organization of Grain Handlers and Processors

The Industrial Organization framework was chosen for this study because the emphasis is mainly on understanding behavior of groups (in this case, grain handlers and processors and grain producers) that either act as competitors or interact as suppliers and customers (Marion and Mueller) in imperfectly competitive markets, and the impact of their behavior on performance.

The grain system is made up of groups of grain handlers and processors, and groups of grain producers. The producers deliver the grain to the handlers, who then pass it down the chain as grain, or as a processed item. The grain handlers and processors act as competitors, and the grain producers interact with them as suppliers and customers. The consolidation of both groups has decreased competition and so created further imperfections in the market.

Organizational theory deals with matters mostly internal to the firm (Cyert and March). Industrial Organization (IO) theory attempts to explain behavior by economic conditions and the competitive environment, and is mostly external. Both internal and external analysis are used in this study in order to come to conclusions about the structure and conduct of the grain system, and what solutions may bring about positive change for future. Positive change would be an increase in the welfare of both producers and the grain industry. The study uses the IO analysis of the grain industry to relate directly to problems and solutions for producers. Because the industry is so closely linked with the producers, the solutions that improve the welfare of the producers will improve the performance of the industry.

The goal of grain handlers and processors is to maintain or increase bushel volume, particularly in off-peak seasons, in order to gain better per bushel cost efficiencies during

those times, and meet profitability goals for the location and the company. The goal of grain producers is to increase and stabilize profitability in order to stay in business, while maintaining or improving their standard of living and lifestyle.

The basic IO paradigm holds that the structure of a market strongly influences the competitive conduct of firms within the market, which in turn strongly influences performance. It provides the only well-developed framework for examining behavior of imperfectly competitive markets (Marion and Mueller).

The concentration (CR4 = 47% of total U.S. off farm storage capacity) of both the grain industry and also grain producers as they have become larger has caused concerns about competition. Fewer grain companies, fewer numbers of elevators and fewer numbers of producers move the market from more perfectly competitive to less. The roots of the IO framework deal with the debate about the effects of monopolies, tight oligopolies and what market power problems they cause. Market power at high levels was found to have positive effects on profits of firms, but negative effects on innovation (Marion and Mueller). There are signs of this in the grain industry and it has also become evident in farming as they have become less diversified, as will be evidenced in the study.

Most of the early work in the IO field considered mainly structure and performance. The conduct portion of the framework has been less developed. This study shows that conduct has a important role, since conduct reveals the effects of management's personalities and emotion in the decision making process. While good business decisions may not include these attributes as part of the process, the admission that they do play a role, and at times may override economic decision rules, proves that they are important to study and should be an integral part of the IO framework. As companies pare back on the number of employees through concentration (firm managers responsible for more facilities and producers farming larger farms), the effects of management's personalities, experience and emotion become more evident in marketing decisions and performance outcomes.

As the concentration increases, larger firms may be less likely to innovate. The attributes of those facilities that remain after consolidation have advantages that increase barriers to entry because of their competitiveness, but that also reduces incentives for those remaining facilities (and firms) to innovate. This study recognizes this assumption and suggests that the system participants should move toward innovation even as market share and power are increasing. This is necessary in Michigan in particular due to the facts (shown elsewhere in the study) that show that the Michigan grain system is at a competitive disadvantage compared to other major grain belt states, and needs to differentiate.

The Michigan grain system is concentrating, and exhibits those characteristics associated with a tighter oligopoly. Yet, as part of the U.S. and world grain system, Michigan is a small participant, and finds itself needing to differentiate in order to compete. The differentiation falls mainly on the producer as a problem, but the grain industry, by understanding the complexities of the structure, can help itself by joining with the producer to find ways to innovate. Failure of the producer to be successful will eventually reduce the need for the grain handlers and processors in Michigan. An X-inefficiency (the tendency for costs to rise more relative to margins in non-competitive markets including excess capacity and operating with suboptimal scale plants (Leibenstein)) could be the result, and the number of grain facilities would continue to decrease. This study attempts to show how that is possible, and that understanding it shows that strategies to deal with this problem are those that are successful in more competitive markets.

Understanding the structure, conduct and performance, as the IO framework provides, allows the economic analyst to suggest solutions that can help participants become more successful. Understanding the signs of increases in market power by studying the structure and conduct can help improve performance. Studying the performance of a group of firms will allow the economist to suggest changes in conduct and/or structure that may improve long term profitability for grain producers as well as handlers and processors. Understanding

each of the three parts of the IO framework individually can lead to suggestions for change that will lead to improved performance. A study such as this can bring to light the state of the grain system (grain producers and handlers and processors in this case) that may otherwise be overlooked or unrecognized.

This part of the study will begin with an analysis of the grain industry nationally, using an Industrial Organization approach. This study will consider concentration as well as differentiation, barriers to entry and exit, growth rate of market demand and imports as key components of the structure. Pricing policies, quality and non-price product policies, promotion, strategic advantages, deterrents to entry and how the firms react to each other will be included in the analysis of the firm conduct. Performance analysis of technical, economic and pricing efficiency, innovation, research, profitability and income and market power distribution will be presented.

This format of analysis will also then be applied to the Michigan grain industry, with similarities and differences noted, compared to the national level.

With a full understanding of grain industry organization both nationally and specifically in Michigan, the stage is set for the discussion of the producer's plight and how the organization of the grain industry affects them.

The study of producers will not be done in the IO framework, as the grain industry was, simply because each producer and farm is a business in itself, and there are so many and they are so varied. But the study does take the information from the IO analysis and directly relate it to how it shapes the system as a whole, and what producers can do to improve their standing in the system.

This analysis can be used to provide justification to the idea that vertical coordination between the firms and the producer would increase the welfare of the grain industry and the grain producers by reducing transaction costs, and may become one of the steps in the next transition in the Michigan grain system.

Transaction costs are the costs of running the system; including the costs of coordinating and of motivating. Its fundamental argument as originally put forward by Williamson (Williamson) is that economic activity and organizations are arranged so as to minimize transaction costs. It is sometimes difficult to separate production costs from transaction costs. Also, just minimizing transaction costs for the firm may not create the most welfare for the firm (Milgrom and Roberts) because other costs could be too high or revenues may not be high enough.

In the grain system, if the industry or a firm can find ways to reduce transaction costs, they will increase transactions with producers. Producers and the firm will benefit by the reduction, which should improve profitability and encourage competitors to do the same. The system will be more efficient and be able to compete more effectively with external competition such as land for development.

The IO framework is used because by studying and understanding the structure and conduct of the grain industry, suggestions can be made to increase the welfare of the producer, which in turn will increase the efficiencies and profitability of the grain industry participants. The grain handlers and processors reliance on bushel volume means that if they can help producers be more profitable, they will keep more of the land employed as farms than it would be otherwise. By changing the nature of the vertical links between the grain industry and the grain producer, both can become more successful.

3.2 Industrial Organization Analysis of the Grain Industry Nationally

The grain industry will be defined as grain handlers and processors in this study and we will define grain as the major grains - corn, soybeans and wheat - because they are the three largest grain crops produced in the U.S.

Although bulk grain production is generally still homogeneous, there is some specialization now into specific varieties that require special handling. However, if the volume

of a specialty crop is high, it will usually be handled from the farm through the same system (modifying the system with more identity preservation) that non-specialty grains are handled. If the volume is low, as for very specific varieties or for very specific uses or specifications, it is more likely to be bagged and sent by container than by bulk through the grain handling system.

Because of the volume and the area that grain is handled in the U.S. and around the world, firm behavior, information, barriers to entry and exit and pricing are inconsistent over time. What is logical under one set of circumstances may not be at other times. Information may be incomplete because of the complexity of the grain markets around the world, and so are imperfect. The grain market is especially imperfect because of the uncertainty of production, its seasonality, perishability, and its integration with unstable international markets and changing public policies.

Industrial Organization analysis will give us a greater understanding of the current system and its imperfections. That knowledge can be applied to suggest the direction of change in the industry in the coming years and used to discuss how coordination between the grain industry and grain producers might be facilitated.

3.2.1 Structure

In the IO framework, structure consists of the relatively stable, economically significant features of the market environment that influence the rivalry (behavior) among the buyers and sellers (firms) operating with it (the industry) (Caves).

These structural elements set the parameters for conduct and ultimately impact market performance. Those elements of structure are examined below.

Concentration

Economic theory tells us that concentrated industries are likely to perform poorly, employing too few factors of production (Caves).

When market demand is growing slowly, individual firms may expand via consolidation, leading to increased concentration (USDA-ERS-Structures). This appears to be the case with the U.S. grain industry. Growing world production has slowed expansion of exports of U.S. grain (Figure 3-a).

Figure 3-a

U.S. Export Market Share

Crop Year	Wheat	Corn	Soybeans	Total
1993	29.75%	60.49%	70.77%	44.80%
1995	29.15	76.48	70.99	51.29
1997	21.75	62.20	64.94	41.12
1999	23.07	67.03	56.63	42.50
2001	24.27	63.67	54.25	43.62
2002	22.30	51.78	44.71	37.47

Source: USDA - World Agricultural Supply and Demand Estimates - World Outlook Board

Domestic demand has grown, but at a slow, steady rate. In an effort to reduce costs and maintain or improve margins, the grain industry has experienced an increase in concentration by merger, acquisition and partnerships, particularly over the past ten years. A brief review of grain storage facility numbers and capacity reveals this (Figure 3-b).

Figure 3-b

U. S. Off - Farm Storage Facilities
and Capacities

Year	Number of Facilities		Storage Capacity (1,000 bu)	
	Michigan	U.S.	Michigan	U.S.
1993	300	11,866	147	8,486,500
1994	295	11,592	143	8,374,110
1995	293	11,295	146	8,301,060
1996	292	10,884	146	8,072,330
1997	289	10,605	146	7,961,340
1998	286	10,272	143	8,003,190
1999	270	9,995	141	8,087,250
2000	250	9,830	141	8,348,996
2001	245	9,697	146	8,424,395
2002	235	9,521	148	8,506,131

Source: USDA - National Agricultural Statistics Service December 31 Stock Reports.

The four largest firms in grain storage capacity, Archer Daniels Midland (ADM), Cargill, Conagra and Bunge, operated 47% of the commercial storage capacity of those companies with at least 6 million bushels of storage in 2002, for a total of 1.943 billion bushels out of 4.172 billion total capacity. The total number of companies in that category has gone from 103 in 1990 to 89 this year (Grain and Milling Annual 2002). The top five grain companies in international trading had 85% of the trade in 1998 (Multinational Monitor). As an example of the velocity of change, Con Agra acquired 11 different companies or product lines in 1998 and 1999 (FRB-Minn 1/00).

As of 1995, the four largest firms in flour milling, grain storage capacity, brewing and minor oilseed processing held 70% of sales in those markets (FRB-Minn 1/00), and that has grown over the past 7 years.

The market environment in trading cash grain is changing from a competitive open trading market with many participants to one of trading outside the firms' own vertically integrated system only out of necessity. All four of the major firms have a presence in processing, milling and exports. The top four firms accounted for 81% of corn exports and 65% of soybean exports (Successful Farming). They use their origination capabilities (handling facilities that purchase from producers) to feed their own systems. Much of this integration has taken place in the last 10 years, through mergers, acquisitions and partnerships. They have used their market power and financial abilities to increase market share by integrating and coordinating vertically and horizontally.

Most grain companies without ties to one of the major grain handling or processing companies are finding it increasingly difficult to compete with the margins needed to support themselves. Even an international grain company like Continental Grain did not feel it could compete because of its limited domestic processing and trading capabilities in the U.S. and merged with Cargill. Some of the hardest hit grain businesses have been cooperatives. In the period from 1993-97, 367 cooperatives merged or were acquired (USDA-rurdev). In 1997 alone, 96 grain cooperatives were merged or acquired. Growmark, Countrymark and Farmland, all cooperatives, have worked agreements with ADM (a stock company) to manage or own their grain facilities (USDA-grain transportation).

As the concentration grows, tighter vertical coordination up the chain to the producer may be the next logical step toward reducing costs and maintaining or increasing market power. The leading firms must beware of the tendency for performance (volume and profitability) to suffer (as competition decreases) with an increase in concentration (Caves). For this study, this is because volume is such an integral part of the grain handling industry. If welfare losses at the producer level are great enough, the volume of production will decrease, which hurts the grain handlers in turn. A change in structure that would assure that bushel

volume for handlers and processors may help to enhance grain producer welfare and improve industry performance and offset this tendency.

Differentiation

Differentiation occurs when consumers have a basis for forming preferences between one brand (or firm) and another. It can occur by the good's physical appearance, by its physical properties, the conditions of sale, service levels, or the location (of the handler or the grain).

Products whose physical units are not distinguishable will tend to be largely undifferentiated in the market place (Caves). That is the case in the U.S. grain industry for the most part. There are some subtle differences in buying techniques, and certain non genetically modified grain varieties may be marketed by some companies and not others. There is some contracting of production taking place in specialty grains, for specific varieties of seed, but contract production is limited to a total of about 2.4% of total grain production (USDA-ERS-#768). Overall, the appraisal of the economic characteristics reflects little differentiation. The differences can be considered as part of the conduct of the firms, but structure is still applicable because of the more specific roles that the leading firms take in the market. They can differentiate by using their size to try new buying programs, for example.

The differentiation in grain companies and how they access grain is associated with the end use for the grain. ADM, Cargill, ConAgra, and Bunge need grain to furnish their processing and milling and export businesses, and they are more active in some parts of the country than others. ConAgra has interests in corn and wheat milling, exports, poultry processing and many other consumer food items. Each company may need or want grain from different parts of the country to meet its short term (two or three months supply) production or export objectives.

The marketing alternatives offered to producers in general do not vary substantially, although some firms differentiate by being more aggressive in their buying practices in some locations than in others. They have become more protective of the geographic areas that work well to their own processing or exporting facilities so that they do not have to enter the marketplace outside their own facilities to access grain.

Pricing differentiation is by location, transportation capabilities and facility operating costs. Generally, price is determined by the ability of facilities and a company to access different sales markets with various modes and capacities of transportation.

Reluctance of concentrated industries to innovate precludes the desire for the large grain firms to differentiate beyond traditional price or marketing option considerations. A structural change into full service facilities that would include banking, futures trading, lending or retirement programs by larger firms, for example, may come about in order to help producers simplify their businesses, and as an additional way to tighten vertical coordination up the chain to the producers. These additional businesses would bring the producers closer to the firms by becoming more full service organizations.

Barriers to Entry and Exit

Entry into the grain business even on a small scale (one elevator) requires a substantial capital outlay. Typical annual net income, depending on costs of running the facility, and volume, is only approximately 10-15% of the asset value. After the facility is built, the ability to buy and sell effectively, to access information, and to provide a variety of services with the expertise and economies of scale is needed to compete with the large companies.

Once the facility is built, it is a sunk cost. The structures exhibit high asset specificity, and unless another company would want it, there may not be a buyer for the facility, and the investment could be lost. The risk of investing in assets that have few other uses is that little

of the capital cost may be recovered if the company goes out of business. This high sunk cost increases both barriers to entry and barriers to exit.

Today's grain companies own and have access to more storage capacity, with the Grain 100 (Grain and Milling Annual 2002) averaging an ownership of 47 million bushels of capacity in 2002 versus 32.5 million bushels in 1987. Building a new facility can cost \$2 to \$3 per bushel of storage, and it needs to be in a location with sufficient potential bushel volume (large enough production area) to generate enough revenues to cover costs. It must also utilize as many modes of transportation as possible in order to be competitive in sales values. The top four grain companies have approximately \$4 billion in grain storage assets if they were built new today.

The size of the top four to six companies is such that their economies of scale is a significant factor. They can spread out their administrative, operating and transaction costs over many facilities, reducing the cost per bushel handled for the company. New firms entering the business will have a hard time matching all of the cost efficiencies of the large firms. There is a high minimum efficient scale relative to market size.

Structure in terms of the form of vertical linkages depends not only on economies of size and scope, but also on costs incurred in completing transactions using various governance mechanisms (Boehlje). If there is an alternative institutional arrangement that will reduce the transaction cost of an exchange, then the new market structure is more efficient (Davidson and Weersink).

Older facilities may cost more to upgrade to meet Occupational Safety and Health Administration standards than it costs to build new. Standards for safety and environment are becoming more stringent, and are expensive to adhere to in older facilities because equipment may be outdated.

Most of the new building is in the area of niche processing of grains by smaller cooperatives and ethanol plants. Smaller facilities that can produce a specific product can

compete in that particular market on a more level plane with the larger companies. They can provide specialized processing and services that the larger plants and companies may find difficult to manage effectively. Nontraditional cooperatives, called “new generation” or “value-added” co-ops, are growing in number and are being watched with interest by agriculture industry experts (FRB-Minn 3/02). In 2002 there were as many as 60 new ethanol plants being constructed or in process, which may lead to overcapacity quickly, particularly if prices for ingredients (mainly corn) would escalate.

With barriers to entry and exit substantial, there are not many grain handling firms entering the industry. Most of the growth is currently in processing, and mainly in ethanol production, where barriers to entry are lower because they are operating in a niche segment of the industry.

Growth

Growth in the grain industry has been slow. Compared to the 1989-90 crop year, corn, soybean and wheat exports combined, are projected to be 304 million bushels lower in the 2002 marketing year, and domestic use has increased 2.3 billion bushels for a combined increase of 2.0 billion bushels out of a total projected crop size in 2002 of 14.4 billion bushels (figures 3-c and 3-d). The growth rate of usage has increased about 14%, or a little over 1% each year on the average (USDA-WASDE). Slow growth leads to more concentration, and that has been the case.

The growth of grain origination is defined by the amount of grain grown in the area the elevator buys from, what market demand is for grains grown there, and what the capability is of the elevators to get the grain to the highest demand market.

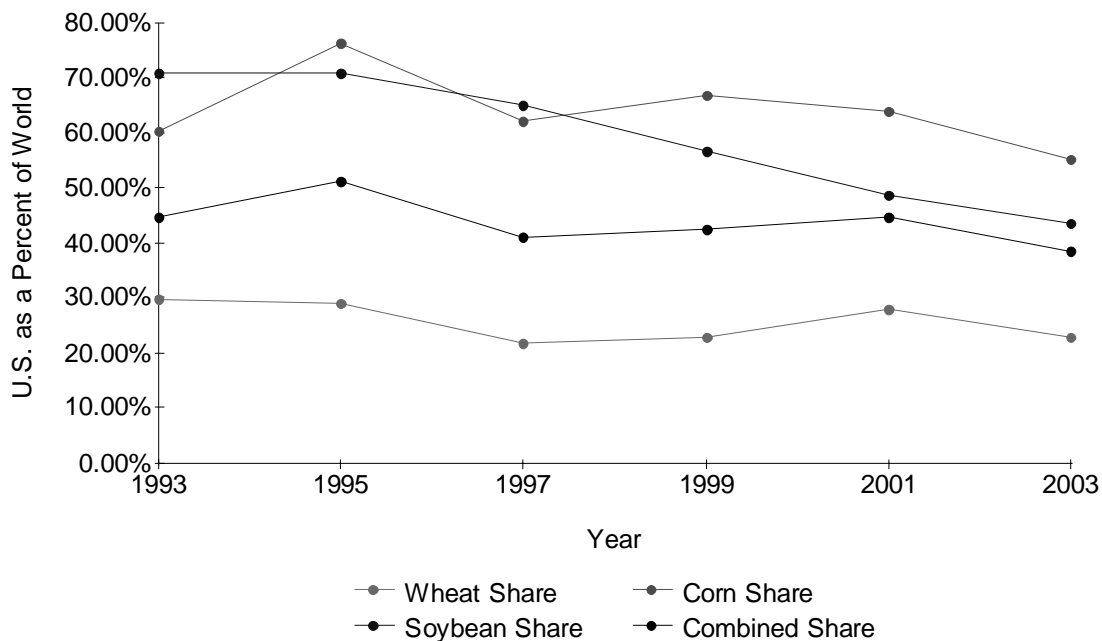
If the facilities have several modes of transportation available then they are in a better position to create growth in their origination by being able to take advantage of changes in

marketing patterns. Those facilities that are, for example, only truck, could not access markets far away as easily as a train loading facility with end users on the same railroad.

Growth is limited by the ability of the elevator and company to access markets. It is also limited by the services it can provide to customers. Price, services (drying, storage, accounting), information (marketing options, market news and analysis) and operational capabilities (how fast unloading and loading occurs, and other efficiencies) will also determine the ability of the facilities to compete.

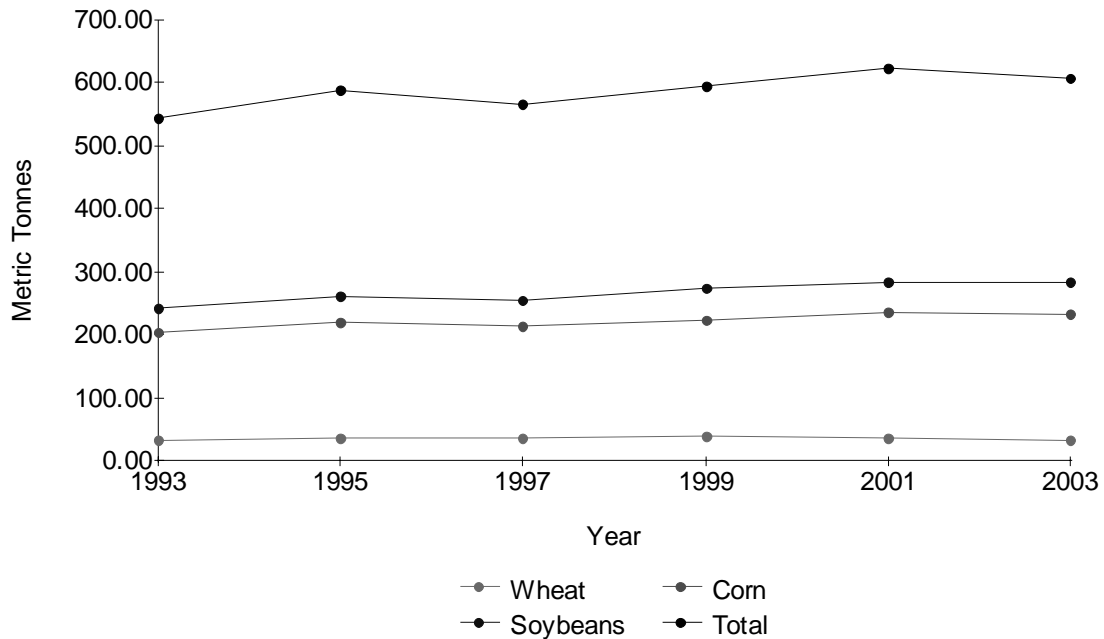
U.S. Export Market Share

Figure 3-c



U.S. Domestic Use

Figure 3-d



(Source: USDA - World Agricultural Supply and Demand Estimates 1993-2003)

Those companies that can access better markets and provide the needs of the producers at the lowest cost will gain local market share at the expense of others.

The growth of some facilities and companies may be affected by externalities such as urban growth or railroad abandonment. Larger companies (grain conglomerates) may be able to change (buy the railroad) or absorb the loss of business (operate seasonally) easier than local smaller grain companies that might have a higher debt to equity ratio.

Growth affects the structure because generally fast growth brings more profits (Caves), the playing field is more level, and the industry participants are more eager to expand market share. In the grain industry, growth has been slow, so new participants are slow to enter the market, particularly considering the cost of entry, and large firms are capturing market share by reducing costs through scale economies in an effort to make more profit.

Imports

The growth of production in some areas of the world, along with the changes in production areas in the U.S. mean that imports will be more prevalent in coming years. Countries that may have lower costs of production may be able to export to the U.S. This has been most evident with Brazilian soybeans and meal being imported to the East coast and wheat from Canada imported into the U.S. millers. This may become more prevalent as urbanization reduces production in coastal areas of the U.S. Another factor may be the increase of trade agreements that prohibit quotas and tariffs.

Imports will become even more evident if government subsidies are reduced. This might mean that more farm land goes out of production, and abandonment would most likely be concentrated on the higher priced land on the East coast, raising prices and forcing more imports to that part of the country.

Structure of the industry is affected by imports because the more competitive imports are, the less need there is for domestic plant expansion, and the more need there is more international trading experience. The focus of the companies can shift from being a leading capital intensive domestic grain handler and processor to a international trading company.

Summary of Structural Characteristics

The overall conclusion about the structure of the U.S. grain handling and processing industry is that it has slow growth, is capital intensive, has little differentiation and has a large concentration in order to gain efficiencies of scale in order to maintain profits. With growth slow, profitability and bushel volume can be improved most by processing and transaction cost reductions. It is difficult for entry except for smaller specialty processors that can provide service or specific products on a small scale.

Profitability and bushel volume for the firms can be enhanced by understanding that the structure of the industry can be changed by coordinating more closely with the grain

producer. This would allow for the possibility of more bushel volume for the firms, and in turn, could increase the profitability of the producer, by decreasing transaction costs.

The structure of the industry shapes the conduct of the firms. Rivalries among the large companies are strong, and their behavior is influenced by efficiencies of scale advantages that can be gained. Increasing volume is the main source for these scale efficiencies, and some of the gains in volume are a result of conduct of the firms. By understanding the structure, the IO framework in this study will help firms distinguish what conduct changes could be made to enhance performance.

A summary of the structural characteristics of the grain industry is presented at the end of section 3.2 (Page 81).

3.2.2 Conduct

Market conduct in the IO framework consists of the policies that participants adopt toward the market (and their rivals in it) with regard to their price, the characteristics of their product, and other terms that influence market transactions (Caves). Conduct links an industry's structure to the quality of its performance. It is the behavior patterns that firms in an industry exhibit in the market where they sell their product, and it arises within the environment of an industry's market structure (Caves). Those behavioral patterns for the grain industry are described below.

Pricing Policies

Pricing policies in the grain business are based on competition, storage capability, logistical capability, available output markets for the elevator to sell to, and the cost structure of the company and the location. There is little price leadership based on any other reasons, except if a company is in a position that is contrary to the market trend. In this situation a company may have either too much ownership (more owned in inventory or purchased than sold) in a downtrending market, or not enough ownership (little or no inventory and/or more sales than inventory or purchases) in an uptrending market, which would force a company to lead prices lower or higher in order to correct its position in the market. But these are more merchandising problems that need to be corrected, and the policy is to reduce market risk. If this conduct is frequent, however, as a result of poor management, the author's experience is that the conduct becomes part of the market and the competitive environment, and will influence the conduct of the other firms.

Critics point out that agribusiness concentration has drastically reduced sales outlets for farm commodities, amplifying the potential for these companies to abuse their (monopsony/oligopsony) market power and keep commodity prices artificially low (FRB - Minn 1/00). This is not as true in the grain industry as others as a whole, but is in some regions of the country. Regions with less transportation alternatives may not be able to support as many competitors especially if market entry costs are high (such as train loading stations in the Western cornbelt). Less competition will allow the location to take a little more margin (bid less for grain with no change in costs or sales values). Too much margin, however, might encourage farm storage direct movement from the farm to the next terminal market or processor, or increase feed demand. It could cause large producers to look for ways to increase their market power. Each company and location needs to assess their competition and their origination capabilities and use price to maximize volume and margin.

The storage capability of a company or location will allow more hours of operation in harvest if competitors are full. This could also mean more margin if the velocity of the movement of grain to the market at harvest is more than the system as a whole in the region can handle. There can be so much grain coming to market in a short time period that if any elevator is able to stay open (not fill to capacity before transportation for shipping arrives), they can increase margins (bid less for the grain) because they are the only option for the producer at that time. It is a temporary differentiation. At other times of the year, more storage may mean that a company may take less margin than competitors (raise their bid for grain) in the near term in order to fill storage space to take advantage of longer term carries (grain values being worth more in the future than they are now) in the market.

Companies are looking for ways to differentiate in order to gain market share. But strategic (long term) differentiation is transparent because producers may deal with several different companies, and the information is soon public, so the conduct of the other companies is to follow quickly as long as they have the financial capability and the knowledge to do so, and so the differentiation is short-lived. Prices change quickly, and can change from customer to customer, depending on what the company and location's needs are at that particular time. So price is the quickest and least transparent way to differentiate day to day. Firms may or may not follow the pricing conduct of others on a day to day basis. Patterns in pricing conduct by one firm may be copied by the other firms and their pricing conduct affected if the conduct is obvious or consistent enough. But merchandiser's interpretations of the market trend may differ and so in this case it may not be obvious or consistent.

Pricing policies are arguably the best representative of a firm's conduct. The ability of a firm to effectively manage its pricing policies can determine whether it is a leader or follower in the market.

Location, combined with the logistical capabilities of companies means that they may be able to take advantage of market opportunities only available by certain modes and/or

quantities of transportation. The facilities that have this kind of advantage may be able to exploit competitors by bidding aggressively at only certain times, when it can make a sale that others are incapable of. If a facility can buy grain from the farm into its grain facility, load a 65 car train shipped to an export elevator 600 miles away, sell the grain direct to an end user in Japan, and the same company owns the elevators, rail cars and boats, they are at a distinct advantage to a competitor that can only load trucks, and has only one facility. The sales price advantage can be substantial. This kind of integration can also allow for substantial capabilities in identity preserving grain, which can lead to more margin if competitors can not match it, and affects the pricing conduct of the firms involved.

In more risky markets, a firm with more margin can be less aggressive to reduce temporary market risk. This may make them less competitive in the near term, but more profitable in the long run.

Pricing conduct can be influenced by their ability to outbid competitors if they need to. In competitive market areas, which are the regions of the country with the most production, all companies may have similar capabilities. In that case, the company with the lowest cost structure will likely be the most profitable when they are bidding the same. The ability of a company to use the most advanced technology in assets can lower operating costs and give an important edge in profit margins. The fixed and variable costs of operating in the grain industry are of utmost importance. A larger firm can allocate improvements in asset technology to those areas where competition is the toughest.

Pricing conduct is the most important tool a grain facility has to quickly influence margins, volume and profits. A merchandisers' decisions about how to bid for grain at any particular time can quickly differentiate a facility and then can be abandoned after the goal is accomplished. How the grain industry uses the pricing mechanism when buying grain is an important link to further insight into the structure of companies and their performance.

Quality and Non-Price Policies

The actions and reactions to the promotion of non-price policies are a part of the study of the market conduct.

There are other forms of differentiation besides price, such as marketing advice, storage, internet services, personal relationships to help solve problems or to give extra service, or the ability and willingness to handle specialty crops or other farming products and services. As a low margin business, the grain industry is always looking for new opportunities to increase revenues. If they can be innovators, they can create more margins, even if it is for a limited time.

To differentiate and capture more margin, grain industry companies of all sizes are looking for niche markets. Quality and/or unique characteristics of a certain grain can be handled separately for specific customers for specific uses. The companies are watching for opportunities to gain profits by serving those customers. Some facilities may be able to segregate and identity preserve certain quality characteristics better than others. This is where smaller companies can compete more effectively, (due to more willingness to innovate) as the market has seen with the increase in the “value-added” cooperatives.

Other non-price policies such as more advanced producer marketing programs and advisory services and other personalized services may enable a company or location to gain market share by taking advantage of knowledge, information, or physical asset capabilities in order to increase volumes and margins.

If a smaller company cannot compete on a global scale, it may be able to be successful by promoting its differential advantages and quality and non-price policies to a specific group of customers. This can be done by more aggressive telephone or internet contact, or by on farm visits or meetings.

Some companies promote more personalized service, better accounting capabilities (computer systems), or to offer non-grain services like savings accounts, credit, futures

brokerage or discounts for doing business in another division like seed, chemicals or fertilizer that the company may also deal in.

The type of promotion needs to be analyzed thoroughly before implementing. Some of the strongest promotion in the grain business was the hybrid Hedged To Arrive contracts several years ago. In return for service charges, companies carried futures and options positions for producers positions on grain contracts. Some of the marketing actions also resulted in more contracts for grain to be delivered to the company. These contracts were very popular for a while with farmers and did enable some companies to gain market share by promoting the flexible contracts. Market conditions in 1995 and 1996 created unforeseen losses in these of type contracts and actually had some severe negative effects on some companies. Producers were stuck in a trading situation that they did not react to or understand.

As opposed to pricing policies, promotion can be centered more on products, where the uniqueness of the firm can be presented and strategies can be implemented that may not necessarily be met by rivals. Larger companies, for example, generally have more expertise and a wider array of knowledge in different areas of operations, merchandising, accounting, policies and other services that they can draw on to promote an overall image of professionalism. But large firms in concentrated markets may be less willing to use this expertise to innovate. Smaller firms may be more willing to innovate, but may not have the expertise. The author's experience is that if the more competitive the market area is, the more the larger companies are willing to promote and innovate. Where there is less competition, the larger companies promote and innovate less, and smaller firms attempt to innovate into niche markets.

Strategic Advantages

Strategic advantages can come from several different aspects. Facility location is one important aspect. Three keys for successful locations of facilities are that they are in areas with less competition, are in a high volume production area, and have several types of transportation access. Conduct can be a result of how a firm chooses to manage these strategic advantages.

Another important advantage is the control of grain flow from the producer to the end user. This is the ability to be the first purchaser of the grain from the producer and then move it through the market in its own logistics system (owning the trucks, rail cars, barges or boats) to the final destination. It is particularly important as the market shifts more towards quality specific attributes, because control of blending for identity preservation is of major importance.

Having the ability to process grains into specific use products by being vertically coordinated (by integration or some alliance) is also an advantage, and all four of the top grain storage companies have this ability (NFU). Those companies that are not vertically coordinated have less of a chance to spread out their risk, and have less consistent earnings. It is harder for them to compete long term. If a company just operates grain elevators and there is a poor crop, and volume is down, they don't have another business to spread out the revenue risk. This vertical capability down the chain also allows those companies to make use of the origination capability to ensure a consistent flow of supply to the processing and export businesses. These vertical (market channels) activities by integration down the food industry chain reduce transaction costs and ensure a demand for the grain purchased.

Many new uses for corn and soybeans have been developed by the checkoff programs that deduct a small amount from each bushel from first time purchases. These programs are sponsored by associations for corn and soybeans (National Corn Growers Association and the American Soybean Association). These new grains and processed products are handled and processed by the industry, and the more of these new markets a company can be part of, the

more opportunity they have to have a competitive, strategic advantage. Innovation in product uses through integration is advantageous to firms that can fill the requirements for handling and processing these new products. How aggressive a firm wants to be in handling and processing innovative products is part of their market conduct.

If firms own other agricultural input businesses, they can tie their grain purchases to selling fertilizer, seed and chemicals, for example. This diversification allows a strategic advantage to firms that are not diversified in the same businesses..

The knowledge of the people that a company can hire and keep, in addition to the culture of the company personnel, can be a significant strategic advantage. The grain industry is made up of many transactions and many movements of the grain to different markets around the world. Making sure the grain in each facility is purchased at the most competitive price for both the producer and the facility, and that it is in turn stored for the amount of time up to when the marginal revenue equals the marginal cost of storage (carry), and then sold to the market that generates the greatest revenue, is a complex merchandising spreadsheet. Market knowledge is key to making an extra 1/2 to 1% margin in a low margin business (2-5% of value).

Firms can gain strategic advantages by their location, integrating vertically and horizontally, processing special use products, and by human resource capabilities. These strategies are further ways to differentiate, and the conduct of the firms is influenced by how successful their strategies are.

Deterrents to Entry and Exit

The conduct of incumbent firms influences actual entry. The price and product policies of the going firms determine whether entrant can expect to make a profit, or whether the going firms may raise the entry barriers directly (Caves).

Since the grain industry is so complex, transaction costs are reduced by pooling resources. A large firm may concentrate expertise in a home office, then distributing that

expertise to facilities as needed. A new entrant may have to hire people or pay for services in aspects such as finance, law, taxes, payroll, etc. By keeping costs down, the firm may be more profitable, but it also is a conduct that deters new entrants.

To enter into the industry takes a substantial outlay of either assets (if building an elevator) and/or knowledge and time (if trading from the farm to a destination or brokering transactions), both of which are deterrents. An existing firm may choose conduct that protects an asset or a market from a new entrant by changing pricing or other business policies.

Risk due to weather (production), or changes in regional demand can be reduced if the firm has elevators or processing plants in different regions of the country. A firm may not necessarily have to allow the weather to affect their decisions if the risk can be absorbed by all the other locations. This conduct allows for arbitrages on a scale that a new entry might have difficulty competing with.

The conduct of the larger grain firms is signaling to the new entrants that profitability could be a problem. Grain merchandising margins are remaining steady, as consolidation reduces costs per unit by scale efficiencies. As a result, most of the newer business are smaller, finding niches to provide a limited quantity of a certain quality of grain or providing a service like brokering, market information or producer marketing management. Some smaller cooperative ventures have been successful providing certain processed products to the market, and are growing in number (FRB-Minn 3/02). Marketing management and advice has grown in demand as the size of the producer has grown. The large producer may not have the time or the expertise to market large amounts of grain to the best markets at the best price and would rather have an advisor with experience helping them with their marketing. Larger companies have the knowledge to perform this function in more varieties of ways than smaller companies or individual enterprises. This expertise and experience level must be considered when deciding to enter the industry.

Market conduct requires that a distinction is made about whether a strategic move is reversible or not (Caves). Sunk costs are commitments of capital that are irreversible. Once a new elevator or processing plant is built, that organization is committed to making it profitable. Existing firms can use the threat of the cost exiting as a tool in keeping new entrants out, by using price and non-price policies and other strategic advantages to discourage them. The irreversibility of a commitment “has potentially important implications for market structures and the performance levels that they deliver (Caves).

Day to day pricing decisions allow uncommitted conduct. Merchandisers can change their pricing rapidly depending on market forces. This is more pronounced if the firm does not have committed policies (guidelines) for their merchandisers to price grain. Commitment will determine whether the conduct of the long run firm may take on a preemptive, protective posture, while the uncommitted firm may look for short term opportunities and back out of the market if profitability is less than the goal. Service businesses have less commitment, and with no assets, can exit more easily. A quick exit may leave the producer having to develop a new relationship for help in marketing their grain.

The level of commitment leaves room for the oligopoly group (such as the major grain companies) to elevate the entry barriers that protect it from new competitors. This conduct is necessary to understand before a new competitor decides to enter. The decreasing number of large grain companies and the increasing number of new entrants into niche markets suggest this is the conduct that is being exhibited.

The barriers to entry and to exit are high if competing directly with the large grain firms. The conduct of the current industry participants results in the appearance that there is more profit opportunity in smaller, specialized niche markets in processing.

How Competitors React to Each Other

The flow of information via producers about the conduct of grain industry firms is frequent and free flowing. Finding out what competitors are paying for grain and what services they are offering is relatively transparent. Differences in services can be seen in some marketing options, and price differences are mainly determined by the facility locations and the vertical integration of the company from origin to final destination (particular needs further downstream).

Large companies use their market power over smaller companies that do not have vertical capabilities by bidding more for grain and by cutting margins by bidding more for grain.

No one company has the capability or power to force the value of grain up or down substantially because of the ease of transportation. If price differences between two regions are more than the cost of transportation, the grain will flow to the market that offers the best net price. In order to increase volume, price and/or margins must be changed to make up the difference if desired. The market tends to find equilibrium in most regions easily due to the number of facilities and for fear of losing market share and the associated profits if the location is uncompetitive.

As already mentioned, the transparency of marketing strategies to producers makes it easy for competitors to react to each other to reduce strategic advantages but only if they have the financial, operational, merchandising or service capability to do so.

In an oligopoly such as the grain industry, independent price action will depend on how other firms react to price changes and non-price competition. Statistical studies confirm that the more rivalrous the oligopoly, the higher the incidence of nonprice competition (Caves). In the grain business this varies by region, based on the differential advantages a facility in that region may have on competitors.

Summary of Conduct Characteristics

Conduct arises within the environment of an industry's market structure and it links the structure to the quality of its performance.

By understanding the structure of the industry, we can better understand how it influences the behavior (conduct) of the participants. The conduct of the firms in an industry links the structure to quality of its performance.

The grain industry exhibits conduct characteristics of an oligopoly. The competitors are aware of each others actions in pricing and quality and non price policies. They understand the advantages each firm may have. They act to protect trade areas by blocking entry and making market exit costly. The study will next link structure and conduct to the understanding of performance.

A summary of the characteristics of conduct is presented at the end of section 3.2 (Page 82).

3.2.3 Performance

Market performance is an evaluation of the results of the firms' behavior. Caves defines market performance as the appraisal of how closely the economic results of an industry's behavior match the best possible contribution it could make to achieve these goals. It is an industry's actual contribution relative to its potential to achieve its goals. The economy should achieve four goals if it is to provide the maximum economic welfare for its citizens. It should be efficient in the use of resources, progressive in enlarging and improving the flow of goods and services, provide stability of prices and employment, and be equitable in its treatment of individuals (Caves). This background is what brings us to this part of the IO analysis for the grain industry.

Performance is what we are ultimately interested in. Performance is the social valuation of systems outcomes. Structure and conduct are instruments by which performance

is influenced (MSU-AEC 841). It is for these reasons that the study now evaluates the performance of the grain handling and processing industry.

Efficiencies

The primary problem of economic efficiency is how to allocate productive resources among the various types of goods and services produced in the economy (Caves). Showing what conditions will produce a consistent level of profit rates, reflecting optimal distribution of resources, is a principle concern of industrial organization (Caves).

The system of moving grain from the field to its final destination in the U.S. is possibly the most operationally efficient in the world. The logistical capabilities are extensive, with a superior complex of roads, railroads and water transportation. Prices to producers are transmitted openly and freely. The Chicago Board of Trade open outcry futures trading is the base price used, with transportation differences applied to local facilities. Grain terminals have become quicker and larger to handle the rush of grain coming in at harvest and to reduce the waiting time of transportation equipment.

Exchange efficiency is how well the quantity available leaves the hands of persons who value the commodity least and ends up in the hands of persons who value it most. This involves the lowest possible transportation costs, facility costs, pricing costs, information costs, inventory costs, and maximum possible trading gains (Sosnick). The exchange efficiency of the grain handling system is excellent. Grain is purchased, graded, weighed, unloaded and paid for quickly and with few problems. It is a system that has been refined and regulated since the mid 1800's to work efficiently. The result is that grain moves quickly and easily to end users at only a small percent of the total consumer price for finished products. It performs the functions that society demand very well.

Progressiveness exploits every available technological change which would reduce cost (Bain). Technical, or operational efficiencies for the grain industry are the ability of the

facilities to handle grain with small amounts of shrink (.5% or less), their ability to store grain with no detrimental change in its condition, to be able to blend the grain to take advantage of being able to discount grain coming in and not be discounted when loading out, to account for it accurately and to be able to buy it and sell it at consistent, profitable margins. If the company is involved in processing of some kind then it should be able to do all those things and also produce a product that the end consumer likes and wants. The successful grain handlers and processors perform these functions well. It gives them an advantage in cost that allows them to bid more competitively.

The inefficient use of resources by firms and industries can take the form of being inefficiently small, so that they are unable to make use of available economies of scale, carrying a large margin of excess capacity at times, because this is wasted capital, or laziness or inefficiency to burden firms with costs higher than the minimum for their outputs (Caves). The main inefficiency with grain elevators is the amount of unused capacity most of the year. The facilities have been built and upgraded to handle the volume of grain at peak periods, and so they have excess capacity the rest of the year. This raises the fixed cost expense per bushel. If there is a major area of improvement that could be made, it would be to increase volume during slow seasons.

The economic efficiencies would be the overall ability of the facilities to generate their goal profit to asset ratios considering the market conditions. Depending on the efficiencies of the facilities, these goals do differ. If the facility cannot generate enough income, and other uses for the asset dollars are available at a greater level, then the company should consider making changes to maximize potential owner/management goals, or at least allocating improvement dollars elsewhere.

Setting the bids for grain and selling the grain requires efficiencies in merchandising. The goal is to maximize the margin by buying grain at as low a basis price (basis - the difference between the local elevator price and the Chicago Board of Trade price) as possible,

and selling it at the highest basis price possible. This requires maximizing the use of (carrying) the inventory space and predicting the trends of the basis price as much as two years ahead. These efforts depend on competition and volume on the origination side, and the available outlets on the sale side. If there is not enough difference between the two to maintain profitable margins, then ways of improving the margins should be considered by reevaluating the merchandisers, the facility and the local trading strategies. Total costs of operating the facility and the administration would also certainly be part of the margin evaluation process.

The norm for production efficiency is that it is desirable, measured by how closely firms in the industry approximate the lower attainable (real) costs for the outputs they produce and distribute (Bain). The grain industry, with little differentiation in products, operates on low (2-5%) per bushel margins, and so must operate at as low a cost as possible in order to compete effectively. Efficiency that can be gained in any aspect of the firms operation may make the difference in survival during lower production years. A manager should be looking at every part of the operation for improvement.

Innovation

Innovation in this market may be new technology, such as quicker accounting programs or fast access to customer databases, dissemination of information (web pages), or operational equipment that can eliminate errors and labor. It also may be considering a capital project (changing or improving the assets of the facility) to improve customer service or expand into different markets (more specialized). Knowledge of processes that have worked in other facilities that might be applied and new, practical ideas that can cause volume and margins to increase can also improve performance, particularly if costs can be better controlled.

New ways of improving old processes and also creating new ideas to generate income come from the knowledge and skill level of the people working for each facility and each

company. Management needs to create an atmosphere and culture where new ideas are welcomed and seriously considered for ways to improve business. In such a competitive homogeneous market, companies are always looking for new ways to cut costs or generate revenue.

High concentration in an industry is apt to retard progress by restricting the number of independent sources of initiative (Scherer). In the grain handling and processing industry, which is becoming highly concentrated, smaller firms are more known for their innovative approach, and the larger companies are not. The differentiation in culture influences performance in the long run by the degree of freedom and the incentives employees have to find innovative ways to improve handling and processing of grain.

Innovation can be an important aspect of the grain industry because it can be used to find more effective ways to perform different functions of the business.

Research

Ways of improving performance sometimes need a more general overview - a perspective of the business that might not be considered by the day to day operators in the company. Research into the overall economic trends, and ways to improve the performance of the company in the long run should be beneficial. A separate staff that considers new possibilities, examines current operations and understands the historical background of the business can be the source of planning, innovation, expansion and future organization of the company.

Research from a grain marketing aspect is also very important. Understanding world supply and demand trends and results helps the company decide what commodities to market, where and when, and that information is conveyed to producers by price through the system.

Without leadership in envisioning the possible outcomes of different industry trends or developing strategies that can lead the company to long term success, a company can lose its focus, which results in lost market power and profitability.

Higher concentration levels dampen firms' incentives to gain market position through accelerated research and development (Scherer). The author has observed evidence of this in the grain industry as we see more niche cooperatives and companies handling and processing specialty products, while the larger firms concentrate more on developing ways to become more cost efficient in existing operations.

The grain industry exhibits limited innovation by the large companies, who concentrate more on limiting nearby costs. This follows the standard evaluation for industry progressiveness that an ideal rate of innovation through time is one that promptly exploits every available technological change which would reduce cost but that foregoes or delays technological changes which, if made currently, would increase production costs over time (Bain). If a niche becomes very profitable, the large firms may just be able to buy that company and absorb the innovation.

The author's experience is that larger firms display a conduct of waiting to see if an innovative idea is successful by smaller firms, and then buying that company or idea and absorbing the innovation. This allows the larger company to be more cost effective by limiting research costs, and using their size to incorporate new ideas only after the performance has been evaluated.

Profitability

Bain asserts that "a basic return equal to the normal interest rate is necessary on the average and in the long-run, for the maintenance of production by any group of firms" or for "the enterprise system to work well in the long-run" (Bain 1959).

At the heart of performance analysis is proper resource allocation. The equity capital that entrepreneurs supply to the firms in different industries does the job of balancing business costs and revenues. Optimal resource allocation requires a normal rate of return on equity to prevail in each industry. Equity capital comes from the general pool of savings in the economy., and it could be allotted to any sort of long - term investment (Caves). If firms do not perform, they are not returning enough to invested capital to compete with other firms or industries, and could lose investment value.

Measurements of profitability among the grain industry leaders varies. The four major firms have many other businesses, and a definition of specific profits made in their grain divisions is difficult to identify. Cargill is a semi-private company and ADM, Bunge and Con Agra are publicly owned, but have many divisions. This is important to understand because identifying performance can be difficult with these large conglomerates.

Profits among these leading companies vary with the volume of grain produced in the United States and also in developing agricultural countries such as Brazil and the former Soviet Union. Competing world values of substitutes such as palm oil, rice and tapioca for instance, and the general farm economy are also influential.

In 2001, ADM's net earnings were 1.9% of sales, Cargill's was .72% (Cargill) and Con Agra's (Con Agra) operating profit was 6.8%. These are not excessive, but are not sub-normal for the industry. The author's experience is that in strictly grain industry handling, normal earnings are 1-2% of sales, and in processing, they can be 1 - 20%. Performance varies depending on how the company is affected by the overall agricultural market economy. Overall company profits for the three companies have improved some the last two years, but have not been good compared to earlier years. It highlights that these companies need to try and find ways to reduce costs as well as increase revenues.

It is difficult to determine how just the grain merchandising portions of these large companies are performing because of the many agricultural businesses these companies are in.

ADM does break out their figures into an agricultural services division, which includes grain merchandising separate from processing, and its operating profit for 1999, 2000 and 2001 was 2.16%, 2.10% and 1.64% of sales respectively. But sales dollars depends on the price of grain, and income should really be measured in cents per bushel handled and return to assets, neither of which are not broken out (ADM).

Cargill, ADM and ConAgra have all faced challenging financial results in the last several years. In 1999, a spokesperson for Cargill said that there has been a “retrenchment through the industry”, after indicating that they had the worst year in probably a hundred (FRB-Minn 1/00).

Cooperatives have had a difficult time recently also. Several cooperatives in the grain business in the last ten years have either given up management control to larger private companies, or have sold out. Since 1990, the number of cooperatives has dropped by 28% and membership by 25% (FRB-Minn 3/02). The costs of running those grain divisions was too high, and they chose to enter into management agreements or sold out.

Fluctuations in profits means that the industry is still competitive and that the integration and coordination level is healthy for the industry as a whole. Chronic excess profits represent a failure of the market system because too few resources are flowing into the industry, the industry is concentrated and entry to barriers are high. Sub-normal profits may indicate a sick or declining industry. Periods of high and low profits indicate that the market is working well. It means that changes in allocation of resources is necessary, and innovation and risk taking are rewarded. Profits should be at levels just sufficient to reward investment, efficiency and innovation (MSU-AEC 841).

The grain industry appears to be between a healthy industry and a sick or declining industry because profitability is fluctuating, but profits have been sub-normal recently.

Diversification

Diversification through integration, both horizontal and vertical, allows the larger companies to avoid risk. Horizontal integration in the grain industry spreads out the ownership of facilities over a larger geographic area. If one region has a drought, another may have record yields, and that can even out revenues, costs and income. Vertical integration, as mentioned, can smooth out income if a few sectors do not do as well as others. A firm that handles grain, processes it, owns transportation equipment, and exports several commodities can spread risk over varying sectors of the industry. Smaller companies without any diversification might get caught with a bad year and not recover, and this goes for the new innovative cooperative and private niche businesses. If they lose their differential advantage or their market, they could lose all of their investment.

Diversification allows the firms to spread risk, which is important particularly in a low margin business such as the grain industry. Under conditions of risk aversion, firm managers may prefer strategies that are on average less profitable but also less risky. In this case, the industry is low margin, and so the managers do tend to be risk averse, and diversification helps reduce risk and help performance.

Market Power

Studies of market power and its relationship to performance indicate that in highly concentrated industries, a negative correlation between concentration and purchasing price exists (Sexton). In the case of the grain industry, this would indicate that the concentration will mean lower prices for producers at the elevators and processors, and a positive performance result (more margin) for grain handlers and processors if costs can also be controlled. The negative correlation is due to market power and not the markets themselves.

The motivation for the number of mergers, acquisitions and other restructuring is to increase efficiency or market power, since their ultimate performance will rest on the balance between these two effects (Caswell and Cotterill).

Producers and consumers on balance have been harmed by the increasing concentration in the food marketing sector. The gains from enhanced efficiency of marketing have not offset the distributional losses (for the grain producer) from market power. Producers have, then, been harmed by increasing concentration in the food sector (Sexton). So as the grain industry has become more concentrated, and their efficiencies have improved, these forces should be detrimental to the grain producer.

In this study, however, we show that in the long run, the grain industry is tied closely with the success of the grain producer. Efficiencies gained in the grain industry have not offset the effects of the loss of market power from the producer. The grain producer, as will be shown later in the study, has found it more difficult to be profitable without government assistance, and this has negatively influenced the grain industry by loss of volume (particularly in Michigan), offsetting the gains the industry has had in efficiencies and market power.

The grain industry, therefore, needs to work on gaining efficiencies, in order to allow themselves more profitability. They could then pass some of those savings on to producers so that they, in turn, can be more competitive with other uses for land and with other world competitors for grains.

The four major grain companies could be viewed as conglomerates, meaning firms that operate in two or more distinct product/geographic markets. By this definition, the theory is that such firms are able to engage in competitive strategies unavailable to specialized single market firms (Marion and Mueller). Conduct of the firms with and without the power is certainly a factor of performance, as well as the structure of the industry as market power shifts.

The links of market power to performance are seen through the structure and conduct of the firms in the grain industry. Market power in the grain industry is gained over a period of time by wearing down the competition in an area. The larger companies are continually finding ways to cut costs, by using leverage to get better deals out of suppliers (conduct) and

spreading the costs of doing business over more facilities (structure) which lowers the overall costs per bushel marketed. The smaller competitors end up facing a competitor that can pay more for the grain, and maintain income levels. Expenses for smaller companies are a larger percent of sales, and as they continue to rise with inflation, and they should widen margins to compensate. But that would be hard for them to do because it would put them at a competitive disadvantage, and performance would likely suffer.

Market power through conduct is used to enhance performance by attempting to reduce competition in some areas. But that is difficult to accomplish as a strategy by itself. The company that has the most facilities in the locations that offer the greatest profit potential (through structure) as previously mentioned has the most market power. A strategy of trying to create market power only through conduct (regardless of recognition of the capabilities of their assets) could backfire in those locations that don't have a true marketing advantage over other competitors. A larger company that has the ability to perform (strong asset base) may use the conduct of exerting market power to continually lose money in an effort to oust a competitor from a certain market and still not complete the objective. The author's experience is that this type of performance characteristics by smaller companies will cause unacceptable performance results and even in large companies it may cause the eventual closing of locations.

Distribution of market power varies in different regions of the country. More power is achieved by companies that need origination to support other parts of their business, such as processing plants or export programs. They have the advantage of passing down profits from downstream operations directly to upstream assets if they desire. If too much power is gained by merger, as in the Cargill/Continental merger, then the Department of Justice may force liquidation of some facilities to reduce monopolistic (or monopsonistic) tendencies and increase competition (Hayenga).

. How each firm decides to conduct itself within the structural parameters (of its capabilities to perform) will influence the structure and ultimately the performance of the firms and facilities in that region. Ultimately, it may also impact and change the structure of the market in which it operates.

A summary of the performance characteristics is presented at the end of section 3.2 (Page 83)

3.2.4 Conclusions and Implications

The popular framework for the Industrial Organization approach uses market structure, market conduct and market performance to set up the key causal hypothesis of economic theory. Theory tells us that market structure determines market conduct and thereby sets the level of market performance (Caves). This concept includes the ability to link each element in varying order to determine the other elements in an industry study. The importance of each element can vary depending on the market. Parts of the structure of an industry may affect performance more than others. Structure sets the parameters that determine the possible conduct choices for the firm. Some conduct aspects may be more important to performance than some structural aspects.

The links between the elements of the IO framework are a powerful tool for analysis. If the aspects of structure and conduct that are most important to performance can be discovered, then we can analyze changes that can have desired effects on performance.

Performance by the firms in the grain industry stem from the need to handle a volume of grain that can allow them to attain a level of net income in total dollars and in percent of sales that is equal to or better than returns the company can make long term in other lines of its business. Performance is made more crucial by the fact that they have heavy investments in assets that can be a sunk cost depending on the location.

The structure of the grain industry is becoming more tightly concentrated in an effort to reduce costs and maintain or improve margins. Large companies have used their financial abilities to increase market share by integrating and coordinating vertically (down the chain, but not as much up the chain to the producer) and horizontally. But this type of structure may create welfare losses for the grain producer, and reduce incentives for further reductions in costs because of less competition. The structure should be altered to one of being more tightly coordinated with the grain producer, which would help increase producer welfare and improve firm performance. Both the producer and the firms should recognize this need and work closer together. This transition may be necessary sooner in Michigan than nationally because of less comparative profitability in grain production in the state.

The return on assets may be improved by more and guaranteed volume. Scale economies could be enhanced and per bushel costs could be decreased further by spreading costs out over the larger amount of bushel volume. The greatest inefficiency is when the elevator is operating at low capacity, so increased volume particularly in the off season, at profitable margin levels is the desired improvement. If the cost per bushel was decreased, and margins were kept the same (little increase in fixed costs), they could more easily achieve their profit goals by being able to be more competitive on price and other services and gain market share.

One of the most direct ways to assure volume (maybe not an increase, but at least no decrease) would be contract farming. But if the methods involved the acceptance of too much market price risk from the producer, it would mean that the grain industry may have to pay more through contracting, and it may offset the increased efficiencies created by reduced costs in operating facilities with higher volume.

The amount that a facility will be able to pay a producer to grow grain (contract production) will depend on how much extra income the facility can generate with the stabilized volume (higher marginal revenue). Handling volume allows the elevators to add

profit in some additional ways, by being more cost effective (lower marginal cost), and increasing chances for other plant efficiencies such as blending, and taking advantage of trading opportunities that may require certain volumes of grain to be moved at certain times. The facilities may have more control over the timing of the movement of the grain from the farm. They could tell the producer when to move the grain from the farm to the elevator or processor, so there would have to be arranged coordination in the storage and delivery of the grain from the field to the grain facilities. They also would be in a better position to be able to identity preserve certain more specialized production if desired.

Other ways to assure volume are by developing more marketing alternatives with more personalized service to individual needs, diversifying by developing specialty grain (identity preserved) programs, developing convenience products such as financial, banking or credit businesses, aggressively pursuing fob farm purchases and overall, developing and maintaining closer communications with grain producers.

A summary of the characteristics of structure, conduct and performance of the national grain industry with a comparison for the Michigan grain industry is presented on the next three pages. The chapter then proceeds to the IO analysis for the Michigan grain industry in section 3.3.

Structural Characteristics
of the Grain Industry

Factor	National	Michigan
Concentration	The four largest firms have 47% of the grain storage capacity and 70% of sales	Fewer handlers per bushel, less of a presence of multi-national companies
Differentiation	Small differences by firm size, location, transportation capabilities and facility operating costs	Transportation capabilities, marketing and service expertise matter the most
Barriers to Entry and Exit	Relatively high barriers due to substantial capital outlay and asset specificity	Higher due to declining production and the effects of negative income variability of producers to national average and its effects on the industry
Growth	Slow - few new participants	Limited due to reduction in production volume and competition
Imports	Increasing trend due to comparatively lower production costs from foreign competitors	Canadian white wheat has been flowing into the wheat mills

Conduct Characteristics
of the Grain Industry

Factor	National	Michigan
Pricing Policies	Leadership based on competition, storage and logistical capabilities and the cost structure of the company and location	Less elevators, larger draw areas, less aggressive pricing
Quality and Non Price Policies	Niche markets, personalized services and innovative marketing provide added revenues	Medium sized firms providing the marketing alternative leadership. Smaller facilities competitive in niche markets
Strategic Advantages	Facility location, control of grain flow through the system, processing capabilities and vertical integration are keys	Transportation alternatives and storage and segregation capabilities are key
Deterrents to Entry and Exit	Larger firms have advantages of lower transaction costs, more asset strength and facilities spread over larger areas. Small firms can compete in niche markets	More land being lost to urbanization and higher cost/revenue ratios causing less production, lowering revenue potential for industry
How Competitors react to each other	Information is transparent, frequent and free flowing	Less promotion with less competition

Performance Characteristics
Of the Grain Industry

Factor	National	Michigan
Efficiencies	Logistical capabilities are extensive, exchange efficiencies are excellent. Unused capacity is largest inefficiency	Higher transportation charges are a disadvantage
Innovation	High concentration has slowed it, more so in large firms than small	Innovation/niche opportunities are higher due to higher production costs and lower yields
Research	High concentration has slowed incentives in large companies, specifically for Michigan because more niche opportunities for small companies	Harder to justify research money of smaller market - less possible returns
Profitability	Driven by resource allocation. large companies have advantage, but smaller niche-driven companies have opportunities to profit	Same as national
Diversification	Horizontal and vertical integration allows larger companies to reduce risk	More niche market opportunities are available to help reduce risk and increase profitability
Market Power	More concentration correlates with lower prices. Enhanced efficiencies from higher concentration do not offset the distributional losses for producers	Larger firms have more ability to provide services that customers desire

3.3 Industrial Organization of the Michigan Grain Industry

The study will now apply an Industrial Organization approach to the grain handlers and processors in Michigan. There are a few changes that need to be made that pertain to the specifics of this market compared to the national analysis. But Michigan is a part of the national and world grain industry, so the analysis done in the previous section will serve as the background for this section of the study.

3.3.1 Structure

There are more grain facilities in Michigan per bushel of production of the three major commodities than the other states in this study. The total commercial storage capacity for the number of bushels produced, compared to the other states, however, is average. This tells us that there are more elevators, but the average size is smaller (Figures 3-e and 3-f and Table 16).

The conclusion might be drawn that Michigan is less concentrated and that there is more competition in Michigan than the other states. But a closer analysis shows that the five largest grain companies, ADM, Michigan Agricultural Commodities, Star of the West Milling, The Andersons and Con Agra(Peavey/UAP) own about 45.3% of the storage capacity (Figure 3-g). At an average of 2 turns (number of times a facility is filled and emptied in a year) per bushel of storage, these companies handle 39% of the production in the state. This means that the remaining handlers that are higher in number, but smaller in size in comparison, and may provide little direct competition to the large companies and facilities. Concentration from this perspective indicates a ratio in Michigan near the national storage capacity concentration rate (CR5) of 47%.

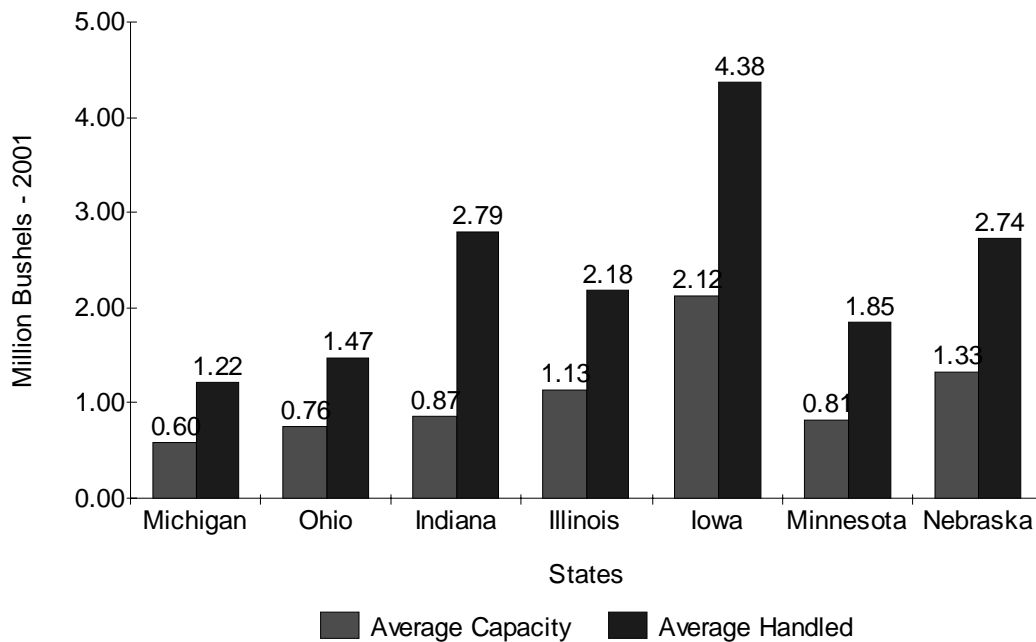
The structural characteristics of high concentration adds to the lower level of competition. It creates an environment that is less competitive than other states. It enhances

the capabilities of the large companies to be profitable, and creates difficulties for bushel volume and profitability for smaller companies. The state industry is similarly as oligopolistic as at the national level.

The following analysis of structure illustrates the differences. Concentration, differentiation and growth in the Michigan grain industry are more unique than at the national level, while barriers to entry and exit are higher, and imports and other components are similar.

Grain Industry Capacity and Handling

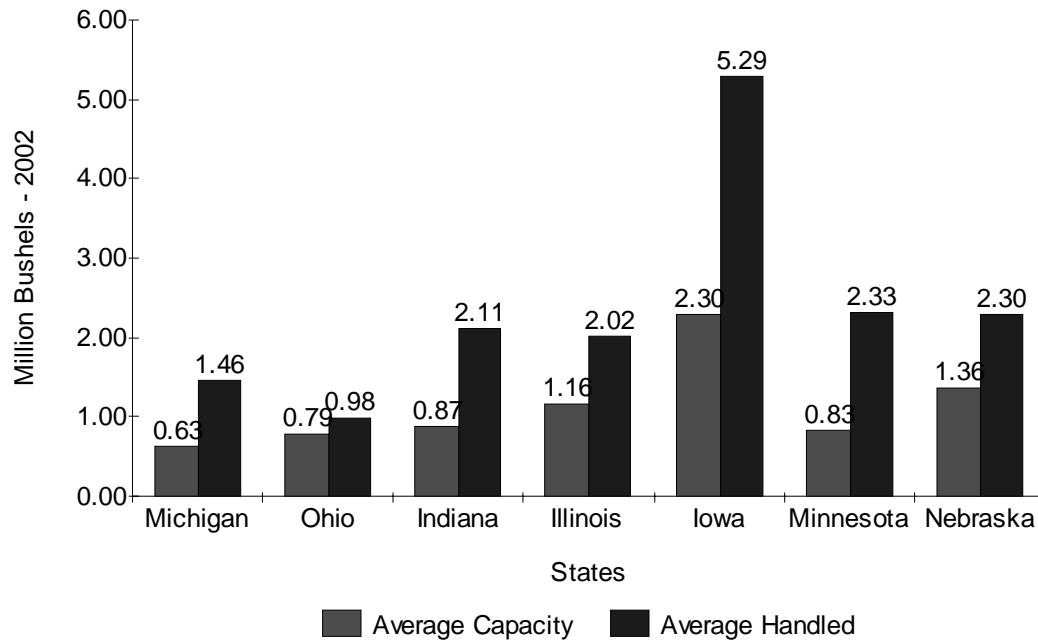
Figure 3-e Average Per Elevator



(Source: National Agricultural Statistics Service, Agricultural Statistic Board, USDA)

Grain Industry Capacity and Handling

Figure 3-f - Average Per Elevator



(Source: National Agricultural Statistics Service, Agricultural Statistic Board, USDA)

Concentration

Concentration has increased, but with less of a presence of multi-national companies than in other states. Con Agra owns Peavey grain facilities in Carrollton and Bay City, with eleven other branch facilities under the U.A.P. Great Lakes name that combine grain with chemical, fertilizer, seed and other production services. Most of these facilities are truck houses (receive and ship only by truck). ADM Grain Company has seven facilities in the state that handle grain, and their Agri-Sales division has 18 other locations in the state that handle some grains, but mostly edible beans and production supplies, and many have been closed (MABA).

There are two medium sized grain handlers in the state that handle a significant amount of bushel volume, the Andersons and Michigan Agricultural Commodities. The rest of the market is splintered into smaller processors, millers, local cooperatives, and small

privately owned companies and broker business buying at the farm bin and then trucking to export facilities at Toledo or into the Canadian feed and processor markets.

Figure 3-g

Concentration of Commercial Grain Storage
in Michigan - 2002

Company	Licensed Storage Capacity	
Archer Daniels Midland	24.305	million bushels
Michigan Agricultural Commodities	19.265	“
Star of the West Milling	8.125	“
Con Agra Companies	7.943	“
The Andersons/ Citizens Grain	7.224	“
Total Capacity	66.862	“

Source: Michigan Department of Agriculture - Licensed Grain Dealers

The number of grain elevators and the amount of storage available commercially has been declining. The number of grain facilities in Michigan decreased from 292 in 1996 to 250 in 2000, a decrease of 14.5%. The rated capacity only decreased 5 million bushels, from 146 to 141 million bushels or 3.5%. This points to less of a need for the smaller elevators as the size of farms grow. Some farm storage facilities may be larger than the smaller grain elevators built many years ago. Those elevators that have remained are mostly those with more storage capability and some of those may have added storage. These facilities are more likely to be located on rail lines that provide a value for the grain that producers cannot access such as 65 car train loading capabilities.

Growth

Growth potential for grain elevators in Michigan is limited. The consolidation has allowed the grain handled by elevators to maintain volume as the surviving facilities absorb some of the market share from the grain handled by the exiting facilities. But the overall trend of larger farms that may market their grain direct to larger markets (such as Toledo or truck into Canada) will mean that there is less of a need for commercial storage at harvest. This trend is due to the increase in the trucking capabilities of larger producers who can gain transportation efficiencies by arranging backhauls (such as taking grain to market and bringing back bulk fertilizer to the farm). It could also mean that there may be more of a demand for services of many types all during the year, such as marketing programs, financial services, brokerage, advisory and information. The remaining elevators may find it necessary to compete in these areas just in order to be competitive and to maintain their current market share.

Overall bushel production in Michigan may have peaked. Lower farm incomes are forcing land to be sold off for residential use, or production switched to more diversified crops, such as beets, beans, fruits and vegetables. The amount of land planted to the three main grain crops may not grow, and one has to wonder whether yield growth is close to leveling off.

The number of grain elevators will most likely have to continue to decline because of the necessity of the facilities to maintain or increase volume in order to control per bushel costs. As total grain production in the state levels off or declines, the least efficient elevators will find it harder to generate acceptable income levels in order to stay in business.

Differentiation

Differentiation can help improve market share, and is a large factor in determining long term survival. As mentioned in the national structure analysis, larger companies, including

those in Michigan, have more capability to provide various marketing programs and other services through market knowledge and financial capabilities. In Michigan, differentiation advantages that will matter most are transportation (good rail and the possibility of water), marketing and service expertise (a shrinking cooperative system and shrinking role of MSU extension) to producers and possibly to smaller private or cooperative processors, and providing links to other markets such as specific varieties of grains that may have premium values.

Barriers to Entry and Exit

The barriers to entry and exit in Michigan are intensified from the national level. Due to the declining grain production and larger negative variability of grain income for farmers and correspondingly for grain handlers because of lower bushel volumes, there is inherently more risk in starting a grain business in Michigan. As grain volume declines and concentration increases, a new entrant will have a difficult task in acquiring market share. With more risk comes more expense. With a market that is in decline, creating a new facility to handle grain would be riskier than other parts of the nation.

The risks for exiting this industry is that the market may not be able to absorb another facility, and a grain elevator is too asset specific to be used for many other things. The entire value of the asset could be unrecoverable

3.3.2 Conduct

With a more oligopolistic structure in Michigan, the conduct of the firms is slightly different than at the national level. The interaction between firms is more direct and personal. This mutual interdependence is recognized more easily because there are less competitors, and

changes in conduct are more noticed by rivals. This is even true of the behavior of handlers of national firms because of the regional nature of the markets

Pricing Policies

The reduction in the number of grain elevators has increased the size of the area that the elevators draw from. From this factor alone, less competition means that the elevators can exercise more market power and take more margin. Producers simply do not have as many marketing alternatives

Counteracting the decrease in the number of elevators is the decrease in the number of farms, the increase in the number of large farms, and the reduction of total farm acres (Figure 3-h).

Figure 3-h
Farm Numbers and Acre Trends

Year	# Farms	Big Farms	Med Farms	Total Farm
		\$100,000 +	\$10 - \$100	Acres
1990	54,000	8,000	18,000	10,800,000
1995	55,000	8,000	17,000	10,700,000
1996	54,000	7,200	17,000	10,600,000
1997	53,000	7,500	17,000	10,400,000
1998	52,000	8,000	17,000	10,400,000
1999	53,000	8,000	16,500	10,400,000
2000	52,000	8,000	16,500	10,400,000
2001	52,000	8,000	15,500	10,400,000
2002	52,000	8,000	15,500	10,400,000
2012	projected (Skjaerlum)			8,300,000
2022	projected (Skjaerlum)			7,300,000

Sources: National Agricultural Statistics Service, Skjaerlum

Less total farms and less production acres mean that even though the size of the draw area may have increased in one area as competitors go out of business, over time there may not be many more farms to buy from, or more production to buy in the total draw area.

Larger farms mean that these operations have gained some market power as they have more quantity to sell, and may be more likely to shop for prices and use more alternatives for

transportation (such as hiring truckers, selling fob the farm (letting the buyer supply the trucks to the farm) or even finding small rail loading capability) than smaller farmers who drive their own farm truck to the elevator to sell.

The result is that the elevators may be able to take more margin (drop prices relative to competition) for a short time, as competing elevators disappear, but in the long run the decrease in total grain produced in that draw area and the size of the farmer bring margins back in so that volume can be maintained, because they have to draw from a larger area to maintain volume.

Strategic Advantages

The elevators that have alternatives in transportation that allow them to bid more for grain than competitors are more likely to maintain volume. In Michigan, these are the facilities that have train loading capabilities. If the railroad that the elevator is on is one of the major railroads, which are the CSX and the Norfolk Southern and to a lesser degree the Canadian National, then they have less shipping cost and more alternatives for size of shipments and destinations. Much of the exported corn in the state is shipped out by trains to the poultry and hog operations in the Southeast (West Virginia, Virginia, and North Carolina) or to an east coast export facility by trainload (65 cars on the CSX and 50 to 100 on the NS). An elevator that can only ship three cars at a time and is on a short line railroad must pay a short haul rate to get to the main line of a major railroad, and the freight charges are higher for smaller car shipments too. There could be as much as a 10-15 cents a bushel difference in value in such a case compared to train quantities. This difference can be as much as the elevator's margin, and certainly puts the smaller, off line elevator at a disadvantage in price.

Facility Capabilities

The physical capabilities of the facilities in Michigan can lead to conduct that takes advantage of storage space, rail loading capabilities or segregation capabilities.

As on the national level, the amount of storage at the facilities is an important tool, particularly at harvest in order to absorb the influx of harvested grain, and additionally in storage income if the grain can be sold at a higher value for future delivery periods. Wheat storage income from 1998 - 2001 were as much as 70-80 cents per bushel gross per year, which a company with a larger amount of storage could take advantage of by keeping the grain on hand while continuing to handle corn and soybeans during the year. These carry margins provided an income that allowed those elevators to be more aggressive bidding because of the income being generated from the stored grain.

As has been mentioned, rail loading ability can mean higher selling prices. Segregation of specialty crops can also be used to enhance a facilities' competitive position by promoting the differentiation.

Quality and Non-Price Policies

Pertaining to quality and non-price policies, in Michigan, the two medium sized companies have been more aggressive in providing marketing services than the two multi-national companies.

They promote marketing programs, more flexibility in marketing plans, buying grain from bigger farmers, fob the farm and away from other competitors. They are more innovative in their approach (the Andersons were the first to offer Price Later Agreements in Michigan in the 1950's) (Bauer). The larger companies tend to be more conservative by offering more basic pricing programs with less variations in their marketing approach, but offer better pricing.

There are several companies in Michigan that handle specialty grains, but few that can handle them from the producer to the importer directly. Coordination to this extent requires the ability to purchase the grain directly from the producer, transport it to an export facility, arrange the export sale and also arrange the vessel transportation to the importing country.

This unbroken chain can help promote sales by being able to better control the preservation of the varieties. Specific varieties, specific grades and special shipment terms can differentiate buyers. There can be more margin for handlers of specialty grains because of the small number of buyers and smaller quantities they want to buy.

Smaller companies can specialize in smaller quantities possibly better than large companies in some specialty markets. What the large companies can do for connections to volume specialty markets, the small ones can make up for in quality by taking special care to handle smaller lots with tighter specifications.

There is opportunity for coordination between the larger companies in Michigan that have the capacity to export, and those smaller companies that specialize in specific varieties.

Promotion

The promotion of these differential advantages are the same in Michigan as nationally. My experience is that there is less promotion in Michigan than other states because the elevators are not in as close proximity as in more productive areas of the corn belt. Seldom are there two elevators in the same town, and at times there is 30 or more miles between terminals even in the more productive grain areas.

Deterrents to Entry and Exit

Deterrents to entry specific to Michigan is the amount of land being absorbed by urbanization, and the high cost/revenue ratios compared to other states (Table 1). Revenues are more volatile in Michigan and so it is riskier in the long run to operate a grain elevator that may also see volumes of grain vary more year to year than major Midwest production states such as Illinois and Iowa, and even Indiana, Ohio, Nebraska, or Minnesota.

Reactions to competitors are similar in Michigan except that as the number of elevators diminish, the flow of communication between competitors is reduced and the

information becomes less transparent between them. It is easier for producers to compare bids because they do not have as many to consider. It is easier for the media to report prices for the same reason. This ease of information can be thought of as a signal to competitors who may want to enter the business that it may be hard to compete profitably. The elevators that have continued operations usually have an advantage that could be used to keep competitors out by adjusting margins to make it tough for a new competitor to be profitable.

3.3.3 Performance

In the early development of the grain handling industry in Michigan, there was a high concentration of elevators in the higher production areas in the Central part of the state and the Thumb area. Many were diversified in that they handled edible beans as well as grain. This horizontal diversification enabled companies to supplement profits between the two businesses.

Many of those facilities have become too inefficient (and unsafe) now, but the larger and more efficient facilities today might be able to use this operating philosophy to handle different varieties of grains to supplement profits similar to past years.

Diversification

The companies that run grain facilities continually look for ways to cut costs as much as possible. Diversification into other businesses can allow the reallocation of some costs into other businesses, but it requires management to allocate expertise from one business into another as needed. This reallocation of personnel may cause costly mistakes and hurt performance, though, if not managed effectively.

Diversification through innovation in the grain business may be an additional way to increase volume. New marketing programs, handling specialty grains or providing financial

services, for example may improve performance through increased volume and service fee opportunities. Innovation may be used to increase revenues to improve profits, instead of cutting costs.

Efficiencies

All of the efficiencies of performance in the analysis of the national grain industry hold true to Michigan as well. The percent decrease in the number of elevators has been greater in Michigan because of the lack of production in grains to justify capital improvements that would have kept the smaller elevators in business longer as feeder elevators into the bigger terminal markets.

From a transportation perspective, the railroads have consolidated and concentrated their efforts in parts of the Midwest that handle more volume on a steady basis going to similar destinations. Because Michigan does not have as large of volume as competing states, it has a more difficult time obtaining as low of freight rates as competing states. The elevators that are on branch rail lines that may be struggling to make profits and to keep their lines in operating condition may have higher rail rates, which makes it more difficult for these elevators to compete with truck transportation.

Innovation

Innovation in the grain industry in Michigan is probably needed more than any other main crop producing state. Because of the nature of higher costs and lower yields, grain farmers and elevators are subject to more variations in income than other states (Table 1).

Innovation has come in the way of diversity in production, and some marketing ideas, but it still needs to find ways to reduce risk. The organizational analysis and possible strategies suggest contract farming as a way to counter some of these effects. It is a possible solution to a similar problem the poultry producers were having in the Southeast before

contract production took hold there. There, technology increased the rates of production and decreased price, so that cost reductions were necessary to be profitable. The contract with incentive approach became popular instead of vertical integration because it reduced the costs of contracting. The contracts adjust automatically for common shocks to productivity among growers (such as high temperatures and disease) and reduce opportunism (by rewarding the most successful growers). The popularity of this type of organizational form in the broiler industry may be due to the large number of growers relative to the number of integrators (broiler industry firms that purchase breeding stock, hatch the chicks and operate feed mills to feed them, but contracts with growers to raise the chicks) (Knoeber). This is similar to the numbers of grain producers compared to the number of grain handlers. There is also a similarity in the risks of production, in the case of the grain producer, weather and large supplies or slow demand that would decrease prices for grains.

In addition, innovation in services such as banking, financial services, credit, brokerage, etc., could enhance a company's ability to capture business. It would increase traffic through the elevators, guarantee volume by committing grain as collateral for financial flexibility, and create additional income in fees while saving costs in grain handling by increasing volume.

Market Power

The large grain companies have the ability to use centralized personnel and so have more ability to be able to provide the services that are in demand. They will have the ability to have people that are capable of managing a variety of businesses, have the research capabilities to design programs that can benefit producers as well as enhance their own profitability, and have the financial ability to put together these new businesses just as a food manufacturer might design and market new consumer products at the grocery store.

They will be able to provide a choice for grain producers in how to market their crops, insure them, finance production, provide capital, and provide farm management. A variety of programs will be needed to meet the different types of farmers' needs.

If the competition from other uses of land increases, as it appears is the trend in Michigan, the options mentioned above will be needed in order for grain handlers and processors to maintain the volume they need to meet their performance standards. If these options can not change the trend, then societies' needs will prove to be more heavily weighted and grain production in Michigan will continue to decline.

Grain companies will need to find ways to maintain and improve profits. Diversification, controlling costs through operations, coordination and even integration will be necessary for them to maintain their market power and for long term survival.

3.3.4 Conclusions for the Michigan Grain Industry

The IO analysis of the grain industry nationally and specifically for Michigan gives understanding to the industry side of the system. It is important to have a full understanding of how the industry is organized, both nationally and in Michigan in order to be able to apply solutions both for the industry and producers.

The industry is finding it more difficult to get adequate returns on assets considering the declining acreage, resulting in less production, and the increased market power of larger producers, which tends to decrease margins for the industry.

Concentration has led to economies of scale from administrative expenditures, but this also has led to a decrease in the human resources that would be needed to increase the amount of service that would increase volume through personalized service and marketing programs.

With just a few large grain companies left, the industry will find it more difficult to consolidate further. The advantages of scale efficiencies, depth of human resources, financial

capabilities, and other competitive comparisons become less as the size of each of the remaining competitors increases. The next step in consolidation may be in the farm sector, with larger farms becoming larger and fewer.

The industry needs to find ways to capture more volume or suffer the consequences of lower returns to assets. In the following section, the study will explore some of the problems brought out by the organizational analysis, and their effects on producers. It will also suggest solutions that may work for both parties.

3.4 Implications of Change for Michigan Grain Producers

Rather than use the IO approach for Michigan grain producers, the study will use the background generated by the IO analysis of the grain industry to discuss the implications of the problem and possible solutions for Michigan grain producers.

The study will first summarize the trends of the grain producers situation nationally. Many of the national trends are also true in Michigan, and the study will take an in-depth view of Michigan grain production in the strategic management section.

The problems affecting both the grain industry and grain producers will then be presented, followed by possible solutions that can benefit both parties.

3.4.1 Grain Producer Situation Summary

Since 1940, the number of farms in the U.S. has declined and the average number of acres per farm has been increasing. The number of farms has dropped from 30 million to 1.9 million in 1988, without a corresponding decline in acreage production. The rise of mass production agriculture involves a shift from small-scale, broad-based family farming to large-scale, more industrial type units (Sofranko), but which are still mainly family owned.

Farm income is expected to decline in 2002, particularly subtracting out government payments (Table 7). A University of Illinois study showed that average farm income in 2000 would have been negative in a study of farms in Illinois without government payments (Farm Progress). This has also been true in other states (Table 7).

The costs of farming continue to rise with inflation, putting more pressure on making revenues. To increase revenues, the most common solutions are for producers to capture economies of scale by farming more land and by lowering production costs (by watching expenses closely), but the question is whether this can be done at a rate fast enough to offset the increase in input and other production costs. Some will be able to, but of those, the older limited-resource group of producers may not want to try and keep up, and may just want to make enough to get to retirement (USDA -ERS #768).

The younger farmers may be more highly leveraged, and risk of failure when farming leveraged is high. Errors in marketing have more substantial results. If the producer could lower the risk, he could get financing more easily (CAST), which would allow more time to pay off debt.

Due to these two situations, less land may be in grain production, which will reduce the volume of grain produced, and it will be more susceptible to other uses if there are fewer farmers available to purchase or farm more ground.

If the government would lean toward a reduction in farm payments, the net farm income will decrease with it. "Perhaps the biggest challenge for some farmers will be to learn to manage risk as the government's safety net shrinks" (Kleckner). This could also lead to less production.

If bushel volume decreases, grain industry companies will have more of an incentive to develop programs that will increase market share. The industry will be more proactive in helping producers make sound marketing decisions and increase revenues by selling at higher prices. Handling commodities is a low margin, high volume business. Volume is a necessity

for survival. Producers should expect more attempts to coordinate from the grain industry if a decreased role of the government negatively affects production.

If producers could stabilize income, they could plan for their families better and maintain their standard of living and lifestyle. If the producer could do both of those things and continue to own land and farm it, the result would be a higher utility for them from farming.

3.4.2 Grain Producer Situation Problems and Solutions

How can producers find ways to become more successful? The problems of lack of sufficient revenue, particularly without government subsidies, rising costs for inputs, land, machinery, taxes, and other costs, and the combination of these factors with risks in marketing, need solutions.

One of the best opportunities for grain producers to become more successful can be found in the solutions of grain industry performance problems. It is in the industry's best interest to find solutions that also fit the needs of the producers. Helping producers gain revenue and lower risk would accomplish part of the task.

Producer Coordination with Grain Handlers

Being proactive in recognizing problems and causes and understanding that the grain industry and grain producers need to coordinate in order to solve mutual problems is the main thrust of increasing performance for both participants in the system. The solutions that are more economically feasible than others may come simply from better communication with handlers and processors. Beginning coordination there, the individual needs of the producer may be further developed and met by the handler in an effort to maintain volume.

In order to match the needs of the handlers with those of the producers, the producers should take an active role in discussing issues with grain industry personnel in order to solve problems. From the handlers perspective, they may want to start focus groups in order to find innovations that can help both the producers and industry be more successful. For handlers and producers, being a part of this type of group may help gain insight into ways that more profits can be gained from the marketing side of their businesses.

A review of the performance problems of the grain industry will give insight into the solutions that will work best for both.

Relating Producer Problems to Industry Performance Problems

The grain industry performance problems are reiterated here because it is important for grain producers to understand that if grain handlers cannot find a way to succeed in maintaining or increasing volume (including help for producers by attempting to find some growth areas), then producers will have less choices for grain marketing. More consolidation and concentration would occur in this case in order to improve performance and in the process, more grain handling facilities might be closed. The changes that are taking place with the grain industry and the grain producers are most likely going to force more coordination between the grain industry and the producer.

Grain industry performance problems, as illustrated in the national grain industry performance section, are mainly due to lack of efficiencies of scale (because of the amount of storage and handling capacity that is unused except during harvest seasons) which are identified in profit to asset ratios. These results are caused by not utilizing the facilities to a fuller extent (unused capacity). They are caused by less volume, due to fewer farms and direct marketing to processors or terminals down the chain. Also causing problems are increasing costs of operation, and slow innovations.

The grain industry can improve its efficiencies of scale by utilizing its assets more fully. The solution would be to find ways to increase volume put through the facilities. This could be done by introducing marketing programs and services, narrowing margins to be more competitive, contracting for production or handling different grains such as specialty grains in addition to generic corn, soybeans and wheat. An increase in volume associated with such programs would help economies of scale and might allow the industry to cover costs on a per bushel basis more easily.

A solution to the problem of losing volume to larger farmers that are marketing direct to processors or terminals down the chain might be to provide services that the producers cannot obtain from those competitors. This might be products such as banking or financial programs, personalized marketing services and information, personal farm calls to help set up marketing plans, or possibly buying the grain on the farm and controlling the destination from there. Grain producers should be looking for these services from their local grain facilities. An aggressive program of asking questions and finding alternatives that the industry wants to pursue might be fruitful.

Maintaining the Chain

The large grain producers will have more sophisticated facilities and more storage that may enable them to go direct to processors or feed or export markets, bypassing the terminal elevators. Companies with assets in grain elevators will need to look for a way to ensure volume in the face of tougher competition. The sheer velocity of grain coming off the farm at harvest in the past has enabled some facilities to fill storage space at wider margins (basis) because the producers don't have time to search for the highest grain price around a large area or to spend the time hauling grain. If the producer has storage, and does not have to bring grain to the local elevator at harvest, those bushels may fall into a competitor's hands by going direct to processing or export markets later in the year if they are accessible. The grain

handlers will want to keep the grain coming to their elevators because of their investment in them. There is also more income to be made on blending, separating, identity preserving specialty crops, or shipping large quantities (trains or boats) to markets that cannot be accessed locally (from Michigan to Southeast feed mills or Atlantic export markets for example). The trend of more farm storage will likely continue, but bypassing the grain terminals may progress very slowly because the grain industry will try and keep grain coming to the terminals until they are obsolete or unprofitable.

Cost Control

Lower transaction costs will be needed by the producer to offset leverage costs. Spreading costs out over more acres can lower per acre costs through economies of scale. Income versus costs and the risks, capital and credit that are associated with farming more land changes the dimension of the farm from a family operation to more like a corporation. Producers have to be prepared to change their management practices, including marketing strategies, to align with their size. Allowing grain handlers to manage marketing by contract production or volume guarantees would reduce transaction costs with marketing grain for the producer and the handler.

Rising costs for facility operations has challenged the grain industry for years. They have consistently found ways to cut costs in order to remain as competitive as possible. In the twenty five years the author has been in the grain business, the margins per bushel have remained about the same. The only real difference is that the costs per bushel handled have been reduced to match inflation on uncontrollable expenses.

Grain producers should be looking at ways that they can help themselves and also save the elevator extra expense. If the producer and the elevator can work together on delivery times, including days and hours of operation, the types of commodities that could be delivered at certain times for example, the elevator can become more efficient by allocating resources

accordingly. If the industry can save on expenses by allocating resources to needs on a timely basis, they may reward the producer for their effort by keeping margins down and providing more services.

Innovations

Innovations for larger companies can take longer. The consolidation in companies has also meant a decrease in the number of employees. They may no longer have field personnel that have the expertise to make decisions. The grain companies may not understand local situations or solutions to producer problems if their most experienced people are in a home office away from the daily activity and communication with producers. This also lends to a lack of commitment to diversifying physical assets or finding innovative ways to handle more identity preserved crops, which takes some opportunity away from both handlers and producers to find new sources for income.

Increased Coordination and Family Farming

As more coordination takes place, concerns about the independence of the family farm, terms of contracts, and competitive pricing of grain will be major obstacles.

Independence of the family farm has been discussed greatly, and is a major concern with the coordination and integration that has taken place already. Farm advocates have used ballooning farm size as evidence of food production consolidation, but a small percent of farmers have always produced about half of the production; 17% in 1900 and 4% in 1999 (FRB-Minn 10/99, 1/00). Family farm size is growing, and the larger farms are recognizing the importance of coordination with grain companies more than the smaller farms. Farming has become more complex, as adjustments to changes in market conditions, government programs and other economic factors have been necessary. Generally, farms with sales less than \$100,000 generate losses, and do not cover the full economic costs of production

(USDA-ERS-#768). Contract production would help keep the family farm entity by reducing risks and allowing for a steady income. The trend has been toward more families forming corporations and expanding beyond the scope of a single family's ability to farm without outside labor and other services.

Contract Production

Contract production is the concept of a grain producer growing a number of acres at a contracted dollar value fee, in this case, for a grain handler or processor. The successful contract will need components that can keep the process simple while attaining the goals of both parties. Those conditions that are optimal at the inception of the contract, however, could be detrimental to one or both of the parties later if it is not flexible enough.

A contract between the grain marketer and the grain producer would have to necessitate that the producer keep ownership of the farm (no integration), and many states have laws to that effect.

They would also need to have some kind of ability to change the contract if events took place that changed the makeup of the farm, such as changes in ownership, size, or other significant changes in value (land sold for development), without being able to take advantage of the grain company.

Production contracts may become more prevalent in order for the grain companies to ensure the volume they need and for the producer to ensure they get the income they need. The possibility of a grain company contracting with producers on a per acre basis in return for production of grains may be the way this is accomplished. In this type of contracting, there will be a transfer of risk from the producer to the grain industry.

There are significant risks in grain farming, with weather and price uncertainty, seasonality of the production requiring capital for inputs early in the year and production

income four to five months later, perishability, unstable international markets in grain and in the economy in general, and public policy changes.

Production contracts take decision-making away from the producer, but also take risk away from the producer, and some producers see contracting as a means for remaining viable given today's low commodity prices. Some producers see it (contracting) as a risk management tool (FRB-Minn 10/99).

The transfer of risk will make it easier for the producer to concentrate on production and not worry so much about marketing. With a contract for production, the banks will be more likely to extend credit to the farms. Grain facilities would be able to increase volume and lower per unit fixed costs, which would have to make up the difference in the costs involved in absorbing risk from the producer.

Another key issue of contracted production at a set dollar amount per acre would be if the prices of grain would increase rapidly. There could be a problem with post contract opportunism or moral hazards. The long term advantages of using production contracts has to be great enough to the producer to keep that from happening. If grain prices would go up beyond government payment levels and above costs, then the producer would want to make that extra income, and would not need the contract in order to be profitable, and might want out of the contract. The contract would have to enable the producer to have a steady long term income, but they would have to be willing to give up some opportunity for that.

The grain industry may have to absorb some of the risk of losses in producing grain in low price years. If so, then it must feel that it will have the opportunity to profit if the market turns higher. Since the grain industry usually hedges, it doesn't normally care about price as much as it would about the increases in volume that would be associated with the contracts.

There would be some opportunity for the company not to hedge purchases or sales if the grain was moving through the system, being processed and sold to an end user. The advantage of buying raw product for manufacturing would provide a great opportunity if

prices rose, because the raw material would have been purchased at a lower price and the products could be sold at the higher price, creating more margin. This would be a higher risk decision and out of normal operating procedure, for the grain handlers and processors, but could create large gains, and could provide some incentive to absorb risk in low price years. If they had the expense of the production per acre locked in, and prices moved up, they could just sell the production at the higher price.

As an alternative, to help alleviate some of the shirking problems (opportunistic behavior) with the producer, the contracts could have a pricing formula that would adjust acre income up with increases in price, with the standard contract term based on a minimum price, which might make the contract more feasible for the long term and more viable for both the producer and grain company.

A contract for production would take more grain out of the open marketplace, and would tend to disrupt the competitive pricing of grain to some degree, by making it a thinner market. But if the producer is happy with this income, the issue would not be with those under contract, but those who are not. If the grain company was able to lock in volume that enabled it to run close to where marginal cost equaled marginal revenue, it may widen margins (be less competitive by lowering prices paid relative to the sales price) to open market grain that it buys. Depending on the handling and storage capacity of a facility, it may take a large amount of contracted volume in order to reach this point. It could even be that there would not be enough production with the competitive draw area for this to be possible.

As long as the facility is not running at full capacity, more volume should help keep costs down, and the conduct of the facility probably would be not to change its market pricing policy (margins). They may even choose to cut margins to be even more competitive for extra bushels. They could arrange to have the facilities open longer if volume was guaranteed, and with costs per bushel reduced, the grain facilities may also be able to offer more services to others than before, and gain differential advantages.

There could be concern about the competitive pricing of grains in the U.S. if more consolidation would occur. Government regulations could interfere with any further increases in the rate of consolidation. The Nussle-Thune bill in the house currently under consideration would require “large agribusinesses” proposing mergers to file a public notice with the Secretary of Agriculture simultaneously with the notice already required to be filed with the Justice Department (NGFA-3/4/02). But as the grain industry becomes more international, the prices of grain will be determined more and more in a world sense. As long as information flow and transportation capabilities are good, it will be more difficult for locations or companies to widen margins or be less competitive for any extended period of time. Since grain businesses operate on volume, there will almost always be a need for grain to particular markets, and the market price at any location will be the value at any destination minus transportation costs. The prices of grain tend to change in order to get it to go where and when it needs to, and so the price as a whole in any part of the country should not vary significantly from the way it is determined now. If grain was priced where marginal cost is less than marginal revenue, the elevator should keep buying as long as it can coordinate the operational aspects and cover expenses.

Contract production would be more likely to happen if producers could attain acceptable income levels and continue to farm. The grain industry could then continue to lower costs and better provide the consumers of grain and grain products what they want.

In the end, the producers and marketers of grains should attain their goals and the system should attempt to maximize the performance of all parties, from the input supplier to the final consumer. This will be done by lowering transaction costs for both grain producers and grain handlers and processors, and allowing more control over the movement of grain to specific uses and users.

Specialty Grains

If the local facility is able to handle more specialty grains, but needs a commitment by producers in order to get the program off the ground, the producers should be willing to pursue trying to produce that particular grain if the premium provides better return potential. Specialty grains can be a way to increase margins for the producer and the grain industry. Margins could be higher for the producer by providing a grain that is in demand and has a higher value, and for the grain industry by increasing volume.

Added value grains such as non genetically modified soybeans, specific varieties of corn capable of producing certain characteristics such as high oil, or wheat varieties specific to mill demand could be a partial solution to some of the industry and producer problems.

These grains take more time and effort to raise, may have lower yields than more conventional crops, and may result in expenditures that are not recovered immediately. But the key is to be innovative, just as the grain industry must be in finding ways to coordinate production and handling of these products.

The seamless origination of specialty grains from the farm to the end users through one grain company creates value by being able to ensure quality from the field to the end user. There is less chance for contamination, and so is more consistent, making it more desirable, particularly as a food item. Producers that are actively searching for markets for these products may find premiums of two to four percent of the value for this effort. If returns are currently \$200 per acre, an extra \$4 to \$8 per acre may be possible.

Marketing Alternatives and Advisors

The grain industry as a whole has the ability to understand and market grain using many more tools and much more expertise than a single grain producer. There may be marketing alternatives that could be used, but are not because it is not standard procedure. Ideas from producers can generate thoughts about contract flexibility, and could lead to giving

marketing alternatives that were not there before. A lot of these opportunities may not be general marketing programs, but could be possible if the question is asked.

If the producer has regular contact with a grain industry representative about the needs of the farm, the industry participant may search for ways to help the producer achieve the goal, whatever it is. It is to the advantage of both to try and make marketing programs work that will get the producer more returns and the grain facility more volume. Closer relationships can help achieve these goals.

Grain producers should be looking at all marketing alternatives to help in marketing grain. This might be done by contracting acres for marketing or production, or a volume guarantee. These programs might enable a producer to gain better access to market information and also a better value for the grain than grain that is sold “over the scale”.

The larger producers in particular will need more help in marketing grain as they become larger and are marketing more directly down the chain. Grain marketing advisors could fill more of the void between the producer and the grain industry buyers in order to get the expertise needed to market more effectively. This could be a more utilized tool for producers to help decipher the complicated aspects of marketing grain. But lack of commitment by advisors (easy exit) may leave producers having to reestablish relations with the grain handler if the advisor exits. The producer may be better off coordinating with the grain handlers directly in the long run.

Using Farm Storage

Size does create more potential market power, and the producer can use it in those cases where the grain industry needs more volume and is willing to find more innovative ways to move the grain from producers through their facilities. Producers can sell their grain fob (free on board) the farm, and allow the elevator the flexibility of selling the grain to different

markets. Many times they may pay a higher price for the ability to market the grain in different directions.

Being flexible on delivery times and the quality of grain brought in at certain times may allow the elevator to run more efficiently, and they may reward this flexibility with a higher price.

3.5 Summary and Conclusions

With a background of the history of Michigan agriculture and a sense for the history of the national grain industry, we proceeded to describe the way the current grain industry is organized nationally and particularly in Michigan.

The study took the organizational analysis and then summarized its effects on grain producers, identifying problems and suggesting solutions for producers.

There are many other aspects of the situation that could be discussed. Some will come out in the Strategic Analysis and Plans for the grain industry and grain producers, and some would be the subject of more research.

The overall conclusion from the Industrial Organization analysis suggests that the degree of coordination between the grain industry and grain producers needs to be enhanced, and services increased in order to achieve the goals, as stated in the introduction of the chapter, that both of these participants have in the overall food system.

Using this information, we can now proceed to investigate the strategies that the grain industry and grain producers can use to increase their performance.

Chapter Four
STRATEGIC MANAGEMENT ANALYSIS AND PLAN
For the Grain Producers and the Grain Industry in Michigan

4.1 Introduction

Strategic Management can be described as the process of crafting and implementing an organizational “game plan” for creating customer value (increasing utility), sustaining competitive advantages and achieving performance targets (Peterson - Thinking Strategically).

The Strategic Management Analysis approach moves beyond these more general observations to an analysis and plan relevant either to a specific firm, or in this study, a specific collection of firms in an industry. This chapter of the study will consider a strategic analysis and plan first for grain producers as a class and then the grain handlers and processors in Michigan. It will aim to determine specifically what strategies producers and commercial grain handling and processing companies in Michigan should take to achieve their goals.

The strategic analysis for the grain producer is more extensive in this chapter, as it brings out parts of their situation that the Industrial Organization analysis may have overlooked. The strategic analysis for the grain firms in Michigan is less comprehensive, because of the more extensive analysis done for grain firms in the Industrial Organization chapter. With the historical background from chapter two, the analysis done in chapters three and four prepare the reader for the summary and conclusions in chapter five.

The process is to first recognize what assumptions and beliefs there are about producers and handlers of grain, then develop a strategy, implement it, and check performance to see if the perceptions of the assumptions were correct or if there are ways the plan and/or implementation can be changed to improve results (Peterson - Thinking Strategically).

A strategy is a set of actions designed to achieve a firm's goals. It has a long run focus, it can be intended or emergent (evolved from operations) and it directs daily operations. An effective strategy delivers value to customers, builds on strengths, captures opportunities, is sustainable across time and can fit any level of the firm (Peterson - Business Strategy).

The long run focus for the grain system in Michigan is to survive. The assumption is that without a change in strategy, the grain system in Michigan will continue a trend of decline in farms due to lack of profitability, a decline in the number of elevators due to competition from other grain producing states, and a decline in production as agriculture gives way to other uses for the land. The study will investigate the internal and external forces acting on the grain system that threaten its very viability in the long run.

In the author's years of experience in the grain industry, the actions taken by grain producers reflect an emergent strategy while the grain industry has a more intended strategy. The strategy developed by the handlers and processors, being intended, is more proactive, and will tend to force the producers to adopt the handler's strategy initially. From there, it is modified by the producers to adapt to their goals. The overall success of the strategy is limited to how well the producers are able to be successful using that strategy. If they are not, then the grain industry will evaluate and adjust their strategy to enhance customer value, and begin the loop again.

The development of a strategic plan will focus on long-term operations of both grain producers and grain firms. It should develop a broad plan for how a business is going to compete, what its goals should be and what policies will be needed to carry out those goals (Porter) at any level of the firm.

Value to customers is a relationship between perceived benefits and price (Peterson - Value Added). The perceived benefits to consumers of corn, soybeans and wheat have been difficult to enhance because of the homogeneity from two aspects. The product grown by

producers has been homogenous, and the great number of producers are themselves homogenous to the grain handlers. But that is changing with biotechnology, as grains can be grown with certain attributes that create additional value to the consumer. There are also changes for the grain firms, as concentration of producers is forcing a more customer specific approach for handlers as producer numbers become fewer and their size larger. The shift in strategies for both is from a commodity strategy, centered on cost reduction, to a value added strategy that identifies specifically what the consumer wants and works to deliver that desired value (Peterson - Value Added).

The strategy needs to identify strengths so that they can be built upon, and understand weaknesses so that they can be compensated for or overcome. By recognizing the environment that the firm (grain producers as well as handlers and processors) is operating in, the opportunities can be discovered, developed and captured, and threats can be avoided.

With this framework for understanding what the long run goals should be, the specifics of the strategic plan can be developed. The actions, strategy and evaluation can be implemented to achieve the best possible desired end result.

The outline for each strategic analysis will include a description of the firms or sector, internal analysis (strengths and weaknesses), external analysis (opportunities and threats), and strategic issues. The strategic plan for each, will then include a strategic mission/vision, strategic objectives, core strategy, action strategy, and an evaluation system.

When the strategic analysis and plans for both producers and the grain firms are complete, they will be brought together to discuss how the two sectors benefit from each other. A summary of the analysis with recommendations and conclusions will end this chapter.

4.2 Strategic Analysis and Plan for Michigan Grain Producers

4.2.1 Introduction

The strategic analysis and plan will look at grain producers as one business. Farms of different sizes may have some differing issues, but the applications of economics can answer questions about how size matters. The emphasis will be on medium and large sized farms (over 60 acres). The study is intended to be mainly concerned with providing direction to those producers who can provide enough possible income to expand to the point where the majority of the income is made from the farm, and not from outside income.

The strategy of grain producers from the author's experience is mostly emergent. It is a strategy that develops from experience and comparison to other area producers. Most producers are more informed and more interested in what crops they grow where, when and how. They are very adept at producing crops that yield as much as possible. But the strategic intention is usually based on how to maximize yields, not an intended strategy of how to maximize income by diversification or other changes that are an adaptation to a consumer market.

Perhaps their marketing analysis and plan is emergent because of the time required in this aspect of the operation. The many factors involved in commodity markets and the continued changes that determine price require time for analysis. Many producers avoid this aspect of their operation because of their basic interest and strength in operational aspects. They prefer to spend their time on operations and not market analysis.

What are the producer's alternatives? How can producers change the trend of poor performance? These questions will be addressed in this section of the study. A strategic analysis and a strategic plan will be formulated to help determine what grain farmers in Michigan should do to improve profitability or even to survive.

4.2.2 Description of Michigan Grain Farming

There were 52,000 farms in Michigan at the end of 2001, the same as in 2000. (MASS-Farm Numbers). A breakdown of the size of farms in Michigan over the past 15 years shows that the number of farms under 50 acres and the farms over 1,000 acres is growing. The number of farms in every other category is decreasing (MASS-Michigan Census). The size of the farms by economic class also illustrates this fact (Figure 4-a).

Figure 4-a
Number of Michigan Farms and Land in Farms
by Economic Sales Class 1996 - 2000

Year	Number of Farms			Total
	\$1,000 - \$9,999	\$10,000 - \$99,999	(1,000 farms) \$100,000 and over	
1996	29.8	17.0	7.2	54
1997	28.5	17.0	7.5	53
1998	27.0	17.0	8.0	52
1999	28.5	16.5	8.0	53
2000	27.5	16.5	8.0	52
		Million Acres		
1996	2.2	3.1	5.3	10.6
1997	2.0	2.9	5.5	10.4
1998	1.9	2.8	5.7	10.4
1999	1.9	2.8	5.7	10.4
2000	1.9	2.8	5.7	10.4

Source: Michigan Agricultural Statistical Service 2001 Yearbook

The dispersion of products shows that grains are mainly produced from the thumb area diagonally toward the southwest corner of the state and also south to the Indiana and Ohio borders (Skjaerlun Map1).

Grain production in the state shifts slightly depending on competition from sugar beets and edible beans (Table 11). There is also fluctuation between the three major grains due to price and government programs. The 1996 farm bill favored soybean planting when prices of corn and soybeans dropped below loan rates because the loan rate ratio was greater than the cost of production on a per bushel ratio. A 2.27:1 ratio is the average per bushel yield to cost equivalent ratio (USDA-ERS-Cost). The 1996 farm bill loan rate ratio was 2.8:1 , with the

national loan rate for soybeans at \$5.26 per bushel and corn at \$1.89.

The reaction to the 2002 farm bill is inconclusive, but it appears that it will favor a shift back to more corn acres with the loan rate ratio now at 2.5:1, with the national loan rate for soybeans at \$5.00 and corn at \$2.00.

The average age of the Michigan grain farmer is in the early 50's (NASS-State Profile). From the author's experience with many mid-Michigan producers, the older farmers may own more of their land and machinery than someone entering the business or producers that are expanding. Even though they may only farm 500 acres, for example, they may be more profitable per acre than larger farmers who are more highly leveraged. But the author has observed that they are also more likely to retire with the same farm, rather than trying to expand. Younger farmers may be more in debt and may be more likely to need an off farm job to make ends meet. They are likely to be in the small to medium sized farm range.

Larger farms (over 1,000 acres) are expanding. These producers are buying or renting more land in order to lower per unit costs of production, probably to support more family members that are also involved in the business.

4.2.3 Strategic Analysis of Michigan Grain Producers

The analysis begins with an assessment of grain producer performance in three areas—profitability, competitiveness and productivity.

Performance

Michigan farms have become more specialized. Less are raising livestock, shifting more production emphasis to field crop production (Table 8). But with less diversification,

comes more risk. If prices for a grain decrease, and/or yields decrease, there are then few other sources for income on the farm. The income alternative now usually comes from jobs off the farm (Table 13).

The trend in Michigan agriculture is that less farms are providing the majority of the income (Table 9). This is due in part to higher costs and lower production and the need for size.

The same soils and climates that afford diversification also help cause more variability in income if planted to commodities that do not yield as well in those soils. This variability means that in order to assure constant income, farmers have been finding supplementary employment off the farm (Table 13) (Mishra and Goodwin, 1997, and Mishra 1996). It also means that the land may be better used for things other than agriculture that have a higher future value, such as, development.

As the number of acres and the number of producers decreases, the importance of agriculture in the state will continue to decline. Some projections indicate that within 15 years there will be a core group of 10,000 farmers that may produce 90% of all agricultural sales in the state, with a loss of an additional 600,000 acres in farm land, resulting in a loss of \$120 to \$240 million annually in local farm income (Skjaerlun).

Costs for inputs in Michigan are higher (Table 3), taxes are higher than other major grain producing states (Table 6), and net cash return per farm unit is lower per acre than other states (Table 4).

Without government payments in some years, net income was negative for many Michigan grain producers (Table 7).

To obtain a net cash return of \$30,000, it would take about 500 acres (Table 4). If the typical grain producer is in this range and also earns some (but less than \$30,000) income at another job, they may be more likely to be oriented to staying on the farm. Under this level,

the producer is farming for other reasons than as a means of making a living farming. The net farm income level that the government has been trying to help achieve through their subsidies is about this level (Womak).

Competitiveness

Comparing Michigan to seven other Midwestern states, Michigan had the lowest percent of farms with sales dollars in the \$100,000 - \$250,000 range and the \$250,000 - \$500,000 range, but the most in the \$1 million plus range. This is an indication that sales need to be higher in Michigan in order to find efficiency scales that allow acceptable profit. In other states, most of the producers are between \$100,000 to \$500,000 (Figure 4-b).

Figure 4-b
Percent of Sales by Class

State	Total Sales Dollars	Dollars of Sales						
		\$25,000 or less	\$25,000 \$50,000	\$50,000 \$100,000	\$100,000 \$250,000	\$250,000 \$500,000	\$500,000 \$1 mil.	\$1 mil. or more
Michigan	\$4,018	4.90%	4.40%	6.00%	14.00%	15.90%	16.50%	38.30%
Ohio	\$4,054	8.10	6.90	10.80	29.30	18.70	14.10	12.00
Indiana	\$4,658	4.20	7.50	8.30	24.40	21.50	19.50	14.50
Illinois	\$8,082	3.80	4.20	6.90	24.80	29.50	18.40	12.30
Iowa	\$10,974	2.80	5.10	8.30	24.70	22.10	15.20	21.70
Minnesota	\$8,844	2.80	3.70	7.10	21.40	21.80	14.20	28.80
Nebraska	\$10,034	1.70	2.70	5.60	20.60	16.30	8.00	45.00

Source: Agricultural Census of 1997 - Volume 3, Special Studies - Ag Economics

The trend in the number of farms shows the greatest losses in the medium sized (60 - 1,000 acres) farms as well (MASS- Census County Summary). This also indicates the need to expand. In a full time Michigan grain farming operation, sales may need to be \$500,000 or

more to obtain the scale of efficiencies needed to be at an acceptable profit level and be competitive if that is why Michigan has so many farms in the higher sales range compared to other states. Sales of \$500,000 equates to about 2,000 acres of corn at \$2 per bushel with an average yield of 125 bushels per acre.

Productivity

The increase in the number of farms under 60 acres can be attributed to urbanization and the definition of a farm. In most cases, sales of farm produce over \$1,000 constitutes a farm. Farms these small can be managed much more easily by one person, even with a full time job, and more likely with less capital invested, and with lower overall debt.

Seventy one percent of the farms in Michigan in 1997 had sales of less than \$25,000, and represented only 4.9% of the total sales. Farms with over \$500,000 in sales numbered 1,606 or only 3% of the total, yet generated 54.8% of the sales, and farms that had sales between \$25,000 and \$500,000 represented 26% of the farms and 40.3% of the sales (MASS-U.S. Census, Market Value).

Most producers concentrate on growing crops and little time on marketing alternatives. Keeping up with technological innovations in machinery, inputs and marketing can require time for study that can be too burdensome. Knowledge about marketing and developing an overall strategy for survival in this competitive and difficult farming environment should require more expertise in almost every field to increase profits. But, the weakness of having to work off the farm is a toll on expanding the knowledge of the producers in general.

In summary, performance in profitability, competitiveness and productivity is low versus producer goals. These performance problems are strategic because major shifts in long-term firm-level behavior are needed to create solutions.

4.2.3.1 Strategic Strengths for Michigan Grain Producers

One strength is the increasing value of the land. Borrowing capacity for investing in property or machinery is helped by the increasing value of the land (Table 14). It also helps producers be able to borrow capital for innovation. If a producer wants to change strategies to new grains or specific varieties, there may be some changes in equipment or extra up front costs that would require initial capital. But caution should be used in borrowing against the value of the land. If the capital expenditure cannot show future values that are high enough to recoup the costs plus interest, then the expansion should not take place in that way.

Another strength for producers is the variation in soils. This could allow all or parts of the farm to be dedicated to raising specialty crops on those soils that are best suited for specific varieties or crops. As production and marketing knowledge and marketing opportunities expand for specialty crops, more of the farm may be used for them. Smaller lots on smaller farms may be managed easier, making production of particular varieties of grain a niche opportunity.

Strength from the larger size of the farms brings advantages by their ability to bypass the elevators (an extra margin) and take grain direct to processors and/or to exert market power to sell at higher prices. Larger farms may also have more storage, so they don't have to sell as much at the harvest lows.

A strength in Michigan producers compared to other states is their experience in managing adverse conditions. Because of the competitive nature and the disadvantages of the production of grain in Michigan, those that have been successful have a good understanding of what it takes to be profitable. It may be that this acquired management skill is more practiced than producers in other states.

The strengths of the grain producers in Michigan are limited. The grain industry needs to help producers develop strengths in finding more margin for their crops and to reduce risk.

Working to develop specialty grains and coordinating marketing more closely can work toward reducing weaknesses.

4.2.3.2 Strategic Weaknesses of Michigan Grain Producers

Michigan farmers are at a comparative disadvantage in commodity grain production and marketing because they are subject to a shorter growing season, varying soil types, higher transportation charges which contributes to higher prices for inputs and lower prices for grains, and yields that are below the major grain production states. Land values compared to yield potential and tax rates are high compared to other states as well (MASS-Ag Stats 2002).

In general, the returns are not as high as other states (Figure 4-c), which makes the land more susceptible to be used for other things. For example, in addition to expanding urban areas from Detroit and Chicago, Michigan also has the highest number of second homes and second highest number of golf courses in the nation (Skjaerlun).

Yields for corn and soybeans over time are less than the national average and even further behind the main production states (Table 1). This is due to a combination of factors such as length of the growing seasons and a necessity for shorter day hybrids, and soil types. The lower yields reduce the revenue potential for the land.

Figure 4-c
State Average Crop Revenues Compared to the National Average 1990 - 2001

	Michigan	Ohio	Indiana	Illinois	Iowa	Minnesota	Nebraska
CORN							
Yield (bu/acre)	-12.96	1.54	5.46	10.21	8.13	1.29	5.63
Price (cents/bu)	-0.05	0.05	0.06	0.07	-0.06	-0.17	-0.02
Revenue (\$/acre)	-32.89	8.86	18.37	31.71	-0.64	-19.53	10.73
SOYBEANS							
Yield	-0.74	2.63	5.68	5.05	6.38	0.43	3.05
Price	-0.07	0.06	0.06	0.13	-0.07	-0.17	-0.15
Revenue	-5.96	17.03	33.76	33.49	32.84	-4.56	10.77
WINTER WHEAT							
Yield	14.23	17.64	14.23	9.31	-0.53	-8.03	-3.94
Price	-0.19	-0.22	-0.20	-0.22	-0.23	-0.04	0.01
Revenue	31.80	39.28	31.44	17.68	-10.01	-24.18	-11.25

Source: National Agricultural Statistical Service

Costs per acre are higher or similar to other Midwestern grain growing states that also have higher yields (Table 3). Input costs, land values, taxes, transportation all contribute to the dilemma of the lower cost to return situation. When comparing Michigan to the same Midwestern farm states in our earlier example, Michigan has the lowest net cash return per farm of the states (Table 3).

In grain farming, many times the producer and a few close family members can do most of the farming. Expansion into other production crops, or in size, may require hiring outside labor to get things done on time. Hiring seasonal labor with the expertise in handling modern equipment may be difficult, and having hired help all year round is too costly. There is also more competition in Michigan for labor at higher wages. The average wage of the hourly worker is higher versus the other Midwestern farm states in this study (Table 10). To hire labor for agriculture is more difficult because of cost, and those with an agricultural background are decreasing. The population of the state involved in farming is less compared to the other states in this study (Table 12).

Since Michigan is further away from major use areas for corn, it costs more to transport the grain to those destinations than states south of us. The price for Michigan grain is less to cover the transportation costs. Some areas of the state are more competitive than others, but some of the areas with the highest prices are also in the highest suburban growth areas. The southeast corner of the state has access to the Toledo market, which can load lake vessels for export from May to November, and sometimes can provide higher prices to the area than other destinations. The southwest corner of the state has a similar situation with Burns Harbor and Chicago, but is also a rapid urban expansion area.

Individually most farmers do not have the financial capability to change farming systems to crops that might require new equipment. The best chance for producers in Michigan to increase profit potential may be in crops that use the same equipment that the farm already has, but specialize into different varieties or other specifications that require more production and marketing skills and not much more capital inflow.

The author's experience is that the producers have a general lack of marketing knowledge. This limits their ability to generate revenues, and increases risk. Given the adverse conditions of operating a grain farm in Michigan, the producer can ill afford to limit revenue opportunities or decrease revenues due to unnecessary risk. They generally do not have solid marketing plans for the grain they produce.

4.2.3.3 Strategic Opportunities for Michigan Grain Producers

Market Direct to Terminal or Processor Markets - The increasing size of the Michigan grain farmer means that they have more storage capacity and probably more transportation capacity. This would allow them to hold grain in the fall when prices are low, and create the opportunity to gain some of the carry in the market by selling for January or later delivery in the crop year. Many years there is a 15 - 20 cent per bushel higher price for delivery in

January versus November. In addition, most of the larger farms have their own tractor trailers and so have the ability to go more distance in marketing their crops, particularly in the off season when farm activity is slow. This allows them to sell direct to larger terminal or to processors at a higher fob farm price than the local elevators may be able to offer.

Specialty Crops - As demand for non-genetically modified (gmo) and specific varieties of grains increases, there is more opportunity in price to adhere to the specific techniques required to produce them. Through the desire of some consumers to eat foods that are healthier (or pose a perceived reduced health risk), a market for non-gmo grains has become large enough to support a premium for crops grown, that fit the specifications for various uses.

Alliances - As the number of farms decreases, and the amount of land farmed does also, grain handlers and users are more likely to want to bond with the larger farmers in order to ensure supplies. Farmers can take advantage of this need by aligning themselves with a grain company or processor that can help them market their grain. It could be a marketing agreement, volume guarantees, contract farming or other combinations that can help them enhance the prices of their grain. The agreements could be with grain handlers, processors or even a cooperative. There is an opportunity for some to form their own cooperatives for manufacturing certain products, possibly not even in their own state.

Water Transportation - Saginaw River - Michigan does have the ability to ship by vessel, which is usually the lowest cost form of transportation available. There has been more extensive use of this system in past years. During the 1970's and 1980's boats were loaded out of the Saginaw area. The flood of 1986 silted in some of this capacity and that, coupled with the reduction of the Russian grain purchases about the same time halted most shipments. A rejuvenation of this access to water transportation could alleviate some of the problems with higher truck and rail transportation rates that put Michigan at a competitive disadvantage to other states. This is a function that could be done privately or by the Army Corps of

Engineers. Dredging a private dock could cost several hundred thousand dollars, and to keep the entire river dredged to Saginaw could be millions. But an extra five cents a bushel on five million bushels would be \$250,000 returned to Michigan, both of which are reasonable expectations in the author's opinion.

4.2.3.4 Strategic Threats to Michigan Grain Producers

Threats to Michigan grain production come mainly from competition for the land, and Michigan's geographic location. Urbanization and associated environmental problems, cost factors and resultant volume reductions could result in fewer markets and less transportation flexibility.

Urbanization - Development is spreading out from Detroit, Grand Rapids and the Chicago area across the main southern production areas for grain. The Thumb area is less affected by the trend currently, but this area of the state is also the most diversified and has little advantage for businesses other than those that are agriculturally related (due to its remoteness). The effect of the cities expanding out to the countryside in many areas is that land values along the country roads have increased to the point that lots are being sold to add cash back into the farming operation. The current value is higher than the expected future value of the land if it continued to be used for agriculture, or is the result of the inability of a producer to pay back debt in a timely manner. The higher property values also increase the taxable value of the land, adding more cost to the farming business.

Volume Reduction - As the amount of grain produced in certain parts of the state is reduced, agricultural businesses will have a more difficult time making enough revenue and margin to cover costs. If businesses pull out of certain areas, the grain producers are likely to find that they must haul their grain further, and acquire inputs from suppliers that are farther

away. Both of these will cause transportation charges to increase, which will negatively impact the bottom line.

Cost versus Revenue - As costs as a whole continue to increase, the grain producer must find ways to cut costs or increase revenues in order to maintain net income levels. Biotechnology has increased yields and quality while helping cut costs. It has reduced the amount of chemicals needed to destroy weeds and pests, and global imaging is reducing waste in fertilizer. Yield enhancements and cost reduction through technology has made the grain producer more profitable than he would have been without these capabilities. The producer needs to continue to find ways to control costs and increase production, as well as improve marketing skills. This need to maintain a standard of living is forcing more farmers to get work at a non-farm occupation. If there is no way to reverse the trend, the producer must increase the percent of non-farm revenue through time working in an occupation off the farm, which means less time will be spent farming. This eventually causes productivity to decrease, and the farm income falls further until it is sold or leased to another producer or another use. Competition of other states and Canada with a lower cost/higher revenue structure may cause production of agricultural commodities to these competing areas.

Rail Access - As volume decreases, the possibility of losing rail access becomes a possibility. The state has been very supportive of helping to maintain the viability of the railroads, not only for agricultural uses but for others as well. But if the railroads are not used, abandonment is certainly a possibility. This is another case where the costs of transportation could increase, which will cause a net decline in net farm and business income.

Competition for the Land - The expanding economy, population and growth of urban areas create situations where the land cannot compete with the other uses in the long run. There are programs such as the American Farmland Trust (AFT) that work out solutions for specific areas to keep urbanization away, but on a large scale it is difficult to accomplish.

Loss of Export Business - For grain producers, the world commodity environment is one that has seen rapid expansion of production in other parts of the world. This production is causing the U.S. to lose some of its advantages for exports. If other countries can raise crops cheaper, and/or are closer to a destination (less transportation costs), they may sell grain cheaper than the U.S. can. As we lose export business, producers may rely more on domestic use to provide a market for our grains.

Slow Domestic Growth - If costs continue to go up, and/or the government would decide to reduce agricultural price supports, there will need to be enough demand domestically to keep income up, or there would likely be a faster reduction in the number of farms. Domestic uses for grains such as ethanol for corn and hundreds of uses of the soybean are providing new markets that could eventually raise the price enough to make farming profitable without assistance, but this could be many years off, and once ground has found a use for something besides farming, it will be difficult to get it back into production. It would then have the cost of reclamation.

Increasing Imports - There is also the issue of imports. As other countries around the world increase grain production, and at less cost than the U.S. producer, it could be that at some point the prices of grains in the U.S. are such that we begin to import more grain. We have seen some of this already with soybean meal into the East coast, oats up the river systems into the interior, and wheat, mainly from Canada, but also from countries overseas. This could be just the beginning of the trend. Some time in the future, the U.S. may no longer be the residual supplier of grains to the world, but an importer of grains to be used in our growing domestic markets.

Environmental - Problems increase with the expansion of houses in a farming areas. Chemicals, fertilizers, dust and other forms of pollution are more apt to cause confrontations as non-farming populations move into farming areas. This could cause a change in zoning

around residential areas or restrict certain applications that may be considered a threat to the health of the residents.

The 2002 farm bill is moving toward setting aside more marginal ground for conservation and environmental reasons (Batie). This land will be more difficult to bring back into production later if necessary. If the government could support grain producers until the time comes that production cannot meet demand, this land might be needed and brought back into production, but at a cost to the environment. The public will have to decide at that time whether low food costs and food security is worth more than environmental concerns. At that time, grain farming should be more profitable, because domestic demand will be more consistent, and the government may not have to play as large of a role. But it could be many years before this type of scenario plays out. Until then, the government is willing to support farming.

Economies of Scale - Grain farming is not a profitable business on its own unless the size of the farm can generate about \$150,000 per family member in sales (Table 3). The government is playing a major role, supporting it in order to support local economies and for food security reasons.

4.3.2.5 Summary of Strengths, Weaknesses, Opportunities and Threats

The grain producers in Michigan have limited strengths. The value of the land is appreciating, variation in soils allows the opportunity for diversified production, the farms are becoming larger, which provides opportunities to sell at higher prices and may create scale economies, and the producers have learned to manage through diverse growing and marketing conditions.

The weaknesses of the Michigan grain producer illustrate the adverse conditions that must be overcome to be profitable. Compared to national averages, and specifically for the

other main grain producing states in the study, Michigan has lower returns, caused by lower yields, and higher costs. Most grain producers also have a lack of grain marketing knowledge that limits their ability to maximize income.

The increasing size of the farms provides opportunities for marketing grain direct to terminals or processors, and they have more storage and transportation capability, all of which can result in higher prices for the grain. Also providing the possibility for higher returns are specialty grain production, alliances with grain handlers and processors. There is some unrealized opportunity in water transportation in the state that could help reduce transportation costs and provide higher prices.

The threats to the viability of grain production in Michigan are many. The producer is faced with urbanization, environmental restrictions, increasing costs of production with limited increases in revenues due to stagnant or depressed grain prices, competition from grain imports, and reduced rail access.

The transition to coordination with the grain handlers and processors brought out in the history of Michigan grain production could provide help to the producer in reducing weakness and working around the threats, while enhancing strengths and capturing opportunities. The analysis tells us that the current situation of the grain producer in Michigan is dominated by weaknesses and threats, and that strategies need to be developed that will pull them toward developing strengths and capturing opportunities.

Figure 4-d

SWOT Summary Table for Producers

Strengths

Increasing value of the land

Variation in soils

Larger farm size

Management ability

Weaknesses

Shorter growing season/lower yields

Inconsistent soil types

Higher transportation

Higher tax rates

High wage structure

Lack of marketing knowledge

Opportunities

Market direct to terminal/processor markets

Specialty crops

Alliances

Water transportation

Threats

Urbanization

Volume reduction

Cost versus revenue

Rail access

Competition for the land

Loss of export business

Slow domestic growth

Increasing imports

Environmental

Economies of scale

4.2.3.6 Strategic Issues Analysis

Core Competencies

The core competency of the Michigan grain producers is their production and management skills.

Their production skill is reflected in their ability to produce grain at the lowest possible cost with a high yield, faced with the adversity of soil types, climate, and a generally higher cost of production than competing states, and be profitable.

Another core competency is the management ability of the Michigan producer, who has been faced with revenue adversity, which allows them to manage costs and redistribute income efficiently.

The adversity in soil types and climate allows for a cost or production advantage by location. The challenge is to differentiate by finding a crop that can provide margin and that is unique to Michigan soil types and climate.

The producer's skill in the production of grain makes them cost effective. They could apply these skills to the production of new products, along with developing storage and separating techniques, adapting them for specific end user demands, and become more profitable.

Competitive Advantages

The key competitive advantage is the state's ability to utilize its climate and soil types. By focusing on developing a crop that can build a strong advantage in a market niche, the producers can increase profitability. By working hard on developing production and searching for demand for specialty grains, differentiation can occur. Producers need to focus on what the consumer market is demanding.

A market focus lets a business “learn” it’s target customers -- their needs, special considerations they want accommodated -- and establishes relationships in ways that “differentiate” the product (Pearce and Robinson).

To develop an advantage, the development of a niche needs to shape the industry’s structure. An ideal situation would be if an emerging demand for quality grains that had special characteristics that could only be grown in the Michigan climate would develop. If it developed a price premium that would pay for research and production, Michigan would have a competitive advantage. Michigan’s cooler climate may help in developing some crop varieties that are resistant to disease problems such as soybean leaf rust, which is becoming more prevalent in Brazil and could possibly spread to the U. S.

Another competitive advantage the state has is the ability to ship commodities by vessel, which many other Midwestern states do not have. Some have the ability to ship by barge, but vessel to the East Coast can be an advantage that other states cannot access. The use of cheaper water transportation can also be used within the state to counter higher truck and rail costs due to the peninsula effect.

Scenarios for the Future of Michigan Grain Producers

The scenarios that could develop over time are as follows:

Scenario One - Urbanization - Urbanization continues to expand, at a faster rate, and farm land continues to be turned into non-agricultural uses in those areas where those returns are higher. As total grain production decreases, the grain industry will find it more difficult to be profitable and may close plants and/or will not continue to expand capacity or update facilities.

Farmers may have to go a farther distance to market their grain. Eventually, transportation costs may become higher due to less volume. Short line railroads may be

abandoned, and if rates even on the main line railroad elevators are increased due to inefficiencies, interior prices for grain would decrease compared to other parts of the country.

Producers may become less profitable and land sold to non-agricultural uses may then increase at an increasing rate. Agriculture's importance to the state may continue to decline and become unable to lobby for legislation to support itself. Some small properties, mostly used for large lots for single family homes, sell some extra produce, qualify as farms, and increase rapidly, and there become very few large grain farmers left in the state.

Scenario Two - Low Net Income - If the profitability of grain farming cannot compete with other farm products within the state, or with profitability of grain farming in other states, then it will eventually give way to a use that is more profitable.

This scenario is like having a diversified business. If it is profitable, you put earnings back into the business whether it has the most profitability now, or it has a greater future value than other segments of the business. If a segment is not profitable, then it will be neglected, and eventually be sold off when the cost of repairs are too high to continue to operate it.

If yields cannot be improved, if grain prices are low and costs continue to rise, then profitability of Michigan grain farming will fall into the neglected category.

It will lead to more farms being lost to urban growth and a decline in acres per farm. There will be the few large farms over 1000 or more acres, fewer between 1,000 and 60, and many that are under 60 acres.

Scenario Three - Specialization - In this scenario, Michigan grain farmers become more specialized in their approach to grain farming, finding ways to grow crops that are in demand and that may have unique qualities specific to Michigan and that are worth a premium over generic corn, soybeans and wheat.

If low net income prohibits current medium sized producers from expanding, they will probably supplement their income by working off the farm. But by farming smaller plots, the

producer may be able to concentrate on specialized crops with certain characteristics for specific uses. The small to medium sized producer may have the time and ability to raise identity preserved or organic crops better than larger farmers. If they are specialized, they may be able to capture more margin and continue to farm.

Specialization of crops could also be a way to increase incomes on large farms. These producers may have the ability and resources to segregate and grow crops on a larger scale. The result would be the same as for small and medium sized farms - more revenues and net income.

Scenario Four - Alliances - Farmers are usually quite good at recognizing and solving problems with production. Solutions to fertilizer, seed, chemical and mechanization problems are usually dealt with efficiently. But the average producer may not spend the time marketing grain that would allow it to be sold at even the average price for the year. A marketing alliance could help improve the price of grain received, and help with some of the other problems such as income, cash flow and storage decisions. An alliance could be arranged by forming a marketing cooperative, hiring an advisor, selling with the help of a broker or contract farming with a large grain company.

In this scenario, the producer gives up some or all pricing decision independence in return for more value in the grain. The amount of control each producer is willing to give up will vary. But the fact is that larger grain companies have information and financial capabilities that can help farmers market grain at higher prices. These alliances would help the farmer by raising revenues and net income, reducing risk and allowing the producer to concentrate on production opportunities, in specialties or in other ways that could increase yields.

These four scenarios suggest that producers will likely find that competition for land use from urbanization and low net income from the combination of flat revenues and increasing production expenses can be partially offset by shifting toward crops that are more

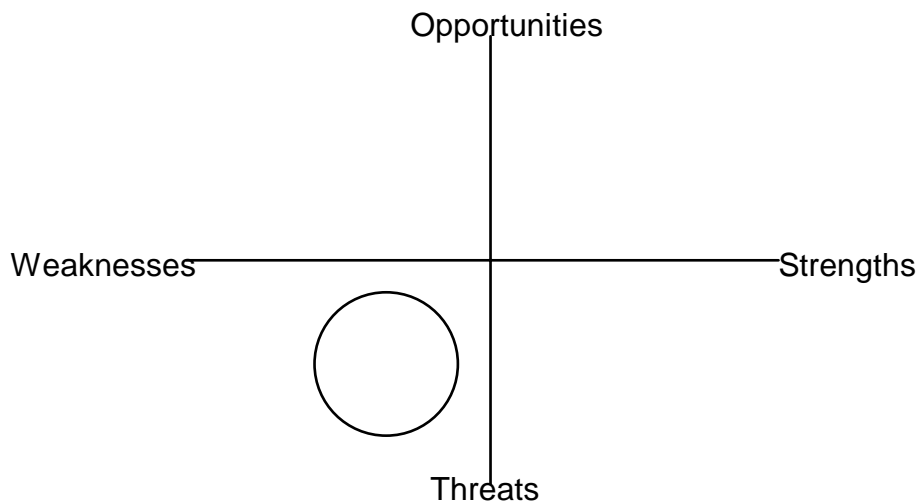
specialized and higher in value, and forming alliances with grain companies to help market grain at higher prices.

The Change Grid

The analysis of the strengths, weaknesses opportunities and threats was summarized earlier in this chapter. If that summary is placed in a grid, the producers would be represented in the weak and threatened quadrant. The analysis and plan should provide direction for producers to be able to initially be pulled up into the weak, but with opportunity quadrant, and with continued success, into the strength and opportunity quadrant (Figure 4-d).

Figure 4-e

The Producer Change Grid



Critical Issues

Urbanization, low net income, specialization and alliances are the critical issues facing today's grain producers. The opportunities and threats confronting the Michigan grain farmer are not new, but have evolved over time, and now some of the issues are approaching a critical point.

Urbanization / Population Growth - The spread of urbanization will increase land values, and taxes and cause environmental problems. The issue here is the need to develop a strategy that will allow grain production to compete on a dollar per acre return with competition for land uses in Michigan and for grain production from other states.

Low Net Income - If yield increases are slower to materialize, prices stay low and input costs continue to rise, lower net real income may force more farmers out of the grain business in Michigan. The producers will soon need to find a way to increase net income.

Specialization - The changing soils and unique climate offer the chance for producers to specialize in grains that may have unique, valuable characteristics that can allow more income. How producers can work toward raising crops that may be unique in quality to other Midwestern grain states is critical.

Alliances - Aligning with grain companies in order to enhance marketing alternatives may mean a higher average sales price and other benefits in return for guaranteed volume. Producers need to find a way to increase profitability, and coordination with the grain elevators, the next link down the food industry chain should be helpful.

Grain producing land in Michigan will be lost to urbanization. But for those areas that can provide the most competitive grain prices, the land value for farming may be able to compete longer, slowing the urbanization rate, and allowing producers and grain companies to benefit.

4.2.4 Strategic Plan for Michigan Grain Producers

Introduction

A strategic plan is needed to guide grain producers to realize their objectives. The author has observed, over many years of experience working in the industry and with producers, the lack of grain marketing planning and the negative results that occur from its

associated complacency. These observations are the basis for the general statements and conclusions in this introduction to the planning stage of the strategic management approach.

To maintain grain farming in Michigan, the farmers will need to follow a strategic plan that can allow them to compete with increasing land values in Michigan caused by urbanization, with other grain producing areas of the country that can get more net income from grain production, and with other commercial or agricultural uses for the land such as producing fruits and vegetables, for example. A strategic plan will need to be developed that can be realistically implemented and that will be effective in its results.

For a producer of grain in Michigan, profitability and survival are the key concerns. In order to be profitable, they need to be knowledgeable about agronomic, mechanical, financial, marketing, legal, accounting, government policy and many other minor subjects.

The producer is an independent business person who must seek help in acquiring knowledge about various business subjects on their own. We all have bounded rationality, and so it is difficult for these people to make good decisions and run their businesses profitably without help.

There are alternatives to farming, and those who are not profitable for one reason or another, and possibly unavoidably, have found supplemental income necessary. Many producers now have jobs in businesses in addition to farming (MASS-Michigan Census). Once that split of income sources is made, it becomes more difficult for that producer to spend enough time gaining knowledge in those areas of farming necessary to increase profitability. Depending on the necessities of keeping the farm, that land is more subject to use for development or to be sold to another producer who needs more land to become more cost efficient, because the producers may not have enough time to manage effectively.

A grain producing farm in Michigan is an independent business that must acquire, use and benefit from knowledge gained in many agricultural and non-agricultural areas to maximize revenues and reduce costs in order to maintain a life style until those responsibilities

can be passed to another family member or until retirement. They must be committed to profitable long term farming.

With the necessary commitment to strategy, all areas of the operation should be analyzed to improve and maximize the revenue opportunities available. Without this strong commitment, the long term viability of the farm is questionable. The producer may be able to use cash flow to roll expenses forward and delay selling out, but it will happen sooner or later, and the farm will not be available for future generations of that family. It may be purchased by a bigger producer, or sold off to other non-agricultural uses.

The three main grains grown in Michigan are corn, soybeans and wheat. There are specific varieties of each that can be grown for a premium price. There are also other commodities that may be grown in limited quantities that from year to year can be more profitable than grains. Producers need to plan what crops will give them the greatest return for their operation. All aspects of the farm must be considered. It may be possible that producing a specialty crop is not economically feasible for some operations. For others, reluctance must be met with the willingness to increase farm prosperity. The possibilities need to be considered for many different types of commodities.

The main problem with expanding into production of new commodities are knowledge and the equipment to grow the crops with good production results. A plan should be in effect. Research should be done into the varieties that can best be produced on the farm. There must also be a market for the products. Depending on the crop, many of the production and marketing basics may already be part of crops that are currently being produced. Non-gmo soybeans, and specific varieties of corn, soybeans and wheat may only require special handling in order to keep the identity of the grain preserved. Many marketing functions are the same as the generic commodity. But the producer should recognize the differences and plan for those differences in production and marketing techniques.

The mission and vision of the farm can give the producer a focus and a general goal to work towards. From it, the producer can develop a strategic plan in order to attain the goals of profitability and survival.

4.2.4.1 Strategic Mission/Vision

The Mission

The mission of the Michigan grain producer is to increase revenues and/or decrease costs in order to become profitable enough to continue farming full time, by taking advantage of differences in production and marketing that the states' location and climate provides.

The basic products for the Michigan grain producer are corn, soybeans and wheat. Demand is developing for specific varieties of these grains that may be best grown in the climate and with the soil types that are specific to Michigan. These varieties can help producers differentiate and garner more revenue than generic varieties.

The primary market for the grains will be for those uses that have the need for specific characteristics of the grains that can best be produced only in Michigan.

The technology that will be required for this production needs to be developed to suit specific end user needs, and the characteristics should be available preferably only in Michigan.

The long term survival of grain production in Michigan will depend on the success of the development of user demand, and varieties of seeds that can produce those needs. The chance for growth and profitability in these areas will be critical to the survival of the Michigan grain producer. The producer will need to be an active participant in the changes that will allow this growth and profitability.

The surviving grain producer could be small and produce specialty grains on a small but very specific scale for large premiums in price, or they could be medium or large sized

farms and use their economies of scale to produce maybe less specific crops at a lower premium, but important niche crops in larger quantities.

The Michigan grain producer's income shows more negative variation from the national average than competing Midwestern states. They must differentiate in order to provide growth and profitability enough to survive against competition from these other states and from other uses for land within the state.

The Michigan grain producer is in the business of producing grains that provide for the needs of consumers. By providing grains that are for more specific types of demand, the producers would be shifting their emphasis to markets that niches that will pay more for their specific needs. The customers producers serve will become those that require production of more specific characteristics in grains.

The existence of the Michigan grain producer may well depend on finding ways to grow specialty grains for specific uses to ensure survival.

The Vision

The vision for the Michigan grain producer is to coordinate grain marketing with the grain handlers and processors that can provide the expertise needed to market all of their grains, and in order to improve profitability and reduce revenue risk. This coordination will allow the producer to concentrate on growing generic and specialty crops more efficiently. The development of production of grains that can increase per acre revenues needs to be a growing part of the vision.

4.2.4.2 Strategic Objectives

The primary and long term objective for grain producers in Michigan is to become more profitable. This objective can be attained by shorter term objectives that develop their willingness to grow different types of commodities, in marketing knowledge, and in continuing to find ways to increase production and decrease costs.

Grain producers in Michigan need to find ways to manage production costs and maximize yields because of the negative variability in revenue compared to the national average. They need to continue to accept and implement new technology that will continue to improve productivity.

They need to be adaptable in their willingness to pursue new products that can bring the opportunity for better returns than other crops. These products could be different grains, but are more likely to be new and specialized varieties of corn, beans and wheat for specific uses.

The development of particular grains that can be grown only in Michigan would be ideal, but unlikely in a large volume. But production of specialty grains for specific uses is already being done and can be expanded.

Grain producers must also accept new ideas and develop and implement solid strategies in marketing grain. More time spent on marketing will improve marketing knowledge and chances to increase revenue. This objective can be achieved by the producer individually or by coordinating those efforts with a grain marketing company or an advisor.

Working alliances with grain companies to develop markets and facilities to handle a variety of specialty grains would help achieve the objective. Along with working together on specialty grains, the grain companies can help producers in their marketing strategies. The grain companies would benefit from alliances to help assure volume, as well as help the producer gain more income.

Attainment of the long term objective of profitability through shorter term objectives can be measured by the revenue variability and production costs compared to other major grain producing states. If net farm incomes in Michigan become closer to the national average, and the other states in the study, then the objectives are being attained. The competitive position for Michigan grain producers compared other states and for other uses of the land will improve.

4.2.4.3 Core Strategy Analysis

The core strategy analysis will consider current and suggest new approaches to customer value/competitive advantage, strategic initiative, strategic scope, industry role and vertical coordination in order to achieve producer performance goals. These approaches are summarized at the end of this section.

Customer Value / Competitive Advantage

The current strategy is one of price/cost advantage, where Michigan producers try to keep up with other grain belt states in profitability, but there are too many disadvantages. A new quality/features strategy would provide the grain market with a product that has the quality and quantity that can add value to the consumer's supply and the producer's profitability.

The value that Michigan grain producers can bring to the market is the ability to grow grains for specific uses (with special qualities). Specific use grains would be those that would be certain varieties with certain qualities unique to Michigan. This could be low acidity, low protein, low oil soybean varieties, shorter season specialty corn or wheat varieties that have qualities specific to Michigan for milling or export demand.

By coordinating through the grain industry, the producer would be better able to assure an outlet for the grains and be more aware of the types of grains demanded. Specific areas of demand for wheat would include special characteristic varieties for food uses by millers and exporters. Michigan grain works well by rail into the East and Southeastern U.S. for soybean processing and corn feed demand markets.

Strategic Initiative

Currently the producers in Michigan are in a maintain and defend strategy, but they are losing ground to competing U.S. producers and other low cost producers around the world. The main new initiative would be a strategy to reposition. The reason that the customer value/competitive advantage strategy above is not to a niche market is that the producer should not change too much too fast, which could increase risk. Maintaining current production will be important as the producers reposition, and a more specialized production capability takes place. They should try and enhance their production efficiency by applying their knowledge to produce more specialty grains that can enhance their competitive position. It will take some time to increase the grain producer's market knowledge and coordinate marketing with the grain companies in order to add value to production, and also to find ways to decrease per unit costs through scale economies or risk reduction..

If the loss of the number of medium sized family farms could be reduced and farm size could be maintained, the expansion of non-farm uses for land would diminish. Part of defending grain farming is to reposition the types of grain grown. If there are other grains that can net more income, they should be pursued as a part of the overall strategy.

Strategic scope

The single dominant products of generic corn, soybeans and wheat production need to be changed. The new strategic scope of the plan is diversification. The producer needs to expand opportunities for improved profitability and at the same time minimize threats from

producers in other states and from uses of land for other purposes. This plan for diversification is into specific varieties of grains. Production can be on a small quantity for very specific uses, or in larger quantities for more widespread uses. The important consideration is that producers look for opportunities to grow grains that can increase profitability in order to be more competitive.

Industry role

With an adopter role currently in place, the Michigan grain producers are trying to incorporate what is successful elsewhere into Michigan, but it doesn't work well because of the unique characteristics of the state. The new industry role for producers should be one of the challenger, a smaller competition that innovates in products and markets. The strategy is an innovative one due to the uniqueness of the production and cost structures in Michigan. The challenge will be to find ways to be innovative not only to better compete with other grain belt states for yield and quality of grains, but to find ways to develop production and markets for grains that will do well in Michigan.

If there are ways that Michigan can differentiate and grow grain varieties for markets that other states cannot or do not need to do, then perhaps the challenger role will be the best to bring more profitability. It will allow flexibility by being able to supply products for markets that may not be able to acquire quantities needed in very many other growing areas. Grain producers that can develop production as a challenger may be able to pick up additional profits by developing grain products for particular markets before others .

Vertical coordination

The current weak vertical linkages need to be abandoned. Producers need to coordinate vertically; to become more willing to look at options that can make them more profitable in this state. Grain producers have been reluctant to give up their independence. In the author's experience, grain marketing has probably been the weakest knowledge base for

producers, and so has resulted in the greatest loss of potential revenue. The producers will need to coordinate vertically either by marketing agreement, advisory agreement or by contract production.

Michigan grain producers need to be willing to accept help with grain marketing, risk management, market information, and farm management from a variety of sources. Certainly, the Michigan State University Extension offices can help, but professional help from grain industry experts can also provide access to ideas and information that can help profitability.

The author's experience shows there is a need for more intensified coordination between grain producers and grain industry representatives. Part of the reason for limited contact on the part of the grain industry may be because of the different nature of marketing grain for producers versus what the grain industry looks at when marketing their own grain. Much of the margin in the grain industry is in storing the grain, blending and reselling it, not from the margin taken when buying from producers.

The grain producer is generally interested in maximizing the flat price of grain, while the grain industry is more interested in the basis. This is because the grain industry hedges most flat price purchases and sales. By doing so, the basis (the difference between the Chicago Board Of Trade price and the price the grain was bought or sold locally).and spreads between futures months (carries are when future months are higher than nearby months and inverses are when future months are worth less than nearby months) are much more important to the grain industry bottom line.

The interest of the grain industry in flat prices has been mainly to anticipate flow from the producer, and to provide information for them in a weak attempt to gain or maintain market share. Since the producer activity is so driven by price, which is based off the Chicago Board of Trade price, plus or minus those characteristics at each elevator depending on where the elevator is located and what transportation capabilities it has, the need for attempting to capture market share by using sales techniques has not been a high priority.

Price analysts in the grain industry are generally separate from the core business of buying, selling and warehousing grain. The expertise provided by this part of the industry is quite analytical, and too detailed for most producers.

As the grain producers in Michigan begin to find more ways to differentiate their crops and concentrate on the markets they can supply the best, they will need to work more closely with the grain industry to make that happen. The coordination should allow Michigan producers to market grain at higher prices (compared to the national average) than they do now, reduce risk, have better access and understanding of market information and be better able to manage all of the aspects of the farm with their help.

Figure 4-f

Core Strategy Summary - Producers

Core Strategy	Current	New
Customer Value/	Price/Cost	Quality/Features
Competitive Advantage	Advantage	Advantage
Strategic Initiative	Maintain and Defend	Reposition
Strategic Scope	Single/ Dominant Product	Diversification
Industry Role	Adopter	Challenger
Vertical Coordination	Little	More

4.3.4.4 Action Strategies

The action would be to first identify the weakest areas in the farm operation, and negotiate help in these areas. The two areas that would be the most important to the strategy would be finding specialty grains with the most profit potential and then marketing those grains. Developing an action strategy is accomplished by:

1) Attacking gaps between resource needs and existing resources. In this case, finding help in deciding which specialty grains to grow and how to market them.

2) Directing resources/investments into priority projects. Once the specialty grains are found that can be produced and marketed, the producer needs to spend time developing a plan to direct resources or capital into the project.

3) Preparing appropriate feasibility studies. With help from the resources found, the producer can study the possible scenarios and their results that will help them decide on a course of action.

4) Create specific links to changes in daily operations. Once the most acceptable project is decided upon, the producer will have to institute changes in the farming operation to accommodate the project and its projected results. If the weakest knowledge area is grain marketing, for example, the producers should concentrate on improving their knowledge base by spending time on marketing on a daily basis (Peterson - How to Alter or Select Strategy)

The need for knowledge, and the great number of areas of expertise required to operate large farms increases the need for help in attaining goals from outside sources. There are three action options that could allow a grain producer to become vertically coordinated with the grain industry to help achieve their goals. The fourth is an exit option.

Option 1 - Market Advisory

If a producer already has a good understanding of grain marketing, which would include a solid understanding of basis, options, fundamental and technical futures price analysis as well as local market values, an advisor would be the best choice.

Market advisory services generally work for a fee either by bushel or by acre, and the producer may not be under an obligation to market the grain following the advisors advice.

Without a good understanding of the marketing concepts mentioned, the producer would not know whether the advice would be an idea that would work for that particular farm or not. The producer may try a strategy that would not necessarily fit into the other aspects of the business (financial, operational), if marketing ability was below the strategy level. The producer could end up losing because of lack of understanding.

The pros would be that the advisor could offer ideas that could be acted on that could allow more margin on grain sales. The cons would be that the added expense of an advisory service may not make the farm any more revenue, and could increase costs not just for the service itself, but in trading losses that might not have occurred with a more conservative approach. Also, unless the advisor had previous experience in specialty grains, they may not be able to help develop markets for new varieties.

Option 2 - Marketing Agreement

If a grain producer would agree to market a percent of the total production through a particular company, there would be an agreed margin and probably some other breaks in charges in return for the guaranteed volume.

This strategy may help add a few cents per bushel to the bottom line and could also allow the producer to see some new marketing alternatives and varieties that may not have been noticed before.

The improved level of communication would be the biggest advantage in this case. The producer would be in more consistent contact with the grain marketer/elevator and would have a better chance of improving marketing knowledge.

The pros would be that by becoming closer to the grain company, future opportunities could arise that could help profitability. More open communication might cause the two parties to form a more formal alliance that could further help each party. A larger grain company would have more access to demand for special varieties of grains that could be integrated into the marketing plan.

The cons would be that unless the agreement was with a destination and company in a very limited competitive area, the opportunity for gaining information or selling to other companies that may have a better price from competitors would be eliminated. It could cost more in lost opportunity than is gained in the terms of the agreement.

Option 3 - Contract Farming

In this situation, the producer agrees on a price for production, and leaves all of the marketing decisions to the grain firm.

Depending on the price per bushel, or per acre that is agreed upon, and other terms, the producer in this case may be able to lock in a level of revenue acceptable to the goals of the farm, eliminate a lot of the risk associated with marketing the grain, and then concentrate on improving the production side of the operation.

The most difficult part of this option is the negotiation for revenue with the grain company. Assessing the potential of possible revenue scenarios, particularly if prices went up substantially would need to be considered. The marketing ability and history of the prices received by producers versus an average might help determine the necessity or feasibility of such an agreement. A formula for determining the average price or some percent of it would help determine the formula or price level needed.

The pros of this option are that the farmer can concentrate on production, he has a guaranteed revenue, and he doesn't have to be extremely knowledgeable about grain marketing.

The cons are that the farmer has less control, and could miss some income if the market goes up.

Option 4 - Hang on and Eventually Exit

If the producer continues on the current course, the trend of unprofitability will most likely continue. The 2002 farm bill may slow down the process due to the amount of aid given, but the overall trend of fewer, larger farms will continue.

For the producer under 1000 acres and more than 100, that means the chances of continuing in the long run are limited.

The producers that are over 1000 acres will have a better chance of survival due to economies of scale opportunities, but without a strategy, mistakes could be made that on a large scale operation can be very costly.

Option 2 is the most acceptable and workable for the producer. The producer should work on developing strong relationships with those grain operations that will be able to serve the best combination of all needs in grain marketing. There is a trust and cooperation that must be found with the companies that perform the marketing activities. The producer and the firm must continue to work together and concentrate on developing communication that allows the producer to increase revenues.

4.2.4.5 Evaluation

These strategies need to be evaluated to compare results after observable changes have taken place. Improved profitability will certainly be key. The yield variances should be less, with producers concentrating on varieties that perform to higher standards in the Michigan climate. Prices for production should improve as producers find special grains that can offer a higher price. Revenues should increase and be more competitive with other grain belt states with the increase in price and less yield variations. If producers can maintain current costs per bushel of production or find a way to lower the cost, they will have an improved chance to increase profitability.

4.2.5 Recommendations and Conclusions

The overall recommendation to Michigan grain farmers is to look for and begin development of the production of a value added crop to specialize in and align with one of the grain companies for marketing grains and to lower risk.

These things can help a farm business concentrate on the most knowledgeable end of the business while delegating those areas that have the greatest risk to the long term success of the operation to those who have more expertise in those areas.

4.3 Strategic Analysis and Plan for Michigan Grain Handlers and Processors

4.3.1 Introduction

The previous section of this chapter provided a strategic analysis of the Michigan grain producer and what strategies could be planned to achieve the desired results. The study will now proceed to study sufficient elements of a strategic analysis and plan for the Michigan

grain handlers and processors that will allow insight into the real feasibility of the producers' strategies just discussed. Much of the background and other information used has been presented earlier in the study, and to reduce redundancy, is not reiterated in this section. However, the author feels it is useful to bring out these and some new perspectives from the viewpoint of the Michigan grain handler and processor, and that the format used in the analysis and plan for the producer is best suited to do this.

4.3.2 Description of the Michigan Grain Industry

The grain that is raised in Michigan goes to many different final destinations. It is used for many different products. It is handled in many different ways. But the majority of the grain raised goes from the farm to a grain elevator for further distribution. If the elevator doesn't handle it, they are most likely involved in arranging transportation, documentation, accounting and pricing of the grain in between the farm and the buyer.

The grain firms face challenges that are directly related to the producer because they depend on the producer selling volumes of grain for their survival. There is a growing need to be able to maintain volume of grains, and in order to achieve that, they need to be able to help producers in the state improve profitability, and to be able to compete with markets outside the state in order to maintain volume, margins and profitability.

In addition to volume, the grain handlers and processors must work with producers to supply the quality of grains that the consumer market demands. Up to this time it has been mainly generic USDA Number 2 yellow corn or USDA Number 1 yellow soybeans or USDA Number 2 Soft Red Wheat or Soft White Wheat. But specialty crops and quality specifications from buyers, driven by consumers, are becoming more restrictive and important as a value added production alternative.

They must work together to ensure the volume necessary, and the quality necessary to supply the end user customers with the grains they need. The Michigan grain handler and processing industry needs to have a strategic plan to guide them through the changing dynamics of this time. This section of the chapter will explore these aspects.

There are three main types of grain firms in Michigan. The largest are the subterminals that can ship train load quantities (50 cars or more). The second are the smaller elevators that ship by truck or smaller rail units (1 - 15 cars), but also may use grains for feed or can clean grain (along with edible beans) for special uses. The third are those that process the grains into other products, such as crushing soybeans for meal and oil, or making corn into ethanol, or wheat into flour.

As indicated in the Industrial Organization analysis, the number of grain facilities in Michigan has decreased from 292 in 1996 to 250 in 2000. The average storage capacity has increased from 500,000 bushels to 564,000 in that same time period (MASS-Mich Ag Stats 2000-01). There has also been a consolidation in the number of firms that operate grain facilities. Larger firms are acquiring smaller firms and in the process are closing smaller unprofitable elevators.

The decrease in the number of firms and the number of elevators means that competition should have decreased and volume to the remaining elevators should have increased. But this is not necessarily the case. Counteracting the grain industry consolidation is the farm consolidation. Some farms are becoming larger, and with that has come a greater ability for them to market grain direct to other users outside their local market. Additional storage capacity on the farm and producers owning and operating their own tractor trailers has enabled them to ship more grain direct from the farm to markets in Canada, Toledo, Ohio or to processors in Indiana and Ohio.

The grain industry in Michigan finds itself in a competitive situation with handlers and processors out of state that can, at times, pay a higher price than Michigan facilities due to their advantage in location, mostly due to transportation cost advantages.

The main concerns about maintaining grain volume for the Michigan grain handlers and processors are those of urbanization, the loss of medium sized farms either selling out to non agricultural uses or to large farms, and the possibility of increased specialization. The number of medium sized farms is decreasing, which means land that may have continued to have been used for grain production may now be urbanized. If sold for smaller plots, land formerly used for grain production may be used for lawns, pasture for horses or vegetables for local sales instead. Consumer driven specialization into specific varieties of grains means that grain handlers and processors must address their ability to identify preserve such crops in handling systems that were mainly designed for generic grains. These issues tie the grain elevators directly to the strategic analysis and plans for Michigan grain producers.

4.3.3 Strategic Analysis for Michigan Grain Handlers and Processors

In this section of the analysis, performance, competition, government programs and consumer driven specialization are characterized as key background conditions for the analysis. The strengths, weaknesses, opportunities and threats of grain industry handlers and processors in Michigan are then discussed. A strategic synthesis will also be outlined and all the parts will then be summarized.

Performance

The grain handling system provides a quick and efficient way to move grain through the channel from the farm. Some of the elevator grain moves to end users, some goes to other terminals, some for export and some for processors.

Location, speed, and low cost per unit handling are the keys to success in the grain business. Facilities that are not able to take grain in and ship it out quickly and in great enough quantities will not be able to generate enough volume to keep costs per unit down. Those facilities will eventually be unable to operate profitably and will close. The more cost efficient facilities will be able to pay more for grain, remain profitable, and take market share away.

The industry has been consolidating rapidly in the last 15 years in order to continue to find ways to cut costs and maintain margins. There is little building of new facilities, mostly only a few places adding storage capacity to existing facilities.

Smaller companies that are not aligned with a major grain company in the state (including cooperatives) may not be able to compete in the long run. Larger companies have the ability to supply the knowledge, markets and marketing alternatives that larger farmers will need. Much more of the grain is now kept within the originating grain company itself or with companies they are aligned with. Agreements, alliances, vertical coordination and integration are all part of a large company that makes it able to ensure supplies and outlets, and it reduces the amount of grain that has to be traded in the open market. Smaller companies that have to operate without these marketing benefits probably cannot be as cost effective as the larger companies.

Competition

Competition for grain elevators in Michigan comes from livestock growers, the Canadian market by truck, the Toledo, Ohio market, and millers and processors inside Michigan and in Northern Indiana and Ohio. Most of the rest of the grain is handled by a grain elevator in Michigan before moving on to another more distant market.

Livestock producers often buy additional feed needs direct from grain producers. They can purchase this grain right from the field before it can get blended with other damage and foreign material at the elevator. They can buy the grain with moisture to feed immediately

or to put in harvestores for later use. This allows grain farmers who may have wet corn out of the field to sell it and avoid the cost of drying and storing, or at less of a discount than the elevators would charge. Feed consumption of corn in Michigan is approximately 80 million bushels, which is about one third of the annual production (Proexporter).

The Canadian market offers farmers an outlet by truck off the farm that is many times a higher value fob the farm than the elevators can pay. Trucks run sugarbeets, wheat and soybean meal to Michigan from Canada and are able to give reduced backhaul rates. There are several markets available in Canada for corn and soybeans.

The Toledo, Ohio market offers higher prices because of their ability to load lakes vessels. These values can be as much as 20 cents a bushel higher than rail values for corn. Boats are not loaded in the November to March period due to ice on the lakes, but this area has a large storage capacity, and so can buy grain to fill space until the lakes open for navigation again in the spring.

There are several soybean processing plants in Northern Indiana and Ohio that sell soybean meal into Michigan and, like Canada, the trucks are looking for backhauls . These markets are not usually competitive until the summer months when soybeans in storage are more difficult to locate in their normal draw areas.

Competition inside Michigan for the use of the land is urbanization and diversification into other agricultural production such as vegetables, sugarbeets, and edible beans. This competition is based off of returns for other uses than for grain production.

Government Programs

Government programs have helped keep more producers in business, which has helped grain handlers and processor maintain more volume. These programs directly effect the profitability of producers. They have worked to allow marginal producers the chance to continue to farm. Without the government assistance, low prices and rising costs would have meant that some farms would have discontinued operations, and more elevators to be closed.

Government subsidies for grain producers have supplied more than 50% of the income for some producers over the last several years (Table-7). The new 2002 farm bill is even larger than the 1996 bill (Young), and so will continue to be an important part of the reason grain farming continues with less change than it would without the bill.

Consumer Driven Specialization

While standard grain has moved through the system smoothly for years and still will, the changes in the organization of farms and variety of crops grown is changing the grain industry.

Trends toward health consciousness concerning foods will add pressure to grain producers to consider raising specialty crops. Non-genetically modified (gmo) crops can provide an additional 2 -10% in price. If the trend toward demand for these products increases, a balance between non-gmo and gmo crops should establish itself as premiums for non-gmo crops increase. Up to now, the convenience and reduced costs of gmo grain production have amounted to more than the non-gmo premium. The premium offered for these crops can be especially important as a strategy as a niche market to supplement revenue in Michigan. Elevators will need to begin to adapt to this change in trend by updating facilities to handle these identity preserved crops on order to increase market share, especially if premiums increase.

4.3.3.1 Strategic Strengths of the Michigan Grain Industry

By recognizing what its strengths are, the grain industry leaders can act to make changes that enhance their position. The strengths of the system need to continue to be the backbone of the industry.

One of the strengths of Michigan handlers and processors is the ability to determine prices easily. The price setting system for the grain business is based off the Chicago Board of

Trade futures contract prices with differentials back to any location, just as it can be done anywhere in the world. The differential (or basis) changes, but much less often than the futures prices. All a producer other marketer needs to know is the basis, and it can determine the price at any location anywhere based off the futures price. It is a quick, efficient and fair way to price grain. The flow of price information is quick, accurate and available to the world instantly as the trade takes place in Chicago.

Another strength for grain handlers and processors is the amount of storage available. Grain elevators are built to take grain in, store it, blend it, dry it and load it back out. The consolidation of companies has caused the least efficient facilities to gradually close, any many times these are the elevators with less storage capability. The ability of an elevator to store grain in the fall has been vital to the business. In the past there has not been enough storage on the farm to store all of the crops at harvest. The elevator has provided an outlet for the excess grain at harvest, and a way to allocate supply to the rest of the food and feed industries for the rest of the year. Usually, the market will pay more for grain it needs later in the year (called carry) and this pays for the elevators to hold the grain over the time needed.

Another strength of the grain handlers and processors is their expertise in transportation. Grain handlers and processors are handlers of grain in more ways than just accepting grain into the facility and loading it out. Many of the companies also own or lease transportation equipment (such as rail cars), which can be a significant help to producers when crops are large. The expertise of the grain handlers and processors in transportation helps move the grain through the system by truck, rail, barge and vessel. The grain handlers and processors have provided a link in the transportation system to move the grain to markets down the chain quickly and in larger quantities than the producers can individually. The ability of some facilities to ship by boats or in 50 or more car trains to markets down the chain has allowed them more margin for the competitive advantage.

Grain handlers and processors provide a strength in the market information they provide. The handlers and processors have been a place where producers can turn for information about the markets. They typically have many sources of information and can provide insight into marketing decisions. They typically offer several marketing alternatives for producers such as forward contracting, pricing orders, price later agreements, basis contracts and warehouse receipts. This information about the grain markets, accumulated in one place, with local people has been a help to the producers as they market their grain during the year.

The accounting and record keeping that handlers and processors provide is a strength in that it is an essential part of running the business, and can be a service for records and information concerning crops for producers. Bushels marketed, dollars paid, and price histories can all help producers during and after marketing their grain.

4.3.3.2 Strategic Weaknesses of the Michigan Grain Industry

Weaknesses of the grain handling and processing industry need to be addressed in order to meet changes, adapt and move ahead.

Grain handlers in particular have a weakness in that many of the facilities are becoming outdated. Most grain elevators in the state were built more than 20 years ago, and many are 30-50 years old. Many of the oldest and least efficient facilities have been closed. This has meant that the remaining facilities are more efficient, in that the ones that are still open are built to handle larger quantities of grain in a short period of time. While this is still good at harvest time, the changes in farming toward specialty grains is turning even these abilities into a weaknesses. It is more difficult for some of these more modern facilities to segregate grain, keep it identity preserved or to handle very many different types of commodities at a time. This inability to adapt to the trend toward specialty crops is slowing down the development

that the producers of this state need in order to increase net income. In order for producers to increase their specialty crop production, they are forced to store these commodities at home. It is also forcing more direct marketing of grains from farm storage to user markets and bypassing the local elevators. The elevator is being forced to change the way it accepts grain or to spend money on assets in order to capture a larger share of this market.

Another weakness is associated with the consolidation and centralization of knowledge in the grain companies to the home office. As the grain industry has consolidated, the companies that are left are likely to be larger companies, with more decisions being made in a corporate office away from the local elevator. Part of the reason for the consolidation is to decrease costs at the individual facilities. Since labor is the highest cost item, most companies are trying to do more volume with less people, and automate as much as they can. Unfortunately the personnel at the elevators have less time and are probably not as experienced as they have been in the past. While this does save costs, it is a detriment in the kind of market that is developing in Michigan. This will only help drive the large producer to store more of the grain on the farm and find ways to market the grain to markets further away. The grain companies need to develop more personal business relationships with the larger producers. They should be spending more time on supplying information and help in more aspects of marketing, particularly with the larger producers. Instead, the grain industry has been focused on cutting back on costs, which has been necessary to maintain margins.

A weakness of the larger grain terminals is that they are designed and located to ship by trainload, but may be ill equipped to compete in truck or specialty markets. More processing capacity in Michigan, such as the Zeeland soybean processing plant and the Caro ethanol plant makes it easier for producers to sell direct to local markets due to their proximity. Local markets take away from one advantage that an elevator has over a producer when the best markets are beyond effective trucking distance. Larger producers may be able

to load trucks as fast as some elevators. This again stresses the need for the grain industry to increase service to handle these local truck and export markets for producers.

4.3.3.3 Strategic Opportunities for the Michigan Grain Industry

Opportunities for grain companies still exist in their abilities to blend, store and gather grain for shipments in larger quantities or to ship to specialty market destinations that are impractical for producers to ship to. They won't need to add storage in most cases because of the increase in the amount of farm storage, but it will be an advantage to be on a main line railroad where there is access to shipments of grain out in large quantities in a short period of time, and be able to dump grain into the facility quickly also.

The ability to provide the quality and quantity of specialty grains is an opportunity for grain handlers and processors to provide producers a market they cannot access on their own. To capture this opportunity, asset dollars for improvements as a whole, for companies and locations that are already in a competitive position, should be spent first on improving the ability of the facility to handle more specialty grains. This would include equipment to ensure or enhance quality and identity preservation of the grain. If the strategy for producers is to increase their production of specialty grains, then the elevators are going to need to be able to handle it.

The trend toward larger farms will also mean more need for services. Not only should the elevator be able to handle grain, but the staff should have the capability to provide assistance in many different areas. This will include grain marketing alternatives, market information, education about marketing, and possibly financial, banking, credit and other services that producers now go other places to obtain.

4.3.3.4 Strategic Threats for the Michigan Grain Industry

Volume is key to the grain business, so the greatest threats to the business will come from less grain being grown. Factors such as land lost to urbanization, competition from other crops such as vegetables, beets, and edible beans, and government set aside programs are the biggest threats.

For smaller grain companies, competing on a cost per unit level with large grain companies will represent a big challenge. If volume decreases, and the available markets are reduced due to consolidation, smaller companies will need to concentrate more fully on services and special needs of those customers in close proximity to try and hold on to market share.

The ability of larger farmers to ship directly from the farm to end user markets and bypass local elevators is a threat to the grain industry in Michigan too. The threat of grain being shipped from the farm into Canada, Toledo or to processors in Indiana and Ohio direct, could develop into a larger problem. This could also effect volume if the grain producers raise more specialty crops and ship those direct also. If grain handlers elsewhere are better prepared to handle all aspects of growing and handling specialty grains and the industry in Michigan cannot keep up, business could be lost.

4.3.3.5 Summary of Strengths, Weaknesses, Opportunities and Threats

The grain handling and processing industry is well organized and provides prices, information, storage and arranges transportation for much of the grain in the state.

The grain handling firms will need to enhance their local facilities to better handle specialty grains. As farms and farming operation become larger businesses, the grain handlers and processors will need to improve their personnel at the facilities by decentralizing. As

markets become more domestic oriented, and more local, the rail shipping advantage may become less apparent.

The opportunities for grain handlers and processors are in supplying producers with storage, both generic and specialty markets, both out of state and off the farm, and to provide increased services for producers. If grain handlers can not find ways to help producers become more profitable, then their volume and profitability may decrease.

Figure 4-g

SWOT Summary Table for the Grain Industry

Strengths

Well understood pricing structure
Available storage space
Logistical expertise
Market information
Accounting and record keeping

Weaknesses

Outdated facilities
Centralized knowledge/decisions
Facilities unadaptable to specialties

Opportunities

Blending, storage, shipping
Specialty grain origination
Providing increased service needs

Threats

Decreasing volume
Small companies uncompetitive
Larger producers shipping direct

4.3.3.6 Strategic Issues Analysis

Core Competencies

The core competency of the grain industry in Michigan is that it provides a place for grain to be stored and marketed for farmers, and also provides a residual supply for the user markets during the year. The elevators also provide grain market information, accounting information and grain market knowledge to the local community. Part of this competency for handlers is the location, speed and low cost per unit handling of the commodities. The logistical capabilities of the handlers are also an important competency that helps move grain from the farm around the world.

Competitive Advantages

The grain industry in Michigan is knowledgeable about agriculture, and in particular, grain markets, in their local areas and have personal contact with their producers. The close proximity to the farms can provide an outlet for farm grain quickly at times when larger production requires it. They have the opportunity to communicate with customers on a one on one basis, as opposed to companies that may be out of state. Michigan grain handlers also perform accounting functions that are important to local producers, who need checks for grain and business information on a personal and timely basis.

Scenarios for the Future of Michigan Grain Firms

The issues that will be affecting the grain industry in Michigan are different depending on which of the following scenarios develops.

Scenario One - Government programs provide a safety net that is adequate for survival for producers until the time that grain prices recover and profitability returns. Higher grain prices could be led by a worldwide demand for food at some point in the future. There have been such concerns in the early 1970's and in the mid 1980's. In this scenario, the

producers are not forced to alter their current crops or methods of marketing in order to stay in business. The 2002 farm bill could allow marginal producers (60 - 1000 acres) to remain marginally profitable until grain prices recover. If yields don't continue to increase on the same level as the past 15 years, and usage increases at a faster rate, prices will go up in order to allocate supplies. If the average cost of production for a marginal Michigan corn producer increases slowly, and the average price increases more quickly, then these producers, as well as the larger producer will have a better chance of being profitable in the short term, and could continue to farm until the safety net is no longer provided. This is not an acceptable long term scenario that is considered for the producer because it depends on the government, and does not develop a strategy for the producers to accomplish profit goals on their own. In this scenario, however, the grain industry will not be forced to look for alternatives such as specialties, services or better transportation alternatives to maintain most of its market share. It may not be in position to change its strategies at a later date in time to adapt to the needs of the increased size of producers. In this scenario, the smaller companies eventually lose market share, but at a slower rate.

Scenario Two - A rapid decline in grain production acres occurs in Michigan, as urbanization, other crop alternatives not conducive to Michigan agriculture and low net farming income force more medium sized producers out of business. The elevators that cannot access the volume necessary to control costs on a per unit basis are forced to close or sell out. This forces the grain that is produced to be marketed only to those elevators that have a market advantage due to size, speed and transportation advantages. These few elevators might actually gain some volume when rail markets are strong. In this scenario, large farms acquire some of the smaller farms and with it, more storage facilities. Some could even purchase smaller grain elevators to use as their own for storage and shipping points. These large producers become big enough to hire professional people to market their grain and work on marketing alternatives with them. The large farms actually become competitors

with the larger elevators for sales markets when truck market values are close to rail values. As the system for marketing from these large farms develops, the elevators lose volume, reduce asset expenditures including repair, and run as residual handlers of grain when rail values are strong or when production requires outlets for grain at harvest beyond usual capacities. Less volume will force profitability down because of the fixed costs expenses, that cannot be reduced. This scenario could lead to the industry exiting the state altogether.

Scenario Three - The user markets that develop the quickest are in areas that are not within a reasonable trucking distance of Michigan . The elevators have an advantage by having the ability to handle and ship rail units in quantities that producers don't have the ability to do. In this scenario, rail would be able to compete with other modes of transportation such as trucks and vessels. The poultry and hog markets in the Southeast have provided a large market for corn. If that expansion continues, grain elevators on main rail lines would benefit from the demand. The users would need a supply of corn from the Eastern corn belt all year round, and the demand would create values for Michigan corn that could compete with local livestock, Canadian and Toledo markets.

Scenario Four - Trend yields continue to increase, and production of grains in Michigan and other states grows fast enough, with prices that are high enough to make producers more profitable. Higher yields will increase production enough to counteract the decreases in acres from urbanization. Competing markets don't have to reach as far into Michigan to buy grain. The handlers could keep volumes from declining even with less farmers and less acres. This scenario is longer term and does not account for the possibility of natural disasters (such as drought) year to year.

Scenario Five- The grain industry is proactive in increasing services for producers in marketing alternatives, marketing programs such as perhaps contract farming, and other non-traditional services such as banking, insurance or financial services, and they use these services to supplement their net income. In this scenario, they would be drawing closer to their

customer base, which could allow them even greater market shares. The larger grain companies would be most likely to have the capabilities to set up and operate these programs. The less innovative grain handlers lose market share to those that are more service oriented.

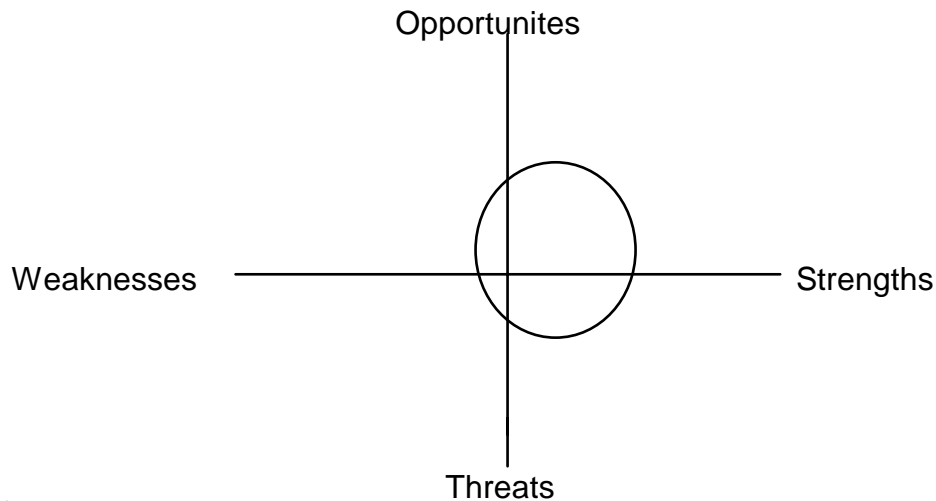
In summary, these five scenarios suggest in the real possibility that the trend of decreasing numbers of farms and the growth in size of grain producers continues, the grain facilities that have the advantage of loading larger train lots to more distant markets, and those that develop services for producers in marketing alternatives will have a better chance of surviving. Those facilities that do not move toward this end will have a tougher time remaining profitable in the long term.

The Change Grid

The grain handlers and processors are in a stronger position than the producers, mainly due to consolidation and their ability to cut costs. They need to make some changes in their facilities and improve personal contact with the larger producers. The grain handlers and processors are also not as threatened as the producer, although the opportunities are limited if the volume of grain production in the state decreases. The grid in figure 4-e illustrates this.

Figure 4-h

The Industry Change Grid



Critical issues

The critical issues are those that will affect total profitability of the grain elevators the most. Those are volume, margins (sales value minus fixed and variable costs) and operational capabilities.

The grain industry needs to work to try and perform the grain marketing functions in a way that can maintain or increase volume of crops handled through their facilities. Price and service are the keys to this effort.

The sales market price (basis) generated by consumer demand for grain products will supply the grain industry with incentives to improve margins in areas that will enhance volume and operational capabilities. The industry needs to recognize these opportunities and concentrate on supplying quality grain in quantities demanded by their best sales market alternatives. They need to work on maintaining sales market share as well as producer market share. Working with a strategic plan through analysis of opportunities and reevaluating should provide chances to capture market share by being a step ahead of the competition.

Without operational capabilities to handle the flow of grain quickly both in and out, elevators will lose marketing advantages. Elevators that can dump grain quickly can buy more

grain at harvest time when the margins are the greatest. There are incentives offered by the railroads for loading quickly, and advantages in making future sales if loading trains can be done in a short period of time. Being able to maintain quality (don't create any quality problems) blend grain efficiently and dry it economically are all capabilities that offer additional margins. Grain facilities that can capture another 3 -4 cents per bushel of income through efficient operations will have a better chance of being able to pay more, and that should translate into more market share.

4.3.4 Strategic Plan for the Michigan Grain Industry

Introduction

The grain industry in Michigan needs to take the analysis as has been discussed and apply it to a plan that will enhance volume by addressing issues with grain producers. They need to do this along with concentrating on creating as many operational efficiencies as possible.

Management needs to spend time analyzing the situation and acting in a manner that is positive and reinforcing to the plan. That may take adjustments in cost from one area of the operation to another, for instance an increase in employee costs in order to bring marketing expertise to the local level while automating as many processes in operations as possible in order to cut other operational costs.

With that frame of mind, the strategic plan can be developed, implemented and evaluated. The trade-offs between expenses and potential revenue enhancing strategies need to be considered. The analysis can direct the development of the plan.

4.3.4.1 Michigan Grain Industry Strategic Mission/Vision

A mission statement for a Michigan grain handler or processor might read as follows: “To serve grain producers by offering a bundle of services that will provide price, knowledge, service products and marketing alternatives that will enhance the profitability of producers, and in turn increase volume and margins for handling and processing that will allow firms to achieve facility and company goal return to asset ratios.”

The changes in the grain industry as well as the farming trends are acting to change the way that grain business has been done in the past. To be able to adjust to these changes, the grain industry needs to shift its mission and vision from a commodity orientation to a service and specialty grain orientation, and needs to coordinate more closely with the producer.

The grain business in the past has been mostly price oriented and competition for local production was between handlers that were closer together than they are now. The farmer would haul his grain in a farm truck to the nearest two or three elevators at harvest, choosing the one that had the best bundle of services, which included price as the main determinant.

Price is still important, but the changes that have taken place with larger farms are that the producer has more storage on the farm and doesn't have to haul as much in the fall to the elevator. They can keep more of it on the farm, and sell it later in the year. They also have greater transportation capabilities than they used to have, driving their own tractor-trailer over longer distances during the marketing year to attain the best price.

The Michigan grain firm must change its ways of originating this grain to adapt to the changes that have taken place. They need to offer additional services to give producers the bundle of services they need to increase profits.

Working to increase marketing skills beyond just finding the best price is one service. Producers need help with increasing marketing knowledge, and they might feel more comfortable gaining that knowledge at the closest handling facility.

Looking for ways to help farmers increase profitability by handling specialty grains could also be important. The controls that are necessary in growing some identity preserved crops may be able to be done better locally.

To maintain volume and help producers reduce risk and ensure revenue, contract farming could be offered. By offering a revenue guarantee per acre, the producer can spend more time dealing with production, government and other issues of importance.

To incorporate those aspects into a mission/vision statement would help a Michigan grain firm concentrate on those aspects that would help grain producers and themselves be profitable.

4.3.4.2 Strategic Objectives

The strategic objectives for grain handlers are to maintain volume, keep costs down and maintain or increase revenues for long term profitability.

The grain handlers and processors need to maintain volume to be profitable. The grain industry typically has run on low margins and high volume to be profitable. Without volume of grain, it is difficult to keep fixed costs in cents per bushel down. A rule of thumb is that storage elevators need to fill and empty their rated bushel capacity at least twice a year in order to be profitable. The author's experience is that fixed costs need to be at 15 cents per bushel or less, and variable costs at five cents per bushel or less to be at least break-even. The market in Michigan doesn't allow much more margin than that to be competitive.

If an elevator can not offer competitive prices, then it is difficult to maintain market share and subsequent volume at a high enough level to keep costs below these maximum levels.

There are tools other than price to increase volume also, such as service, specialty grains, marketing programs, promotions, etc., but price is the main factor.

The objective is for management to understand all of these aspects of the facility and to bid for grain as aggressively as possible to find the level where marginal revenue equals marginal cost. Finding the correct amount of volume to make this formula work is the key to profitability.

Part of the cost of operating a grain facility depends on the size of the facility, the book value and market value, its operating capabilities (speed of unloading and loading out), how much carry (a higher value in the future) there is in the market, competition in the area, competitive advantages such as main line rail loading ability, automation (to keep labor costs down) and many other smaller factors. All of these things must be managed and considered in the price paid for the grain and to determine at what price to sell the grain.

Keeping costs down as low as possible has been a major thrust by grain companies to try and maintain margins versus trying to find innovative ways to increase revenues. The consolidation that has taken place has reduced administrative, data processing, operational compliance (including OSHA standards monitoring and implementation), and expertise required in merchandising, logistics and accounting. By managing several facilities, the cost per facility and per bushel for each of these functions is reduced.

By reducing costs, facilities can keep from increasing margins, which allows them to buy grain at more competitive prices and increase volume. As already discussed, volume is critical to the overall profitability. Controlling costs is important in keeping the facilities profitable. If volume is increased, but costs per unit also increase, the net result could be a net loss.

Increasing volume and controlling costs can help achieve profitability goals, but a strategic objective for long term profitability must also include ways to increase revenues.

In storage facilities, part of the revenue is a calculation of maximizing the carry in the market. This means being able to buy grain at the lowest possible basis (usually in the fall)

and holding the grain until either the chances for spoilage is too great or the basis is at its highest point. This is usually in the April - July time period.

Another part of the revenue stream is the grain that is handled after the elevator is full. This grain must be purchased and then sold and shipped in a shorter period of time. This margin usually covers only part of the average fixed and variable costs. The grain that is stored over a longer period of time makes up the rest of the average fixed and variable costs.

Also part of the revenue stream are charges for storage, drying and other services the handler may offer. Diversification can offer additional revenues also, but must be weighed against costs. For instance, handling specialty grains may increase volume, and the margins may be higher than for generic grains, but the costs associated with documentation, labor, operational requirements, and testing may be so high that the returns are inconsequential. Each new undertaking must be considered for its effect on net income. What may appear to be a lucrative diversification may end up costing more than the revenue it generates.

Long term profitability is a daily consideration for the management of the grain facility as well as the centralized company office. In Michigan, volume considerations may cause the most concern. If total production continues to decrease, those operations that can not control costs and buy and sell the grain with adequate margin will have the most difficult time surviving in the long term.

4.3.4.3 Core Strategy Analysis

This section will analyze the components of the core strategy, describing the current strategy and the recommended strategy for the grain industry in Michigan. A summary reference is illustrated at the end of the section.

Customer Value / Competitive Advantage

The current strategy of price/cost advantage has not allowed the grain industry in Michigan to grow. Decreasing numbers of elevators tell the analyst that the usefulness and profitability of some facilities is inadequate for customer needs and company viability.

In order to create customer value and competitive advantage, the grain industry will need to shift to a quality/features strategy. The quality/features advantage will be dominant in that it can help increase volume by providing services that other companies both in state and out of state may not or cannot offer. These are the marketing programs, contract alternatives, financial programs, marketing knowledge and accounting capabilities that can separate a company into an advantageous position of respect in their trade area.

Grain companies can choose to concentrate on a niche commodity as an advantage. This would be the ability to handle specialized commodities that others in and out of the state choose not to concentrate on. This shift in strategy is necessary in order to improve producer profitability.

Strategic Initiatives

The grain industry in Michigan is in a position where it should look at a strategy of growth, which will be needed to increase market share. The current strategy of retrenching has resulted in less elevators and stagnant volume, and the grain firms must recognize this in order to move forward.

Growth in services, marketing and contract alternatives or other innovative ideas can increase market penetration by acquiring new customers interested in new services or special commodities in order to maintain the amount of volume they currently have.

This new growth will help gain customers while the loss of medium sized farms continues. Repositioning with the current customer base may help maintain market share of existing customers, but growth is more far reaching, expanding market share by gaining new customers.

Strategic Scope

Currently the scope of the business is a single/dominant product which is basically handling the generic grades of grain. The grain industry will need to adopt a diversification strategy in order to gain competitive advantages over other grain belt producing states. They would remain in the grain handling business, but look for expanded opportunities in areas such as specialty grains adding associated services such as banking or grain futures brokerage, or by looking for acquisitions or partnerships in other parts of the state that could reduce the risk of weather reducing volume.

Industry Role

The grain companies in Michigan will need to remain the leaders. The most profitable companies will be those that have the capabilities to advance new ideas and initiate them into their facilities. The larger companies will have the knowledge and resources to start new strategies and give them time to work, but medium sized companies may also be leaders in innovative methods to increase volume. The handlers need to lead the changes in grain marketing and handling that will increase the chances for producers to be more profitable.

Vertical Coordination

More vertical coordination with the producers could create an assured supply of grain for the grain companies. An agreement where the producer receives a price per acre for production guaranteed to the grain firm might be one solution. A contract such as this would act to eliminate much of the risk of income for producers aside from the government payments. Vertical coordination and integration down the chain to end users such as livestock or food manufacturers and for export can help by having consistent outlets for grain and by reducing transaction costs as the grain moves down the chain.

More handler control in contracting grain could be less involved form of vertical coordination than acre contracts. By forming marketing agreements or by a closer relationship with larger producers, the handlers can move more gradually toward contract production. The need for a closer relationship would be advantageous for grain handlers and producers so that they can find ways to work together and to align vertically.

The Michigan grain industry is going to be more successful if they can source competitive sales markets and provide expertise in marketing and/or origination programs by being aligned with national and international organizations. The volume and expertise in Michigan alone will not be enough to compete with larger states.

Figure 4-i

Core Strategy Summary - Grain Industry

Core Strategy	Current	New
Customer Value/	Price/Cost	Quality/Features
Competitive Advantage	Advantage	Advantage
Strategic Initiative	Retrench	Grow
Strategic Scope	Single/ Dominant Product	Diversification
Industry Role	Leader	Leader
Vertical Coordination	Little	More

4.3.4.4 Action Strategies

The grain handlers and processors in Michigan are going to need to be more proactive and innovative in developing new alternatives for producers to market grain in order to maintain volume. The nature of the business in Michigan will require an extra effort to develop strategies that bring the companies closer to the producers.

The primary actions that may be taken are to contract acres for production, provide marketing alternatives that encourage producers to market all of their production through the company, develop specialty grain markets so that producers can increase margins, and developing programs that provide innovative services in the financial or farm advisory areas.

The pros of this strategy are that they bring the grain companies closer to the producers. This vertical coordination will be key in keeping market share and volume while the grain production as a whole is decreasing.

It will also diversify the income base, which would enable the elevators (companies) to concentrate on the most profitable areas of their operation depending on the year.

The cons of this multi-tasked strategy are that the expertise required to do all of these strategies at once may not be feasible for all companies. It will most likely lead to more concentration, particularly if the strategy is successful. The knowledge and financial capability required for this strategy means that the firm must have personnel that can organize and implement these programs.

There will be costs involved in these programs as well as risk. The firms that implement this strategy will need to carefully consider which strategy will be most important, and concentrate on them in order of anticipated net profit results and future opportunity and value. If projections show that profits are feasible only longer term, with short term start up costs above revenue, they may have to be implemented in stages versus a short period of time.

4.3.4.5 Evaluation

The goal for the grain handlers and processors is a multi-faceted strategy to improve profitability. This will be accomplished by increasing volume, at a profitable margin, by controlling costs and capturing revenue.

A record of the performance of the main product lines would be set up as follows for each program

- 1) generic grain
- 2) specialty grains
- 3) other services

For each program, records of bushel volume by commodity, revenue by commodity, and cost by commodity, which includes drying, discounts, contract costs, and total costs/total bushels to get the per unit costs will be necessary.

In general terms, the business should be evaluated using ratio analysis in addition to total profitability. Return to assets, total net income, and market share should also be monitored to be able to observe changes in overall results due to the strategies that are implemented.

The results should be analyzed and used to evaluate the overall operation as well as each individual program.

4.3.5 Summary and Conclusions

Understanding the environment that the Michigan grain industry finds itself helps in putting together a plan to maximize business opportunities.

Agricultural land in Michigan is decreasing, and lack of production income in grain farming is limiting the potential for future growth. It may be that grain production in Michigan has peaked.

In order for the grain industry to make acceptable income levels, some changes will need to be made in their current marketing strategy.

Increased vertical coordination with large grain producers would help handlers ensure volume. Recognition and actions to increase the amount of specialty grains handled would help diversify horizontally, and could help both producers and the elevators gain extra revenues and income. Handlers need to offer more services to provide more reasons for a producers to do business with them. A bundle of services could offer convenience and expertise in several key aspects of farming as an independent business.

In order for these changes in strategy to be implemented and then be successful, management of the companies must understand the importance of the need to shift focus. The strategies must be further analyzed so that the refined final version of the plan is workable. It should offer a good chance for long term success and it needs to be profitable.

After the strategies have been implemented, they should be evaluated and refined to increase total effectiveness.

The final result of analyzing and implementing a strategic plan should mean that the handlers and processors have successfully made changes that have increased profitability for producers and themselves.

Chapter Five

Summary and Conclusions

This chapter serves to summarize the study. It brings together the formal Industrial Organization and Strategic Management analysis with the author's experience in the grain industry. As stated in chapter one, consistent problems and consistent recommended solutions between the organizational and strategic studies mean that the solutions should be applicable and successful. The study abbreviated some aspects of each study to avoid redundancy. As it turns out, similarities between the two studies are more than a result of how they are organized. Organization and strategy are intertwined because the structure, conduct and performance of the market affects how firms can fit their strategies into the structure, how other firms may react to the strategies and what performance results might be expected in a market with the changes that may be implemented by a firm.

The conclusions and opinions expressed are a combination of the economic analysis with the author's interpretation of how the economic conditions will lead to a practical outcome. As stated in the problem statements and methods in chapter one, the goal of this research is that this study can bring together practical knowledge and theoretical knowledge in a way that is practical in its applications and sound in its economic conclusions.

5.1 Summary of the Industrial Organization Analysis

In the Industrial Organization analysis, the grain industry, first nationally and then specifically for Michigan, were studied. The effects of the organization of the grain industry on grain producers was then discussed.

Based on this analysis, the problems that recurred for the grain industry were lower revenues and slow or little growth potential. There has been consolidation and concentration

among grain handlers and processors, which has helped reduce competition and improve the possibility of increasing margins. But the reduction in production acres, the decrease in the number of medium sized farms and the increase in the size and number of large farms has counteracted the effects of consolidation.

The consolidation has left grain handlers and processors with facilities that are more efficient operationally. More of the remaining elevators can ship train load quantities, have more logistical capabilities as a whole, have more storage capacity, and are more likely to be associated with a large grain company (few small stand- alone independently owned operations), with resources available to operate the facilities with lower costs per bushel.

There has been a decrease in the total number of grain facilities, which should mean that there is more grain available for those surviving facilities to handle. But that is not necessarily the case.

The reduction in the number of acres farmed for grain production means that there is less grain available for the industry to handle. This trend means that even though consolidation has reduced the number of facilities, there may not be any more grain for each of the existing facilities to handle.

The reduction in the number of medium sized farms also changes the topography of competition. The medium sized farms are likely to have less on farm storage as a percent of production, less ability to haul grain long distances for a better bundle of services, and may not be as heavily burdened by debt. These farms are decreasing because the producers are older and may not be as interested in expansion, or may only be interested in maintaining a level of income that will allow them to get to retirement age before they sell out. These producers are more likely to take their grain to the local grain facility at harvest, and don't have enough quantity to exert enough market power to offer the grain at a higher price. They are the customers that have made the larger portion of the revenues for the grain industry for many years.

The increase in the number and size of the large producer results in these producers demanding more from grain handlers and processors. The larger producers have more storage capabilities to keep grain on the farm at harvest, when basis levels are at their low. They have enough quantities to offer to exert their market power and offer and most likely sell their grain at a higher price. They have more logistical capabilities, trucking their grain over longer distances in order to get a higher fob the farm price. They are also more focused on working the market for more value because their debt structure is heavier than other producers.

All of these producer factors mean that competition from other facilities may have decreased, but competition for maintaining the same or increasing grain volume, particularly from this growing class of larger grain producers has increased. This will force the grain industry to continue to look for ways to reorganize in order to increase efficiencies by garnering more volume.

There are several alternatives that can serve as solutions to this problem. The most prominent solutions are developing better capabilities for handling specialty grains, devising convenience products (associated services), developing more personalized marketing programs and having more direct communications with producers, increasing fob farm purchasing programs and finding innovative marketing programs to increase volume. The most dynamic solution would be contract farming, because of its potential in solving profitability problems for both producers and grain handlers and processors, and because of its societal implications.

In order to improve the performance of both grain producers and grain handlers and processors, tighter vertical coordination is needed. If the programs that are developed in the grain industry are designed to help the producer, and the if the producer makes an effort to utilize the marketing and service programs offered, both can achieve higher returns through increased efficiencies.

5.2 Summary of the Strategic Management Analysis

The Strategic Management approach analyzed and set plans for grain producers and then the grain industry in Michigan. Creating customer value, sustaining competitive advantages and achieving performance targets is the goal of the analysis.

If grain producing customers can increase their value to the grain handlers and processors, the industry will more intensely pursue the use of price, risk management, and associated services and develop marketing programs to draw those producers to their facilities. That value can be created by producers accepting innovative ideas in producing specialty grain crops, using their volume as market power, striving for better and more open communication with the industry, and gaining knowledge necessary to use more innovative marketing alternatives.

For the grain handlers and processors, creating value for customers can be accomplished by increasing specialty grain programs, which can pay premiums to standard grade commodities. They could use their expertise in markets to develop marketing programs for producers that can help them achieve a higher average price for their grain. Risk reduction for producers could be accomplished by contract farming, where the grain industry can use their knowledge to hedge risk more efficiently than producers. Providing an array of services such as financial, banking or credit, that could help producers save time and money could create loyalties that would bring grain volume with it.

The producer's competitive advantages include the varying soil types and a different climate in Michigan, which could help differentiate a special crop that may not grow as well or have the same characteristics in competing grain belt states or elsewhere. The producers are efficient in producing high yields. The grain producers in Michigan may also be more willing to diversify due to the variety of soils and the need for more revenue.

The grain handlers and processors in Michigan have the ability to handle grain quickly and efficiently, and have expertise in marketing grain in markets that are different than in other states. They have adequate storage facilities and are a good information source for their producer customers. They can provide additional services to help producers market grain and also to provide assorted services such as financial and insurance programs.

For producers to achieve their performance targets, the study points to raising more specialty crops and working on alliances with the industry to raise revenues and also to reduce risk.

The grain handlers and processor targets are to increase volume and keep costs down. They also can accomplish their goals by increasing their handling of specialty crops, forming alliances with producers that will guarantee more bushels, use their logistical advantages to bid competitively with competition from outside Michigan, and provide innovative services and marketing alternatives to increase market share.

Most of the strategies that were discussed would be enhanced by increased vertical coordination between the producer and the industry. They share common interests and would both be able to benefit from working more closely together. The biggest problem is trading the desire for independence for improved profitability.

5.3 Final Conclusions and Recommendation

One conclusion arrived at from the in-depth analysis of grain producers and the grain handlers and processors in Michigan is that tighter vertical coordination is needed.

These two groups of participants in the grain system should work together to increase production of specialty crops, provide services to each other to help increase utility for both, and begin the process of designing programs that lead to contract farming (through a process of industrialization).

At the end of all this analysis, the final and ultimate question, is what characteristics will prevail in Michigan grain production and utilization over the coming years? If our analysis is complete and the strategic plan for tighter vertical coordination works, Michigan grain production may decline, but at a slower rate. Grain producers will be more successful extracting margins from their business. The grain industry will adapt their approach to satisfy the needs of the end consumer, but fit it into what is functional for the producer.

There are three main strategies that are recommended to create coordination between the grain producer and the grain industry in Michigan. These are increasing the production of specialty grains, increasing services (both by the producer and the grain industry), and beginning the development of contract farming (industrialization).

If vertical coordination is beneficial, the final beneficiary is the end consumer, who will obtain a higher level of utility from the entire process. The end consumer will still have a low cost food or feed source that can satisfy all of the demands for health, variety, taste, etc. This satisfaction will be transferred up the chain all the way to the producer.

The production process and the grain industry functions in this chain required a study of how the system is organized and what strategies each part must recognize and implement to be successful. Both of these analyses point to more coordination as the key to achieving the goals. If coordination between each party in each transition is as efficient as it can be, then clearer lines are drawn as to what actions need to take place. In our study, the actions of the grain industry and grain producers will lead to production of crops that generate more income, and a handling system that gets these products to markets where, when and how they need to be for the next participant in the chain.

The study has covered substantial territory. It is hoped that the information included in the study can be used to help guide current and future participants to a greater understanding of problems and solutions, and help them initiate new thought processes about how the system can be improved.

The recommendations made in this study would benefit both producers and handlers of grain. Both could use a coordinated system to improve their profitability.

The study only analyzes two parts of the food chain, and the analysis looks at those parts through two techniques for understanding the many aspects of the system. While the study has generated some ideas for success of the participants in the system, it cannot pretend to be all inclusive.

It is hoped that the study has jarred some thoughts and created conversation that will bring criticism and hopefully consideration for solutions to the grain production system in Michigan.

The history of grain production in the state is extensive, and it has made several transitions during its course, which has allowed it success. To continue its viability in the long run, it must make another transition. Michigan cannot hope to be a powerhouse grain producing state, but it can offer the market some products, services and ideas for coordination that may be able to be used in other states years from now when they are also trying to deal with similar problems.

Further research into specialization of crops through genetic modification or through organics or somewhere in between that can be grown more exclusively in a climate, and with varying soil types such as Michigan will be important.

Implementation of marketing programs that can help producers reduce risk and increase revenues and profits needs to be suggested, and trials studied to see if there are ways to bring these objectives about. Again, coordination between grain producers, grain companies and university studies can work to advance new ideas.

Table 1 Corn, Soybean and Wheat Revenue Summary - 1990 - 2001 (Dollars per Acre)

		1990	1991	1992	1993	1994	1995
National	Corn Revenue	270.18	257.38	272.21	251.75	313.33	367.74
	Soybean Revenue	195.73	190.84	209.06	208.64	226.87	237.22
	Wheat Revenue	106.63	101.32	123.77	121.81	135.47	166.26
	Total Revenue	572.55	549.54	605.03	582.20	675.67	771.21
Michigan	Corn Revenue	254.15	257.40	204.75	270.60	260.91	368.00
	Soybean Revenue	213.94	209.76	182.49	240.16	200.91	260.80
	Wheat Revenue	132.00	122.12	172.48	124.64	172.25	246.00
	Total Revenue	600.09	589.28	559.72	635.40	634.07	874.80
	Total Variation	27.54	39.74	-45.31	53.20	-41.60	103.59
Ohio	Corn Revenue	280.72	238.08	294.58	282.70	309.97	401.72
	Soybean Revenue	226.59	204.84	226.00	243.96	239.69	254.60
	Wheat Revenue	162.00	143.57	162.18	152.36	178.06	241.56
	Total Revenue	669.31	586.49	682.76	679.02	727.72	897.88
	Total Variation	96.76	36.95	77.73	96.82	52.04	126.67
Indiana	Corn Revenue	297.99	225.40	307.23	331.32	324.00	381.94
	Soybean Revenue	238.21	221.52	241.23	290.26	259.91	265.84
	Wheat Revenue	147.68	108.80	159.50	144.56	185.44	237.60
	Total Revenue	683.88	555.72	707.96	766.14	769.35	885.38
	Total Variation	111.33	6.18	102.93	183.94	93.68	114.16
Illinois	Corn Revenue	299.72	263.22	314.39	334.10	354.12	372.90
	Soybean Revenue	228.15	213.75	244.67	279.07	255.26	268.32
	Wheat Revenue	132.00	81.92	177.12	123.64	170.24	190.61
	Total Revenue	659.87	558.89	736.18	736.81	779.62	831.83
	Total Variation	87.32	9.35	131.15	154.61	103.94	60.62
Iowa	Corn Revenue	278.46	269.10	294.00	195.20	337.44	393.60
	Soybean Revenue	233.65	223.16	243.76	196.54	274.22	292.60
	Wheat Revenue	123.30	81.60	118.95	50.00	148.05	141.75
	Total Revenue	635.41	573.86	656.71	441.74	759.71	827.95
	Total Variation	62.86	24.31	51.68	-140.46	84.03	56.74
Minnesota	Corn Revenue	269.08	266.40	217.74	158.20	316.66	373.66
	Soybean Revenue	216.45	197.47	176.64	142.14	214.80	266.90
	Wheat Revenue	73.80	101.52	121.80	82.80	94.54	182.49
	Total Revenue	559.33	565.39	516.18	383.14	626.00	823.05
	Total Variation	-13.22	15.84	-88.85	-199.06	-49.67	51.83
Nebraska	Corn Revenue	291.84	297.18	282.15	262.08	323.87	357.42
	Soybean Revenue	192.86	183.25	225.54	223.20	248.63	216.48
	Wheat Revenue	96.14	96.32	94.80	106.40	115.26	186.96
	Total Revenue	580.84	576.75	602.49	591.68	687.76	760.86
	Total Variation	8.29	27.20	-2.54	9.48	12.09	-10.35

Table 1 Corn, Soybean and Wheat Revenue Summary - 1990 - 2001 (Dollars per Acre)

		1996	1997	1998	1999	2000	2001	12 Year Average
National	Corn Revenue	344.44	307.88	260.74	243.52	253.27	276.40	284.90
	Soybean Revenue	276.36	251.68	191.78	169.46	172.97	170.28	208.41
	Wheat Revenue	160.64	144.06	118.19	109.46	112.20	119.63	126.62
	Total Revenue	781.44	703.62	570.70	522.44	538.44	566.31	619.93
Michigan	Corn Revenue	250.04	280.80	210.90	231.40	235.60	199.50	252.00
	Soybean Revenue	203.78	249.10	194.61	184.40	163.44	126.00	202.45
	Wheat Revenue	148.58	202.12	125.82	146.28	151.92	156.80	158.42
	Total Revenue	602.40	732.02	531.33	562.08	550.96	482.30	612.87
	Total Variation	-179.05	28.39	-39.37	39.64	12.52	-84.00	-7.06
Ohio	Corn Revenue	305.25	332.32	286.23	238.14	279.30	276.00	293.75
	Soybean Revenue	259.70	285.56	219.56	169.92	194.46	180.40	225.44
	Wheat Revenue	153.66	199.08	144.64	140.70	145.44	167.50	165.90
	Total Revenue	718.61	816.96	650.43	548.76	619.20	623.90	685.09
	Total Variation	-62.83	113.34	79.73	26.32	80.76	57.60	65.16
Indiana	Corn Revenue	341.94	308.66	289.07	248.16	279.30	304.20	303.27
	Soybean Revenue	278.92	286.67	212.10	183.69	212.06	215.60	242.17
	Wheat Revenue	154.28	184.44	129.80	140.58	145.59	158.40	158.06
	Total Revenue	775.14	779.77	630.97	572.43	636.95	678.20	703.49
	Total Variation	-6.30	76.14	60.27	49.99	98.51	111.90	83.56
Illinois	Corn Revenue	379.44	326.37	387.64	267.40	288.41	311.60	324.94
	Soybean Revenue	305.78	282.08	220.44	199.50	203.28	202.50	241.90
	Wheat Revenue	156.56	191.54	112.80	126.60	119.13	149.45	144.30
	Total Revenue	841.78	799.99	720.88	593.50	610.82	663.55	711.14
	Total Variation	60.33	96.37	150.18	71.06	72.38	97.25	91.21
Iowa	Corn Revenue	358.80	321.54	269.70	256.28	253.75	306.60	294.54
	Soybean Revenue	323.84	291.18	229.92	201.59	195.32	189.20	241.25
	Wheat Revenue	143.50	132.72	121.00	102.34	101.05	135.00	116.61
	Total Revenue	826.14	745.44	620.62	560.21	550.12	630.80	652.39
	Total Variation	44.70	41.82	49.92	37.77	11.68	64.50	32.46
Minnesota	Corn Revenue	308.75	283.80	261.63	240.00	247.95	240.50	265.36
	Soybean Revenue	275.88	241.80	195.30	185.64	179.58	153.55	203.85
	Wheat Revenue	153.36	103.04	65.07	66.00	109.48	75.40	102.44
	Total Revenue	737.99	628.64	522.00	491.64	537.01	469.45	571.65
	Total Variation	-43.45	-74.98	-48.70	-30.80	-1.43	-96.85	-48.28
Nebraska	Corn Revenue	377.52	306.24	272.60	243.25	239.40	294.00	295.63
	Soybean Revenue	323.55	254.34	212.52	189.98	168.72	191.10	219.18
	Wheat Revenue	150.15	118.40	116.84	105.60	93.96	103.60	115.37
	Total Revenue	851.22	678.98	601.96	538.83	502.08	588.70	630.18
	Total Variation	69.78	-24.64	31.26	16.39	-36.36	22.40	10.25

Table 1-1 Variations in Yield, Price and Revenue to National Averages - Corn - 1990 - 2001

State		1990	1991	1992	1993	1994	1995
National	Yield / acre	118.5	108.6	131.5	100.7	138.6	113.5
	Avg. Farm Price	2.28	2.37	2.07	2.5	2.26	3.24
	Revenue / acre	270.2	257.382	272.205	251.75	313.236	367.74
Michigan	Yield	115	110	105	110	117	115
	Variation	-3.5	1.4	-26.5	9.3	-21.6	1.5
	Avg. Price	2.21	2.34	1.95	2.46	2.23	3.2
	Variation	-0.07	-0.03	-0.12	-0.04	-0.03	-0.04
	Revenue	254.2	257.4	204.75	270.6	260.91	368
	Variation	-16	0.018	-67.455	18.85	-52.326	0.26
Ohio	Yield	121	96	143	110	139	121
	Variation	2.5	-12.6	11.5	9.3	0.4	7.5
	Avg. Price	2.32	2.48	2.06	2.57	2.23	3.32
	Variation	0.04	0.11	-0.01	0.07	-0.03	0.08
	Revenue	280.7	238.08	294.58	282.7	309.97	401.72
	Variation	10.54	-19.302	22.375	30.95	-3.266	33.98
Indiana	Yield	129	92	147	132	144	113
	Variation	10.5	-16.6	15.5	31.3	5.4	-0.5
	Avg. Price	2.31	2.45	2.09	2.51	2.25	3.38
	Variation	0.03	0.08	0.02	0.01	-0.01	0.14
	Revenue	298	225.4	307.23	331.32	324	381.94
	Variation	27.81	-31.982	35.025	79.57	10.764	14.2
Illinois	Yield	127	107	149	130	156	113
	Variation	8.5	-1.6	17.5	29.3	17.4	-0.5
	Avg. Price	2.36	2.46	2.11	2.57	2.27	3.3
	Variation	0.08	0.09	0.04	0.07	0.01	0.06
	Revenue	299.7	263.22	314.39	334.1	354.12	372.9
	Variation	29.54	5.838	42.185	82.35	40.884	5.16
Iowa	Yield	126	117	147	80	152	123
	Variation	7.5	8.4	15.5	-20.7	13.4	9.5
	Avg. Price	2.21	2.3	2	2.44	2.22	3.2
	Variation	-0.07	-0.07	-0.07	-0.06	-0.04	-0.04
	Revenue	278.5	269.1	294	195.2	337.44	393.6
	Variation	8.28	11.718	21.795	-56.55	24.204	25.86
Minnesota	Yield	124	120	114	70	142	119
	Variation	5.5	11.4	-17.5	-30.7	3.4	5.5
	Avg. Price	2.17	2.22	1.91	2.26	2.23	3.14
	Variation	-0.11	-0.15	-0.16	-0.24	-0.03	-0.1
	Revenue	269.1	266.4	217.74	158.2	316.66	373.66
	Variation	-1.1	9.018	-54.465	-93.55	3.424	5.92
Nebraska	Yield	128	127	135	104	139	111
	Variation	9.5	18.4	3.5	3.3	0.4	-2.5
	Avg. Price	2.28	2.34	2.09	2.52	2.33	3.22
	Variation	0	-0.03	0.02	0.02	0.07	-0.02
	Revenue	291.8	297.18	282.15	262.08	323.87	357.42
	Variation	21.66	39.798	9.945	10.33	10.634	-10.32

Source: National Agricultural Statistical Service

Table 1-1		Variations to National Averages - Corn - 1990-2001					
State		1996	1997	1998	1999	2000	2001
National	Yield / acre	127.1	126.7	134.4	133.8	136.9	138.2
	Avg. Farm Price	2.71	2.43	1.94	1.82	1.85	2
	Revenue / acre	344.4	307.881	260.736	243.516	253.265	276.4
Michigan	Yield	94	117	111	130	124	105
	Variation	-33.1	-9.7	-23.4	-3.8	-12.9	-33.2
	Avg. Price	2.66	2.4	1.9	1.78	1.9	1.9
	Variation	-0.05	-0.03	-0.04	-0.04	0.05	-0.1
	Revenue	250	280.8	210.9	231.4	235.6	199.5
	Variation	-94.4	-27.081	-49.836	-12.116	-17.665	-76.9
Ohio	Yield	111	134	141	126	147	138
	Variation	-16.1	7.3	6.6	-7.8	10.1	-0.2
	Avg. Price	2.75	2.48	2.03	1.89	1.9	2
	Variation	0.04	0.05	0.09	0.07	0.05	0
	Revenue	305.3	332.32	286.23	238.14	279.3	276
	Variation	-39.2	24.439	25.494	-5.376	26.035	-0.4
Indiana	Yield	123	122	137	132	147	156
	Variation	-4.1	-4.7	2.6	-1.8	10.1	17.8
	Avg. Price	2.78	2.53	2.11	1.88	1.9	1.95
	Variation	0.07	0.1	0.17	0.06	0.05	-0.05
	Revenue	341.9	308.66	289.07	248.16	279.3	304.2
	Variation	-2.5	0.779	28.334	4.644	26.035	27.8
Illinois	Yield	136	129	141	140	151	152
	Variation	8.9	2.3	6.6	6.2	14.1	13.8
	Avg. Price	2.79	2.53	2.04	1.91	1.91	2.05
	Variation	0.08	0.1	0.1	0.09	0.06	0.05
	Revenue	379.4	326.37	287.64	267.4	288.41	311.6
	Variation	35	18.489	26.904	23.884	35.145	35.2
Iowa	Yield	138	138	145	149	145	146
	Variation	10.9	11.3	10.6	15.2	8.1	7.8
	Avg. Price	2.6	2.33	1.86	1.72	1.75	2.1
	Variation	-0.11	-0.1	-0.08	-0.1	-0.1	0.1
	Revenue	358.8	321.54	269.7	256.28	253.75	306.6
	Variation	14.36	13.659	8.964	12.764	0.485	30.2
Minnesota	Yield	125	132	153	150	145	130
	Variation	-2.1	5.3	18.6	16.2	8.1	-8.2
	Avg. Price	2.47	2.15	1.71	1.6	1.71	1.85
	Variation	-0.24	-0.28	-0.23	-0.22	-0.14	-0.15
	Revenue	308.8	283.8	261.63	240	247.95	240.5
	Variation	-35.7	-24.081	0.894	-3.516	-5.315	-35.9
Nebraska	Yield	143	132	145	139	126	147
	Variation	15.9	5.3	10.6	5.2	-10.9	8.8
	Avg. Price	2.64	2.32	1.88	1.75	1.9	2
	Variation	-0.07	-0.11	-0.06	-0.07	0.05	0
	Revenue	377.5	306.24	272.6	243.25	239.4	294
	Variation	33.08	-1.641	11.864	-0.266	-13.865	17.6

Table 1-1

Variations to National Averages - Corn - 1990 - 2001

State			
National	Yield / acre	125.71	Avg. Yield
	Avg. Farm Price	2.29	Avg. Price
	Revenue / acre	284.89	Avg. Revenue
Michigan	Yield	112.75	Avg. Yield
	Variation	-12.96	Avg. Yield variation
	Avg. Price	2.24	Avg. Price
	Variation	-0.05	Avg. Price variation
	Revenue	252.00	Avg. Revenue
	Variation	-32.89	Avg. Revenue variation
Ohio	Yield	127.25	Avg. Yield
	Variation	1.54	Avg. Yield variation
	Avg. Price	2.34	Avg. Price
	Variation	0.05	Avg. Price variation
	Revenue	293.75	Avg. Revenue
	Variation	8.86	Avg. Revenue variation
Indiana	Yield	131.17	Avg. Yield
	Variation	5.46	Avg. Yield variation
	Avg. Price	2.35	Avg. Price
	Variation	0.06	Avg. Price variation
	Revenue	303.27	Avg. Revenue
	Variation	18.37	Avg. Revenue variation
Illinois	Yield	135.92	Avg. Yield
	Variation	10.21	Avg. Yield variation
	Avg. Price	2.36	Avg. Price
	Variation	0.07	Avg. Price variation
	Revenue	316.61	Avg. Revenue
	Variation	31.71	Avg. Revenue variation
Iowa	Yield	133.83	Avg. Yield
	Variation	8.13	Avg. Yield variation
	Avg. Price	2.23	Avg. Price
	Variation	-0.06	Avg. Price variation
	Revenue	294.54	Avg. Revenue
	Variation	9.64	Avg. Revenue variation
Minnesota	Yield	127.00	Avg. Yield
	Variation	1.29	Avg. Yield variation
	Avg. Price	2.12	Avg. Price
	Variation	-0.17	Avg. Price variation
	Revenue	265.36	Avg. Revenue
	Variation	-19.53	Avg. Revenue variation
Nebraska	Yield	131.33	Avg. Yield
	Variation	5.63	Avg. Yield variation
	Avg. Price	2.27	Avg. Price
	Variation	-0.02	Avg. Price variation
	Revenue	295.63	Avg. Revenue
	Variation	10.73	Avg. Revenue variation

Table 1-2 Variations -Yield, Price and Revenue to National Averages - Soybeans 1990-2001

		1990	1991	1992	1993	1994	1995
National	Yield / acre	34.1	34.2	37.6	32.6	41.4	35.3
	Avg. Farm Price	5.74	5.58	5.56	6.4	5.48	6.72
	Revenue / acre	195.73	190.836	209.056	208.64	226.872	237.216
State							
Michigan	Yield	38	38	33	38	37	40
	Variation	3.9	3.8	-4.6	5.4	-4.4	4.7
	Avg. Price	5.63	5.52	5.53	6.32	5.43	6.52
	Variation	-0.11	-0.06	-0.03	-0.08	-0.05	-0.2
	Revenue	213.94	209.76	182.49	240.16	200.91	260.8
	Variation	18.206	18.924	-26.566	31.52	-25.962	23.584
Ohio	Yield	39	36	40	38	43.5	38
	Variation	4.9	1.8	2.4	5.4	2.1	2.7
	Avg. Price	5.81	5.69	5.65	6.42	5.51	6.7
	Variation	0.07	0.11	0.09	0.02	0.03	-0.02
	Revenue	226.59	204.84	226	243.96	239.685	254.6
	Variation	30.856	14.004	16.944	35.32	12.813	17.384
Indiana	Yield	41	39	43	46	47	39.5
	Variation	6.9	4.8	5.4	13.4	5.6	4.2
	Avg. Price	5.81	5.68	5.61	6.31	5.53	6.73
	Variation	0.07	0.1	0.05	-0.09	0.05	0.01
	Revenue	238.21	221.52	241.23	290.26	259.91	265.835
	Variation	42.476	30.684	32.174	81.62	33.038	28.619
Illinois	Yield	39	37.5	43	43	45.5	39
	Variation	4.9	3.3	5.4	10.4	4.1	3.7
	Avg. Price	5.85	5.7	5.69	6.49	5.61	6.88
	Variation	0.11	0.12	0.13	0.09	0.13	0.16
	Revenue	228.15	213.75	244.67	279.07	255.255	268.32
	Variation	32.416	22.914	35.614	70.43	28.383	31.104
Iowa	Yield	41.5	40.5	44	31	50.5	44
	Variation	7.4	6.3	6.4	-1.6	9.1	8.7
	Avg. Price	5.63	5.51	5.54	6.34	5.43	6.65
	Variation	-0.11	-0.07	-0.02	-0.06	-0.05	-0.07
	Revenue	233.65	223.155	243.76	196.54	274.215	292.6
	Variation	37.911	32.319	34.704	-12.1	47.343	55.384
Minnesota	Yield	39	36.5	32	23	40	40.5
	Variation	4.9	2.3	-5.6	-9.6	-1.4	5.2
	Avg. Price	5.55	5.41	5.52	6.18	5.37	6.59
	Variation	-0.19	-0.17	-0.04	-0.22	-0.11	-0.13
	Revenue	216.45	197.465	176.64	142.14	214.8	266.895
	Variation	20.716	6.629	-32.416	-66.5	-12.072	29.679
Nebraska	Yield	34.5	33.5	42	36	47	33
	Variation	0.4	-0.7	4.4	3.4	5.6	-2.3
	Avg. Price	5.59	5.47	5.37	6.2	5.29	6.56
	Variation	-0.15	-0.11	-0.19	-0.2	-0.19	-0.16
	Revenue	192.86	183.245	225.54	223.2	248.63	216.48
	Variation	-2.879	-7.591	16.484	14.56	21.758	-20.736

Source: National Agricultural Statistical Service

Table 1-2 Variations to National Averages - Soybeans - 1990 - 2001

		1996	1997	1998	1999	2000	2001
National	Yield / acre	37.6	38.9	38.9	36.6	38.1	39.6
	Avg. Farm Price	7.35	6.47	4.93	4.63	4.54	4.3
	Revenue / acre	276.36	251.683	191.777	169.458	172.974	170.28
State							
Michigan	Yield	28.5	38.5	39	40	36	30
	Variation	-9.1	-0.4	0.1	3.4	-2.1	-9.6
	Avg. Price	7.15	6.47	4.99	4.61	4.54	4.2
	Variation	-0.2	0	0.06	-0.02	0	-0.1
	Revenue	203.775	249.095	194.61	184.4	163.44	126
	Variation	-72.585	-2.588	2.833	14.942	-9.534	-44.28
Ohio	Yield	35	44	44	36	42	41
	Variation	-2.6	5.1	5.1	-0.6	3.9	1.4
	Avg. Price	7.42	6.49	4.99	4.72	4.63	4.4
	Variation	0.07	0.02	0.06	0.09	0.09	0.1
	Revenue	259.7	285.56	219.56	169.92	194.46	180.4
	Variation	-16.66	33.877	27.783	0.462	21.486	10.12
Indiana	Yield	38	43.5	42	39	46	49
	Variation	0.4	4.6	3.1	2.4	7.9	9.4
	Avg. Price	7.34	6.59	5.05	4.71	4.61	4.4
	Variation	-0.01	0.12	0.12	0.08	0.07	0.1
	Revenue	278.92	286.665	212.1	183.69	212.06	215.6
	Variation	2.56	34.982	20.323	14.232	39.086	45.32
Illinois	Yield	40.5	43	44	42	44	45
	Variation	2.9	4.1	5.1	5.4	5.9	5.4
	Avg. Price	7.55	6.56	5.01	4.75	4.62	4.5
	Variation	0.2	0.09	0.08	0.12	0.08	0.2
	Revenue	305.775	282.08	220.44	199.5	203.28	202.5
	Variation	29.415	30.397	28.663	30.042	30.306	32.22
Iowa	Yield	44	46	48	44.5	43.5	44
	Variation	6.4	7.1	9.1	7.9	5.4	4.4
	Avg. Price	7.36	6.33	4.79	4.53	4.49	4.3
	Variation	0.01	-0.14	-0.14	-0.1	-0.05	0
	Revenue	323.84	291.18	229.92	201.585	195.315	189.2
	Variation	47.48	39.497	38.143	32.127	22.341	18.92
Minnesota	Yield	38	39	42	42	41	37
	Variation	0.4	0.1	3.1	5.4	2.9	-2.6
	Avg. Price	7.26	6.2	4.65	4.42	4.38	4.15
	Variation	-0.09	-0.27	-0.28	-0.21	-0.16	-0.15
	Revenue	275.88	241.8	195.3	185.64	179.58	153.55
	Variation	-0.48	-9.883	3.523	16.182	6.606	-16.73
Nebraska	Yield	45	40.5	44	42.5	38	45.5
	Variation	7.4	1.6	5.1	5.9	-0.1	5.9
	Avg. Price	7.19	6.28	4.83	4.47	4.44	4.2
	Variation	-0.16	-0.19	-0.1	-0.16	-0.1	-0.1
	Revenue	323.55	254.34	212.52	189.975	168.72	191.1
	Variation	47.19	2.657	20.743	20.517	-4.254	20.82

Table 1-2 Variations to National Averages - Soybeans - 1990 - 2001

National	Yield / acre	19.14	Avg. Yield
	Avg. Farm Price	2.69	Avg. Price
	Revenue / acre	102.71	Avg. Revenue
State			
Michigan	Yield	17.67	Avg. Yield
	Variation	-1.48	Avg. Yield variation
	Avg. Price	2.66	Avg. Price
	Variation	-0.02	Avg. Price variation
	Revenue	93.44	Avg. Revenue
	Variation	-9.27	Avg. Revenue variation
Ohio	Yield	20.17	Avg. Yield
	Variation	1.03	Avg. Yield variation
	Avg. Price	2.72	Avg. Price
	Variation	0.04	Avg. Price variation
	Revenue	109.13	Avg. Revenue
	Variation	6.42	Avg. Revenue variation
Indiana	Yield	21.46	Avg. Yield
	Variation	2.32	Avg. Yield variation
	Avg. Price	2.73	Avg. Price
	Variation	0.04	Avg. Price variation
	Revenue	115.75	Avg. Revenue
	Variation	13.04	Avg. Revenue variation
Illinois	Yield	21.54	Avg. Yield
	Variation	2.40	Avg. Yield variation
	Avg. Price	2.75	Avg. Price
	Variation	0.06	Avg. Price variation
	Revenue	117.80	Avg. Revenue
	Variation	15.09	Avg. Revenue variation
Iowa	Yield	22.50	Avg. Yield
	Variation	3.36	Avg. Yield variation
	Avg. Price	2.65	Avg. Price
	Variation	-0.03	Avg. Price variation
	Revenue	119.25	Avg. Revenue
	Variation	16.54	Avg. Revenue variation
Minnesota	Yield	19.92	Avg. Yield
	Variation	0.78	Avg. Yield variation
	Avg. Price	2.59	Avg. Price
	Variation	-0.10	Avg. Price variation
	Revenue	102.65	Avg. Revenue
	Variation	-0.07	Avg. Revenue variation
Nebraska	Yield	21.29	Avg. Yield
	Variation	2.15	Avg. Yield variation
	Avg. Price	2.62	Avg. Price
	Variation	-0.07	Avg. Price variation
	Revenue	111.68	Avg. Revenue
	Variation	8.97	Avg. Revenue variation

Table 1-3 Variations in Yield, Price and Revenue to National Averages - Wheat - 1990-2001

		1990	1991	1992	1993	1994	1995
National	Yield / acre	40.7	34.7	38.2	40.2	40.2	37.7
	Avg. Farm Price	2.62	2.92	3.24	3.03	3.37	4.41
	Revenue / acre	106.634	101.324	123.768	121.806	135.474	166.257
State							
Michigan	Yield	55	43	56	41	53	60
	Variation	14.3	8.3	17.8	0.8	12.8	22.3
	Avg. Price	2.4	2.84	3.08	3.04	3.25	4.1
	Variation	-0.22	-0.08	-0.16	0.01	-0.12	-0.31
	Revenue	132	122.12	172.48	124.64	172.25	246
	Variation	25.366	20.796	48.712	2.834	36.776	79.743
Ohio	Yield	60	49	53	52	58	61
	Variation	19.3	14.3	14.8	11.8	17.8	23.3
	Avg. Price	2.7	2.93	3.06	2.93	3.07	3.96
	Variation	0.08	0.01	-0.18	-0.1	-0.3	-0.45
	Revenue	162	143.57	162.18	152.36	178.06	241.56
	Variation	55.366	42.246	38.412	30.554	42.586	75.303
Indiana	Yield	52	40	50	52	61	60
	Variation	11.3	5.3	11.8	11.8	20.8	22.3
	Avg. Price	2.84	2.72	3.19	2.78	3.04	3.96
	Variation	0.22	-0.2	-0.05	-0.25	-0.33	-0.45
	Revenue	147.68	108.8	159.5	144.56	185.44	237.6
	Variation	41.046	7.476	35.732	22.754	49.966	71.343
Illinois	Yield	48	32	54	44	56	49
	Variation	7.3	-2.7	15.8	3.8	15.8	11.3
	Avg. Price	2.75	2.56	3.28	2.81	3.04	3.89
	Variation	0.13	-0.36	0.04	-0.22	-0.33	-0.52
	Revenue	132	81.92	177.12	123.64	170.24	190.61
	Variation	25.366	-19.404	53.352	1.834	34.766	24.353
Iowa	Yield	45	34	39	25	47	35
	Variation	4.3	-0.7	0.8	-15.2	6.8	-2.7
	Avg. Price	2.74	2.4	3.05	2	3.15	4.05
	Variation	0.12	-0.52	-0.19	-1.03	-0.22	-0.36
	Revenue	123.3	81.6	118.95	50	148.05	141.75
	Variation	16.666	-19.724	-4.818	-71.806	12.576	-24.507
Minnesota	Yield	30	36	42	30	29	33
	Variation	-10.7	1.3	3.8	-10.2	-11.2	-4.7
	Avg. Price	2.46	2.82	2.9	2.76	3.26	5.53
	Variation	-0.16	-0.1	-0.34	-0.27	-0.11	1.12
	Revenue	73.8	101.52	121.8	82.8	94.54	182.49
	Variation	-32.834	0.196	-1.968	-39.006	-40.934	16.233
Nebraska	Yield	38	32	30	35	34	41
	Variation	-2.7	-2.7	-8.2	-5.2	-6.2	3.3
	Avg. Price	2.53	3.01	3.16	3.04	3.39	4.56
	Variation	-0.09	0.09	-0.08	0.01	0.02	0.15
	Revenue	96.14	96.32	94.8	106.4	115.26	186.96
	Variation	-10.494	-5.004	-28.968	-15.406	-20.214	20.703

Source: National Agricultural Statistical Service 196

Table 1-3 Variations to National Averages - Wheat - 1990 - 2001

		1996	1997	1998	1999	2000	2001
National	Yield / acre	37.1	44.6	46.9	47.8	44.7	43.5
	Avg. Farm Price	4.33	3.23	2.52	2.29	2.51	2.75
	Revenue / acre	160.643	144.058	118.188	109.462	112.197	119.625
State							
Michigan	Yield	38	62	54	69	72	64
	Variation	0.9	17.4	7.1	21.2	27.3	20.5
	Avg. Price	3.91	3.26	2.33	2.12	2.11	2.45
	Variation	-0.42	0.03	-0.19	-0.17	-0.4	-0.3
	Revenue	148.58	202.12	125.82	146.28	151.92	156.8
	Variation	-12.063	58.062	7.632	36.818	39.723	37.175
Ohio	Yield	39	63	64	70	72	67
	Variation	1.9	18.4	17.1	22.2	27.3	23.5
	Avg. Price	3.94	3.16	2.26	2.01	2.02	2.5
	Variation	-0.39	-0.07	-0.26	-0.28	-0.49	-0.25
	Revenue	153.66	199.08	144.64	140.7	145.44	167.5
	Variation	-6.983	55.022	26.452	31.238	33.243	47.875
Indiana	Yield	38	58	55	66	69	66
	Variation	0.9	13.4	8.1	18.2	24.3	22.5
	Avg. Price	4.06	3.18	2.36	2.13	2.11	2.4
	Variation	-0.27	-0.05	-0.16	-0.16	-0.4	-0.35
	Revenue	154.28	184.44	129.8	140.58	145.59	158.4
	Variation	-6.363	40.382	11.612	31.118	33.393	38.775
Illinois	Yield	38	61	48	60	57	61
	Variation	0.9	16.4	1.1	12.2	12.3	17.5
	Avg. Price	4.12	3.14	2.35	2.11	2.09	2.45
	Variation	-0.21	-0.09	-0.17	-0.18	-0.42	-0.3
	Revenue	156.56	191.54	112.8	126.6	119.13	149.45
	Variation	-4.083	47.482	-5.388	17.138	6.933	29.825
Iowa	Yield	35	42	44	43	47	54
	Variation	-2.1	-2.6	-2.9	-4.8	2.3	10.5
	Avg. Price	4.1	3.16	2.75	2.38	2.15	2.5
	Variation	-0.23	-0.07	0.23	0.09	-0.36	-0.25
	Revenue	143.5	132.72	121	102.34	101.05	135
	Variation	-17.143	-11.338	2.812	-7.122	-11.147	15.375
Minnesota	Yield	36	32	27	30	46	29
	Variation	-1.1	-12.6	-19.9	-17.8	1.3	-14.5
	Avg. Price	4.26	3.22	2.41	2.2	2.38	2.6
	Variation	-0.07	-0.01	-0.11	-0.09	-0.13	-0.15
	Revenue	153.36	103.04	65.07	66	109.48	75.4
	Variation	-7.283	-41.018	-53.118	-43.462	-2.717	-44.225
Nebraska	Yield	35	37	46	48	36	37
	Variation	-2.1	-7.6	-0.9	0.2	-8.7	-6.5
	Avg. Price	4.29	3.2	2.54	2.2	2.61	2.8
	Variation	-0.04	-0.03	0.02	-0.09	0.1	0.05
	Revenue	150.15	118.4	116.84	105.6	93.96	103.6
	Variation	-10.493	-25.658	-1.348	-3.862	-18.237	-16.025

Table 1-3 Variations to National Averages - Wheat - 1990 - 2001

National	Yield / acre	41.36	Avg. Yield
	Avg. Farm Price	3.10	Avg. Price
	Revenue / acre	126.62	Avg. Revenue
State			
Michigan	Yield	55.58	Avg. Yield
	Variation	14.23	Avg. Yield variation
	Avg. Price	2.91	Avg. Price
	Variation	-0.19	Avg. Price variation
	Revenue	158.42	Avg. Revenue
	Variation	31.80	Avg. Revenue variation
Ohio	Yield	59.00	Avg. Yield
	Variation	17.64	Avg. Yield variation
	Avg. Price	2.88	Avg. Price
	Variation	-0.22	Avg. Price variation
	Revenue	165.90	Avg. Revenue
	Variation	39.28	Avg. Revenue variation
Indiana	Yield	55.58	Avg. Yield
	Variation	14.23	Avg. Yield variation
	Avg. Price	2.90	Avg. Price
	Variation	-0.20	Avg. Price variation
	Revenue	158.06	Avg. Revenue
	Variation	31.44	Avg. Revenue variation
Illinois	Yield	50.67	Avg. Yield
	Variation	9.31	Avg. Yield variation
	Avg. Price	2.88	Avg. Price
	Variation	-0.22	Avg. Price variation
	Revenue	144.30	Avg. Revenue
	Variation	17.68	Avg. Revenue variation
Iowa	Yield	40.83	Avg. Yield
	Variation	-0.53	Avg. Yield variation
	Avg. Price	2.87	Avg. Price
	Variation	-0.23	Avg. Price variation
	Revenue	116.61	Avg. Revenue
	Variation	-10.01	Avg. Revenue variation
Minnesota	Yield	33.33	Avg. Yield
	Variation	-8.03	Avg. Yield variation
	Avg. Price	3.07	Avg. Price
	Variation	-0.04	Avg. Price variation
	Revenue	102.44	Avg. Revenue
	Variation	-24.18	Avg. Revenue variation
Nebraska	Yield	37.42	Avg. Yield
	Variation	-3.94	Avg. Yield variation
	Avg. Price	3.11	Avg. Price
	Variation	0.01	Avg. Price variation
	Revenue	115.37	Avg. Revenue
	Variation	-11.25	Avg. Revenue variation

Table 2 Production Percentages of Corn, Soybeans and Wheat for States
(In Millions of Bushels)

Year	1990	1991	1992	1993	1994	1995
Corn						
National	7934	7475	9477	6336	10103	7374
Michigan	238	253	242	226	255	250
% of total	3.00%	3.38%	2.55%	3.57%	2.52%	3.39%
Ohio	417	326	508	361	487	375
% of total	5.26%	4.36%	5.36%	5.70%	4.82%	5.09%
Indiana	703	511	878	713	858	599
% of total	8.86%	6.84%	9.26%	11.25%	8.49%	8.12%
Illinois	1321	1177	1646	1300	1786	1130
% of total	16.65%	15.75%	17.37%	20.52%	17.68%	15.32%
Iowa	1562	1427	1904	880	1915	1427
% of total	19.69%	19.09%	20.09%	13.89%	18.95%	19.35%
Minnesota	763	720	741	322	916	732
% of total	9.62%	9.63%	7.82%	5.08%	9.07%	9.93%
Nebraska	934	991	1067	785	1147	855
% of total	11.77%	13.26%	11.26%	12.39%	11.35%	11.59%
Year	1990	1991	1992	1993	1994	1995
Soybeans						
National	1926	1987	2190	1871	2517	2177
Michigan	43	53	48	55	57	60
% of total	2.23%	2.67%	2.19%	2.94%	2.26%	2.76%
Ohio	136	136	147	156	174	153
% of total	7.06%	6.84%	6.71%	8.34%	6.91%	7.03%
Indiana	171	173	194	223	215	197
% of total	8.88%	8.71%	8.86%	11.92%	8.54%	9.05%
Illinois	355	341	405	387	429	378
% of total	18.43%	17.16%	18.49%	20.68%	17.04%	17.36%
Iowa	328	350	359	257	443	407
% of total	17.03%	17.61%	16.39%	13.74%	17.60%	18.70%
Minnesota	179	195	173	115	224	235
% of total	9.29%	9.81%	7.90%	6.15%	8.90%	10.79%
Nebraska	81	82	103	90	134	101
% of total	4.21%	4.13%	4.70%	4.81%	5.32%	4.64%

Source: National Agricultural Statistics Service 199

Table 2 Production Percentages of Corn, Soybeans and Wheat for States
(In Millions of Bushels)

Year	1990	1991	1992	1993	1994	1995
Wheat						
National	2730	1980	2467	2396	2321	2183
Michigan	41	24	35	22	31	37
% of total	1.50%	1.21%	1.42%	0.92%	1.34%	1.69%
Ohio	80	53	59	53	68	74
% of total	2.93%	2.68%	2.39%	2.21%	2.93%	3.39%
Indiana	50	29	25	35	38	40
% of total	1.83%	1.46%	1.01%	1.46%	1.64%	1.83%
Illinois	89	45	62	68	50	68
% of total	3.26%	2.27%	2.51%	2.84%	2.15%	3.11%
Iowa	3	2	2	1	2	1
% of total	0.11%	0.10%	0.08%	0.04%	0.09%	0.05%
Minnesota	139	67	140	71	71	72
% of total	5.09%	3.38%	5.67%	2.96%	3.06%	3.30%
Nebraska	86	67	56	74	71	86
% of total	3.15%	3.38%	2.27%	3.09%	3.06%	3.94%

Table 2 Production Percentages of Corn, Soybeans and Wheat for States
(In Millions of Bushels)

Year	1996	1997	1998	1999	2000	2001	Average
Corn							
National	9233	9207	9759	9431	9968	9507	8817.00
Michigan	212	255	228	254	244	200	238.08
% of total	2.30%	2.77%	2.34%	2.69%	2.45%	2.10%	2.76%
Ohio	311	476	471	403	485	437	421.42
% of total	3.37%	5.17%	4.83%	4.27%	4.87%	4.60%	4.81%
Indiana	670	702	760	748	816	885	736.92
% of total	7.26%	7.62%	7.79%	7.93%	8.19%	9.31%	8.41%
Illinois	1469	1425	1473	1491	1669	1649	1461.33
% of total	15.91%	15.48%	15.09%	15.81%	16.74%	17.35%	16.64%
Iowa	1711	1642	1769	1758	1740	1664	1616.58
% of total	18.53%	17.83%	18.13%	18.64%	17.46%	17.50%	18.26%
Minnesota	869	851	1033	990	957	806	808.33
% of total	9.41%	9.24%	10.59%	10.50%	9.60%	8.48%	9.08%
Nebraska	1180	1135	1240	1154	1014	1139	1053.42
% of total	12.78%	12.33%	12.71%	12.24%	10.17%	11.98%	11.99%
Year	1996	1997	1998	1999	2000	2001	Average
Soybeans							
National	2380	2689	2741	2654	2758	2891	2398.42
Michigan	47	72	74	78	73	64	60.33
% of total	1.97%	2.68%	2.70%	2.94%	2.65%	2.21%	2.52%
Ohio	157	191	193	162	186	188	164.92
% of total	6.60%	7.10%	7.04%	6.10%	6.74%	6.50%	6.92%
Indiana	204	231	231	216	252	274	215.08
% of total	8.57%	8.59%	8.43%	8.14%	9.14%	9.48%	9.02%
Illinois	399	428	464	443	460	478	413.92
% of total	16.76%	15.92%	16.93%	16.69%	16.68%	16.53%	17.39%
Iowa	416	478	497	478	465	480	413.17
% of total	17.48%	17.78%	18.13%	18.01%	16.86%	16.60%	17.16%
Minnesota	224	255	286	290	293	266	227.92
% of total	9.41%	9.48%	10.43%	10.93%	10.62%	9.20%	9.41%
Nebraska	135	144	165	181	174	223	134.42
% of total	5.67%	5.36%	6.02%	6.82%	6.31%	7.71%	5.47%

Table 2 Production Percentages of Corn, Soybeans and Wheat for States
(In Millions of Bushels)

Year	1996	1997	1998	1999	2000	2001	Average
Wheat							
National	2277	2481	2547	2299	2232	1958	2322.58
Michigan	23	32	31	41	36	36	32.42
% of total	1.01%	1.29%	1.22%	1.78%	1.61%	1.84%	1.40%
Ohio	52	69	74	72	80	60	66.17
% of total	2.28%	2.78%	2.91%	3.13%	3.58%	3.06%	2.86%
Indiana	27	37	36	34	35	25	34.25
% of total	1.19%	1.49%	1.41%	1.48%	1.57%	1.28%	1.47%
Illinois	42	66	58	61	52	44	58.75
% of total	1.84%	2.66%	2.28%	2.65%	2.33%	2.25%	2.51%
Iowa	2	1	1	1	1	1	1.50
% of total	0.09%	0.04%	0.04%	0.04%	0.04%	0.05%	0.06%
Minnesota	107	77	80	79	97	80	90.00
% of total	4.70%	3.10%	3.14%	3.44%	4.35%	4.09%	3.86%
Nebraska	74	70	83	82	59	59	72.25
% of total	3.25%	2.82%	3.26%	3.57%	2.64%	3.01%	3.12%

Table 3 Total Farm Production Expenses				
State		1987	1992	1997
Michigan		Census	Census	Census
	Total Production Expense Dollars (in 000's)	\$2,211,823	\$2,583,189	\$2,835,658
	Total Cropland Acres	8,181,320	8,156,388	7,891,802
	Expense Dollars / Acre	\$270	\$316	\$359
	Average Net Cash Return / Farm	\$6,252	\$9,257	\$14,919
Ohio	Total Production Expense Dollars (in 000's)	\$2,730,026	\$3,119,014	\$3,608,883
	Total Cropland Acres	11,920,433	11,528,727	11,340,967
	Expense Dollars / Acre	\$229	\$270	\$318
	Average Net Cash Return / Farm	\$8,645	\$11,133	\$15,152
Indiana	Total Production Expense Dollars (in 000's)	\$3,178,679	\$3,645,379	\$4,011,772
	Total Cropland Acres	13,592,873	13,366,034	12,848,950
	Expense Dollars / Acre	\$234	\$272	\$312
	Average Net Cash Return / Farm	\$12,533	\$15,324	\$20,089
Illinois	Total Production Expense Dollars (in 000's)	\$4,557,450	\$5,088,894	\$5,542,904
	Total Cropland Acres	25,102,092	24,164,457	23,920,923
	Expense Dollars / Acre	182	211	232
	Average Net Cash Return / Farm	19495	27954	37365
Iowa	Total Production Expense Dollars (in 000's)	\$6,647,645	\$7,744,947	\$8,405,838
	Total Cropland Acres	27,290,868	27,195,676	26,821,844
	Expense Dollars / Acre	\$243	\$285	\$313
	Average Net Cash Return / Farm	\$20,412	\$22,718	\$32,705
Minnesota	Total Production Expense Dollars (in 000's)	\$4,427,445	\$5,244,708	\$6,362,110
	Total Cropland Acres	21,876,066	21,387,063	21,491,743
	Expense Dollars / Acre	\$202	\$245	\$296
	Average Net Cash Return / Farm	\$14,503	\$16,209	\$25,015
Nebraska	Total Production Expense Dollars (in 000's)	\$5,409,171	\$6,711,544	\$7,596,196
	Total Cropland Acres	23,320,162	22,402,132	22,092,954
	Expense Dollars / Acre	\$232	\$300	\$343
	Average Net Cash Return / Farm	\$20,314	\$27,638	\$40,717

Author's note - While expenses include crops and livestock, the cost per acre of cropland still gives a good indication of overall expenses in farming. Michigan is higher than the other states in the study

This information has been retrieved by the county data in the U.S. Census reports in the years and states indicated.

With expenses per acre at \$359, a farm that raised just corn would have to sell it at \$2.872 a bushel to break even if yields were 125 bushels per acre. With average corn prices including government payments much less than that in the years after 1997, producers have been forced to find ways to cut costs and/or raise yields and prices in order to be profitable.

This explains the necessity of size, more so in Michigan with expenses higher per acre than other competing midwestern grain belt states. If corn was \$2.20 per bushel, a yield of 125 bu per acre would generate revenues of only \$275 per acre. Producers have been forced to increase size to increase economies of scale in order to force expenses lower, and have also been pressured to increase yields and be better marketers at the same time.

Table 4 Average Net Cash Return per Acre including Government Payments
(Dollars per Acre)

State		1987	1992	1997
Michigan	Net Cash Return (Dollars per Farm)	\$6,252	\$9,257	\$14,919
	Average Farm Size - Acres/Farm	202	217	215
	Net Cash Return (Dollars per Acre)	\$30.95	\$42.66	\$69.39
Ohio	Net Cash Return (Dollars per Farm)	\$8,645	\$11,133	\$15,152
	Average Farm Size - Acres/Farm	189	201	206
	Net Cash Return (Dollars per Acre)	\$45.74	\$55.39	\$73.55
Indiana	Net Cash Return (Dollars per Farm)	\$12,533	\$15,324	\$20,089
	Average Farm Size - Acres/Farm	229	249	261
	Net Cash Return (Dollars per Acre)	\$54.73	\$61.54	\$76.97
Illinois	Net Cash Return (Dollars per Farm)	\$19,495	\$27,954	\$37,365
	Average Farm Size - Acres/Farm	321	351	372
	Net Cash Return (Dollars per Acre)	\$60.73	\$79.64	\$100.44
Iowa	Net Cash Return (Dollars per Farm)	\$20,412	\$22,718	\$32,705
	Average Farm Size - Acres/Farm	301	325	343
	Net Cash Return (Dollars per Acre)	\$67.81	\$69.90	\$95.35
Minnesota	Net Cash Return (Dollars per Farm)	\$14,503	\$16,209	\$25,015
	Average Farm Size - Acres/Farm	312	342	354
	Net Cash Return (Dollars per Acre)	\$46.48	\$47.39	\$70.66
Nebraska	Net Cash Return (Dollars per Farm)	\$20,314	\$27,638	\$40,717
	Average Farm Size - Acres/Farm	749	839	885
	Net Cash Return (Dollars per Acre)	\$27.12	\$32.94	\$46.01

Author's note - In Michigan, a farm with 500 acres would generate \$34,695 average net cash return.

Data from the county summary highlights of the 1997 Census of Agriculture.

Table 5 Percent of Sales of Net Farm Related Income by Class

State	Net Farm Related Income	Dollars of Sales						
		\$25,000 or less	\$25,000 to \$50,000	\$50,000 to \$100,000	\$100,000 to \$250,000	\$250,000 to \$500,000	\$500,000 to \$1,000,000	\$1,000,000 or more
Michigan	\$3,097	4.90%	4.40%	6.00%	14.00%	15.90%	16.50%	38.30%
Ohio	\$2,190	8.10	6.90	10.80	29.30	18.70	14.10	12
Indiana	\$3,573	4.20	7.50	8.30	24.40	21.50	19.50	14.5
Illinois	\$3,389	3.80	4.20	6.90	24.80	29.50	18.40	12.3
Iowa	\$5,406	2.80	5.10	8.30	24.70	22.10	15.20	21.7
Minnesota	\$5,278	2.80	3.70	7.10	21.40	21.80	14.20	28.8
Nebraska	\$8,258	1.70	2.70	5.60	20.60	16.30	8.00	45

Source: Agricultural Census of 1997

Table 6

State Property Taxes - Dollars per acre

State		1996	1997	1998	1999	2000
Michigan	Taxes \$	211.3	248.1	228.3	211.8	221.0
	Acres	10.6	10.4	10.4	10.4	10.4
	Tax\$/ Acre	19.9	23.9	22.0	20.4	21.3
Ohio	Taxes \$	166.5	182.6	194.1	188.2	194.2
	Acres	14.9	14.9	14.9	14.9	14.9
	Tax\$/ Acre	11.2	12.3	13.0	12.6	13.0
Indiana	Taxes \$	231.2	241.7	256.8	249.0	257.0
	Acres	15.6	15.6	15.6	15.5	15.5
	Tax\$/ Acre	14.8	15.5	16.5	16.1	16.6
Illinois	Taxes \$	449.5	498.9	530.1	514.2	530.6
	Acres	27.9	27.8	27.8	27.7	27.7
	Tax\$/ Acre	16.1	17.9	19.1	18.6	19.2
Iowa	Taxes \$	512.4	461.1	489.9	475.2	490.4
	Acres	33.0	33.0	33.0	33.0	32.8
	Tax\$/ Acre	15.5	14.0	14.8	14.4	15.0
Minnesota	Taxes \$	353.8	433.5	398.9	370.1	386.2
	Acres	29.2	29.1	28.9	28.8	28.6
	Tax\$/ Acre	12.1	14.9	13.8	12.9	13.5
Nebraska	Taxes \$	412.3	428.3	426.3	413.8	424.4
	Acres	46.4	46.4	46.4	46.4	46.4
	Tax\$/ Acre	8.9	9.2	9.2	8.9	9.1

Source: USDA, Economic Research Service, Data, Farm Income Database,
Net Value Added (with net farm income).

Acres are from the individual state statisticians offices

Table 7		Net Farm Income minus Direct Government Payments - all farms				
State		1996	1997	1998	1999	2000
Michigan						
	Net Farm Income	410.3	399.1	356.5	728.5	313.8
	Direct Govt. Payments	109.6	121.3	210.6	401.4	381.1
	Farm Income	300.7	277.8	145.9	327.1	-67.3
Ohio						
	Net Farm Income	1329.1	1875.7	1362.8	872.7	1103.6
	Direct Govt. Payments	163.1	186.4	315.6	650.2	678.1
	Farm Income	1166.0	1689.3	1047.2	222.5	425.5
Indiana						
	Net Farm Income	1296.3	1276.7	761.4	392.8	779.7
	Direct Govt. Payments	213.6	265.1	468.9	852.1	938.5
	Farm Income	1082.7	1011.6	292.5	-459.3	-158.8
Illinois						
	Net Farm Income	2501.6	2050.6	1368.2	986.1	1537.1
	Direct Govt. Payments	386.7	552.5	944.9	1798.8	1943.9
	Farm Income	2114.9	1498.1	423.3	-812.7	-406.8
Iowa						
	Net Farm Income	4184.3	3721.2	2170.3	1553.1	2427.2
	Direct Govt. Payments	508.3	712.8	1168.7	2061.9	2302.1
	Farm Income	3676.0	3008.4	1001.6	-508.8	125.1
Minnesota						
	Net Farm Income	2190.2	753.8	1299.6	1232.8	1302.5
	Direct Govt. Payments	349.3	417.0	794.5	1409.9	1502.2
	Farm Income	1840.9	336.8	505.1	-177.1	-199.7
Nebraska						
	Net Farm Income	3430.9	2014.6	1785.1	1687.6	1357.1
	Direct Govt. Payments	388.7	454.5	814.7	1411.9	1407.0
	Farm Income	3042.2	1560.1	970.4	275.7	-49.9

Source: USDA, Economic Research Service - data, Farm Income Database,
Net Value Added (with net farm income)

Table 8 Reduction in Livestock Production and Growth in Grain Production in Michigan

Commodity		1987	1992	1997	Change
Beef Cows	Number of Animals	110156	116106	116399	6243
	Number of Farms	8163	7548	7566	-597
Milk Cows	Number of Animals	344550	316954	300641	-43909
	Number of Farms	6499	5198	3990	-2509
Hogs and Pigs	Number of Animals	1227069	1231641	1032014	-195055
	Number of Farms	5577	4774	2853	-2724
Sheep and Lambs	Number of Animals	101330	97433	72107	-29223
	Number of Farms	2057	1831	1628	-429
Layers and pullets	Number of Animals	8428623	5388894	6043468	-2385155
	Number of Farms	3550	2454	2276	-1274
Broilers and chickens	Number of Animals	702431	400262	393028	-309403
	Number of Farms	495	386	336	-159
	Total Number of Animals	10914159	7551290	7957657	-2956502
Number of Bushels					
Corn	Number of Bushels	189779819	226824263	238319219	48539400
	Number of Farms	25140	18962	16712	-8428
	Number of Acres	1982401	2221271	2122283	139882
Soybeans	Number of Bushels	36267622	41633625	62242411	25974789
	Number of Farms	12734	13175	12561	-173
	Number of Acres	1023599	1332114	1694872	671273
Wheat	Number of Bushels	16465394	29350586	28432159	11966765
	Number of Farms	10327	12433	8976	-1351
	Number of Acres	356073	583245	499742	143669
	Total Number of Acres	3362073	4136630	4316897	954824
	Total Number of Bushels	242512835	297808474	328993789	86480954
Michigan	Total Number of Farms	51172	46562	46027	-5145
	Total Number of Acres	10316861	10088170	9872812	-444049

The number of acres for corn, soybeans and wheat has increased while the number of farm acres has decreased, as well as the number of animals on farms in these categories.

Source: Michigan Agricultural Statistical Service

Table 9 Number of Michigan Farms and Land in Farms

By Economic Sales Class 1996 - 2000				
Number of Farms (thousands)				
Year	\$1,000 - \$9,999	\$10,000 - \$99,999	\$100,000 and over	Total
1996	29.8	17.0	7.2	54.0
1997	28.5	17.0	7.5	53.0
1998	27.0	17.0	8.0	52.0
1999	28.5	16.5	8.0	53.0
2000	27.5	16.5	8.0	52.0
Million Acres				
1996	2.2	3.1	5.3	10.6
1997	2.0	2.9	5.5	10.4
1998	1.9	2.8	5.7	10.4
1999	1.9	2.8	5.7	10.4
2000	1.9	2.8	5.7	10.4
Total Farms Total Acres (millions)				
1950	161,000	17.9		
1955	138,000	16.9		
1960	118,000	15.4		
1965	98,000	14.1		
1970	84,000	12.7		
1975	70,000	11.5		
1980	65,000	11.4		
1985	61,000	11.3		
1990	54,000	10.8		
1995	55,000	10.7		
2000	52,000	10.4		

Source: Michigan Agricultural Statistical Service 2001 Yearbook
National Agricultural Statistical Service Historical Data

Table 10

Wages - Manufacturing Average Hourly Earnings by State
Annual Average 1997 - 2001

State	1997	1998	1999	2000	2001
Michigan	17.18	17.61	18.38	19.26	19.71
Ohio	15.30	15.79	16.26	16.71	17.13
Indiana	14.79	14.97	15.26	15.83	16.20
Illinois	13.35	13.75	14.05	14.36	14.55
iowa	13.57	13.91	14.20	14.46	14.92
Minnesota	13.63	13.92	14.34	14.99	15.36
Nebraska	12.10	12.32	12.77	12.94	13.39

Data is from the U.S. Department of Labor, Employment, Hours and Earnings from the Current Employment Statistics Survey (State and Metro Area)
Manufacturing Average Hourly Earnings Not Seasonally Adjusted.

Table 11 Planted Acre Comparison for Edible Beans and Sugarbeets versus Corn, Soybeans and Wheat

(in 1,000 Acres)

Commodity	1996	1997	1998	1999	2000	2001
Dry Beans	340	315	300	350	285	215
Sugarbeets	153	163	177	194	189	180
Total	493	478	477	544	474	395
Change		-15	-1	67	-70	-79
All Corn	2600	2500	2300	2200	2200	2200
Soybeans	1650	1870	1900	1950	2050	2150
Wheat	680	530	600	610	530	570
Total	4930	4900	4800	4760	4780	4920
Change		-30	-100	-40	20	140

This table shows the correlation between total acres of dry beans and sugarbeets compared to corn, soybeans and wheat. The effect is more noticeable in the thumb area where more dry beans and sugarbeets are grown.

Planted Acre Comparison for Tuscola and Huron Counties

Commodity	1996	1997	1998	1999	2000	2001
Dry Beans	163	156	143	167	140.5	99.5
Sugarbeets	82	77.2	84	89	85	82
Total	245	233.2	227	256	225.5	181.5
Change		-11.8	-6.2	29	-30.5	-40
All Corn	240	247	207	190	203	196
Soybeans	84	77.2	118	99	124	171
Wheat	84	62	71	75	57	69.5
Total	324	324.2	325	289	327	367
Change		0.2	0.8	-36	38	40

Source: Michigan Agricultural Statistics Service

Table 12

State Fact Sheets

State	1997 US Census Population Total	1997 % employment in farm & related jobs - production	Ratios - 2000		1997 Average Operator Age	1997 % of operators listing farming as occupation
			Debt/Equity	Debt/Assets		
Michigan	9785450	1.4	15.1	13.2	53	47.9
Ohio	11212498	1.5	13.3	11.8	53	45.2
Indiana	5872370	2.3	17.5	14.9	53	46.6
Illinois	12011509	1.4	15.2	13.2	53	57
Iowa	2854396	6.4	23.2	20.1	52	62
Minnesota	4687726	3.2	25.2	21.8	51	60
Nebraska	1656042	6.1	27.9		53	69.5

Farms by sales dollars (percent)

State	Farms by sales dollars (percent)			
	\$50000 or less	\$50000 - 99999	\$100000 - 499999	\$500000 or more
Michigan	76.2	8	13	2.8
Ohio	75.4	9	13.6	2
Indiana	69.3	9.9	17.4	3.4
Illinois	55.6	12.7	27.6	4.1
Iowa	50.2	15.1	30.3	4.3
Nebraska	49.1	15.6	30.5	4.9

Farms by size in acres (percent)

State	Farms by size in acres (percent)				
	1 - 99	100 - 499	500 - 999	1000 - 1999	2000 or more
Michigan	52.3	37.1	7	2.9	0.8
Ohio	50.6	39.4	6.7	2.6	0.7
Indiana	49.8	35.1	9.1	4.8	1.2
Illinois	36	38.9	15.9	7.4	1.8
Iowa	29.2	48	16.3	5.6	0.9
Minnesota	30.3	48.9	13.3	5.8	1.7
Nebraska	21.5	36.3	20.1	13.1	9.1

The population figures are from the US Census Bureau archives, state population time series annual time series. The rest of the data is from the USDA Economic Research Service state facts database, web site www.ers.usda.gov/StateFacts.htm.

Table 13 Operators by Principal Occupation

State		1987		1992		1997		Number Change	Percent Change
		Number	Percent	Number	Percent	Number	Percent		
Michigan									
	Farming	26112	51.03%	24396	52.39%	22043	47.89%	-4069	-15.58%
	Other	25060	48.97%	22166	47.61%	23984	52.11%	-1076	-4.29%
	Total	51172		46562		46027		-5145	-10.05%
Ohio									
	Farming	39569	49.91%	34604	48.94%	31022	45.23%	-8547	-21.60%
	Other	39708	50.09%	36107	51.06%	37569	54.77%	-2139	-5.39%
	Total	79277		70711		68591		-10686	-13.48%
Indiana									
	Farming	36654	51.99%	31547	50.25%	26993	46.61%	-9661	-26.36%
	Other	33852	48.01%	31231	49.75%	30923	53.39%	-2929	-8.65%
	Total	70506		62778		57916		-12590	-17.86%
Illinois									
	Farming	57122	64.34%	47875	61.69%	41645	57.01%	-15477	-27.09%
	Other	31664	35.66%	29735	38.31%	31406	42.99%	-258	-0.81%
	Total	88786		77610		73051		-15735	-17.72%
Iowa									
	Farming	75279	71.57%	66885	69.28%	56256	61.96%	-19023	-25.27%
	Other	29901	28.43%	29658	30.72%	34536	38.04%	4635	15.50%
	Total	105180		96543		90792		-14388	-13.68%
Minnesota									
	Farming	58519	68.78%	51021	67.96%	44047	60.04%	-14472	-24.73%
	Other	26560	31.22%	24058	32.04%	29320	39.96%	2760	10.39%
	Total	85079		75079		73367		-11712	-13.77%
Nebraska									
	Farming	45387	75.02%	39123	73.92%	35742	69.46%	-9645	-21.25%
	Other	15115	24.98%	13800	26.08%	15712	30.54%	597	3.95%
	Total	60502		52923		51454		-9048	-14.95%

Source: Census of Agriculture 1997

Table 14

Farm Real Estate - Average Value Dollars per Acre

State		1998	1999	2000	2001	2002	1998-2002 Change
Michigan	Real Estate	\$1,670	\$1,850	\$2,150	\$2,300	\$2,500	\$830
	Cropland	\$1,480	\$1,670	\$2,000	\$2,100	\$2,300	\$820
Ohio	Real Estate	\$2,040	\$2,220	\$2,300	\$2,480	\$2,700	\$660
	Cropland	\$2,150	\$2,350	\$2,420	\$2,600	\$2,750	\$600
Indiana	Real Estate	\$2,060	\$2,220	\$2,350	\$2,500	\$2,590	\$530
	Cropland	\$2,100	\$2,270	\$2,400	\$2,550	\$2,640	\$540
Illinois	Real Estate	\$2,130	\$2,250	\$2,380	\$2,530	\$2,640	\$510
	Cropland	\$2,240	\$2,370	\$2,500	\$2,650	\$2,750	\$510
Iowa	Real Estate	\$1,700	\$1,770	\$1,820	\$1,900	\$1,980	\$280
	Cropland	\$1,860	\$1,930	\$1,970	\$2,050	\$2,120	\$260
Minnesota	Real Estate	\$1,160	\$1,230	\$1,280	\$1,360	\$1,450	\$290
	Cropland	\$1,160	\$1,230	\$1,270	\$1,340	\$1,420	\$260
Nebraska	Real Estate	\$645	\$670	\$695	\$730	\$755	\$110
	Cropland	\$1,040	\$1,080	\$1,110	\$1,170	\$1,210	\$170

United States Department of Agriculture
National Agricultural Statistical Service, land, August 2002.

Table 15

World Production, World Exports, U.S. Exports and Market Share, U.S. Domestic Use
All Data in Metric Tonnes

Crop Year	Wheat	World Production			Crop Year	Wheat	World Exports		
		Corn	Soybeans	Total			Corn	Soybeans	Total
1993	561.87	533.19	117.18	1212.24	1993	123.85	69.85	29.59	223.29
1995	524.75	560.22	137.78	1222.75	1995	110.93	72.32	32.13	215.38
1997	582.74	590.39	131.67	1304.80	1997	125.27	73.31	36.96	235.54
1999	588.19	605.27	159.83	1353.29	1999	122.92	75.06	38.67	236.65
2001	581.07	599.03	184.42	1364.52	2001	108.08	75.99	53.36	237.43
2002	564.11	601.74	195.81	1361.66	2002	104.27	78.48	63.30	246.05

Crop Year	Wheat	U.S. Exports			Crop Year	Wheat	U.S. Domestic Use		
		Corn	Soybeans	Total			Corn	Soybeans	Total
1993	36.84	42.25	20.94	100.03	1993	30.69	172.93	38.37	303.65
1995	32.34	55.31	22.81	110.46	1995	35.01	183.58	42.40	329.05
1997	27.25	45.60	24.00	96.85	1997	35.40	177.64	42.43	309.89
1999	28.36	50.31	21.90	100.57	1999	37.69	185.68	48.74	323.94
2001	26.23	48.38	28.95	103.56	2001	32.66	201.25	50.87	337.47
2002	23.25	40.64	28.30	92.19	2002	30.62	203.46	47.95	326.27

Crop Year	Wheat	U.S. Market Share - Exports		
		Corn	Soybeans	Total
1993	29.75%	60.49%	70.77%	44.80%
1995	29.15%	76.48%	70.99%	51.29%
1997	21.75%	62.20%	64.94%	41.12%
1999	23.07%	67.03%	56.63%	42.50%
2001	24.27%	63.67%	54.25%	43.62%
2002	22.30%	51.78%	44.71%	37.47%

Source: USDA - World Agricultural Supply and Demand Estimates - World Outlook Board

Table 16
Commercial Grain Elevator Numbers and Capacity Comparisons by State

State	2001 Number	(In Millions of Bushels)				Commercial	
		Bushel Capacity	Average Capacity	Bushels roduction	Bushels Per Elev	Capacity % Prod	Number of Turns (1)
Michigan	245	146	0.60	300	1.22	0.49	2.05
Ohio	467	353	0.76	685	1.47	0.52	1.94
Indiana	425	370	0.87	1184	2.79	0.31	3.20
Illinois	995	1127	1.13	2171	2.18	0.52	1.93
Iowa	490	1040	2.12	2145	4.38	0.48	2.06
Minnesota	623	507	0.81	1152	1.85	0.44	2.27
Nebraska	519	690	1.33	1421	2.74	0.49	2.06
2002							
Michigan	235	148	0.63	343	1.46	0.43	2.32
Ohio (2)	454	357	0.79	444	0.98	0.80	1.24
Indiana	420	367	0.87	885	2.11	0.41	2.41
Illinois	980	1136	1.16	1978	2.02	0.57	1.74
Iowa	465	1070	2.30	2460	5.29	0.43	2.30
Minnesota	611	506	0.83	1423	2.33	0.36	2.81
Nebraska	508	690	1.36	1166	2.30	0.59	1.69
Two Yr Avg	531.21	607.64	1.11	1268.36	2.36	0.49	2.15

Source: National Agricultural Statistics Service, Agricultural Statistic Board, USDA

Note (1) - Number of times the inventory capacity is replaced (volume/capacity)

Note (2) - Ohio production was extremely low due to drought.

Table 17 Comparison of Field and Miscellaneous Crops to Other Principal Crops

Year	Michigan				Other Study States Combined			
	Field and Misc Crops	Other Principal Crops	Total Crop Value	% other	Field and Misc Crops	Other Principal Crops	Total Crop Value	% other
2002	\$1,681	\$354	\$2,035	17.40%	\$28,347	\$456	\$28,803	1.58%
2001	\$1,298	\$426	\$1,724	24.71%	\$25,069	\$473	\$25,542	1.85%
2000	\$1,429	\$438	\$1,867	23.46%	\$24,397	\$426	\$24,823	1.72%
1999	\$1,615	\$424	\$2,039	20.79%	\$24,300	\$389	\$24,689	1.58%
1998	\$1,503	\$389	\$1,892	20.56%	\$26,001	\$373	\$26,374	1.41%
5 year avg				21.38%				1.63%

Michigan ranked 11th in corn production for grain, soybeans and wheat in 2002.

Source: Michigan Agricultural Statistics Serve 2002-03 Annual Report - Farm Economics

U.S. Totals

	Field and Misc Crops	Other Principal Crops	Total Crop Value	% other
2002	\$71,290	\$23,433	\$94,723	24.74%
2001	\$66,493	\$21,959	\$88,452	24.83%
2000	\$65,709	\$22,474	\$88,183	25.49%
1999	\$65,572	\$21,501	\$87,073	24.69%
1998	\$70,573	\$20,638	\$91,211	22.63%
5 year avg				24.47%

Source: National Agricultural Statistics Service, USDA, Publications, Crop Values.

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Glossary Of Grain Industry Terms

Arbitrage - The act of simultaneously buying and selling in two nearly identical markets in order to take advantage of what is thought by a trader to be a temporary discrepancy in price.

Basis - The difference between cash prices at a given location and a given contract month in the futures market. Basis is quoted in terms of cents over or under the futures.

Bids - What the elevator or processor is willing to pay for a commodity (Author).

Blending - The mixing together of differing grades of a given commodity in order to obtain a third grade.

Broker - A person or company that arranges transactions between buyers and sellers without owning the commodity. They usually charge a fee for bringing the two sides together (Author).

Carry - The difference between the value of a commodity now and a higher value at some point in the future. It can be a cash carry or a carry in the futures market between futures contract months (Author).

Draw Area - The area around a handler or processor that they usually buy from (Author)

Grain Flow - How a commodity moves (all the transactions and logistical considerations) from the original production area through the system to a final use (Author).

Hedged To Arrive - An unpriced forward contract in which the futures price component of the final cash price is set, but not the basis. The basis is set later using the current spot bid for a particular cash market agreed to in the contract.

Margin - This paper the author refers to margin in the grain industry as the difference between the price paid for the grain and the price it can be sold for. This margin is the per bushel profit plus all the variable costs and some of the fixed costs. The other part of the fixed costs are paid for by the carry times the owned bushels stored at the facility (Author)

Origination - Programs that a handler or processor may have to buy grain for their facilities (Author).

Ownership - The bushels that a handler or processor has purchased either for future (forward contracts) delivery or that they already have title to either in their facility or, at times in other facilities (Author).

Shrink - The pounds of a commodity that are lost by handling. This could be by spilling, mechanical wear, deterioration or other operational functions (Author).

Train - In this study, the author is referring to shipments of 50 or more cars at one time (Author).

Turns - A common term in the grain industry that refers to the amount of bushels a facility handles in a year divided by the total bushel storage capacity (Author).

Volume - The number of bushels that a facility handles (Author).

The terms in this glossary are from the author as noted, or otherwise were taken from the Practical Grain Encyclopedia (2002) - Commodity Center Corporation, 8541 N. 600 W., Lake Village, IN 46349. Published by Hugh Ulrich. (www.practicalgrain.com), which provides a more complete glossary for further research.