COMPETITIVE FACTORS AFFECTING THE EXPANSION OF GREENFIELD ELEVATOR SITES

by

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ABSTRACT

The purpose of this thesis is to identify Greenfield grain facility sites within 100 miles of Holdrege, Nebraska and to evaluate the feasibility of these sites. CHS Agri Service Center currently has facilities that are within 50 miles of Holdrege, Nebraska. However there are no Greenfield sites in this area that would be feasible due to a large number of competitors already operating in this area.

This problem was broken down into two components. The first is site selection and the second is a financial model using net present value to determine if the sites selected would be profitable to the standards that CHS, Inc. requires (12% or better return on assets). In order to determine where Greenfield sites might be located supply and demand factors were evaluated to determine surplus and deficit grain areas. The areas where there were large surpluses of grain have the greatest potential for a Greenfield facility to succeed. Then a feasibility analysis of the chosen sites is conducted using net present value and internal rate of return analysis to determine if there is enough grain volume to operate the grain facility above the 12% return on assets criterion.

After a detailed review of the supply and demand factors of grain in the region, two locations were determined to be good candidates for further study. Based on recent projects completed at CHS, Inc. two model facilities were created as tools to determine if a certain facility type is more profitable than another. The cost structures for these two model facilities are based on costs that are currently incurred at CHS Agri Service Center locations. It was found that neither facility at either location was profitable enough to meet the minimum performance criteria required by CHS, Inc.

As a result of these findings it may be possible to move ahead with a Greenfield facility at one of these sites if a higher volume can be obtained. A merger with another grain company in the immediate area of the proposed facility may be the best way to increase volume.

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CHAPTER I: INTRODUCTION

CHS Agri Service Center is located in South Central Nebraska. They are part of the Country Operations division of CHS, Inc., a Fortune 100 company. Currently CHS Agri Service Center operates grain facilities in 10 towns in an area roughly 50 miles in diameter surrounding Holdrege, Nebraska. The average grain volume throughput for this company over the last three years is 40 million bushels. The company has seen a volume growth trend near 4% per year over the last decade. This growth has put a lot of strain on CHS Agri Service Center's grain facilities.

Since the merger of Agri Coop and CHS, Inc. two years ago, creating CHS Agri Service Center, there has been a shift in strategy from survivorship to growth. In the past two years there have been many upgrades to all grain facilities, from new scales and dryers to two 700,000 bushel storage bins. CHS Agri Service Center desires to continue growing the company and one way to do this is to add new locations. Unfortunately, the current trade territory of CHS Agri Service Center has many competitors and some areas of this territory see heavy price competition. This limits what can be done in the current trade territory. Other options are to build onto existing facilities or to merge with another grain company in the area. These other options have already been researched with little success. CHS Agri Service Center can continue to repair and upgrade their existing facilities, or they can look to surrounding areas for opportunities to expand and to do this before a competitor takes the initiative.

The goal of this research project is to determine if the area surrounding CHS Agri Service Center is feasible for any Greenfield facilities. Greenfield is defined by Wikipedia as "undeveloped land that is in a city or rural area." The key parameter in determining the

size of the expanded territory is that any proposed location be close enough that it could be managed and the grains marketed by the current CHS Agri Service Center personnel in Holdrege, Nebraska.

Recently there has been a large number of new grain facilities constructed, especially shuttle loading facilities in the United States. This is a response to corn and soybean yields increasing over time. Because of this supply increase, there is currently more grain than can be handled by the current facilities, many of which are old and require upgrades. This leaves opportunities for companies that have the capital to take advantage of them. CHS, Inc. is one of those companies that are financially able to build new state-of-the-art locations that can handle the speeds and volumes of today's harvest. Another option for CHS, Inc. is to update older locations so they can handle the same harvest pressures as a new facility. The purpose of this research is to evaluate the feasibility of new Greenfield facilities. The upgrading of existing facilities is not going to be investigated further in this thesis.

Accounting for new yield increases may mean that Greenfield facilities may work in locations that in the past did not have enough volume to be financially feasible. If these locations can be determined and facilities built, CHS Agri Service Center will increase its reach and grain volume. In the past the only way to expand volume was to merge or enter into a joint venture with another company. In addition, finding and taking advantage of these Greenfield site opportunities provides a first mover competitive advantage. One of the reasons expansion into new areas is being looked at before upgrading current facilities is that new areas may be lost while upgrade opportunities will still exist in the future. If the current facilities are upgraded first, the opportunity to expand by building a new facility

may be taken away by a competitor acting first. The goal is to find a site and facility type that will return a minimum Return on Assets (ROA). In order for CHS, Inc. to fund any investments the project needs to have a minimum return of 12% ROA and the desired return is 15% ROA or more.

The deliverables of this project are a written thesis, oral defense of this thesis, and a presentation to the CHS Agri Service Center General Manager. In order to answer the questions posed above, county data is needed on bushels grown for all of the counties that CHS Agri Service Center has facilities in, as well as other counties that fall within 100 miles of Holdrege, Nebraska. A three-year average on crop data was used so that crop rotations, weather, and other factors which might affect one year will not skew the data. Secondly, data on all grain handling facilities, feed yards, and ethanol plants by county is needed so that the demand for grains can be assessed. This information is available in the Kansas Grain and Feed Association Directory[1], the Nebraska Grain and Feed Association Directory[2], and BeefSpotter.[3] The Grain and Feed Association Directories list all the elevators by location with their grain handling capacity, and BeefSpotter is a directory of the feed yards and includes data such as their maximum head capacity. With the supply and demand data it is possible to find the surplus and deficit markets. The next chapter describes the previous research and data needed for this thesis.

[1] (K. G. Association 2010)
[2] (N. G. Association 2010)
[3] (Publications 2010)

CHAPTER II: LITERATURE REVIEW

This chapter discusses the underlying factors that ultimately affect the decision for CHS Agri Service Center to expand by building new assets or to seek out another way to increase grain volume and profitability. This topic is limited to a specific industry in a specific time and place which makes it difficult to find closely related literature. Porter's five forces of competition which includes barriers to entry, bargaining power of the supplier, bargaining power of the buyer, substitutes, and rivalry is used. The location of the CHS Agri Service Center trade territory, Nebraska, is taken into account with the strategic and competitive factors that form the basis of the decisions and have the best chance of being the right decision and thereby profitable.

The strategy of the firm is to increase profitability while growing the company by adding two new locations in the next three years. This goal sets the strategy of where the company expects to be in three years. This statement alone does the company little good without the domain and means. The domain is the scope or boundaries that tell management what they can and cannot do. This provides all employees with a solid knowledge of what is acceptable and what is not. This is very important so that resources and time are not wasted pursuing ideas and ventures that are outside the focus of the company.[4]

CHS Agri Service Center management has decided that they want to look only at proposed sites for expansion within 50 miles of the current trade territory. As stated earlier, the current trade territory is 50 miles in diameter around Holdrege. This expansion would result in opportunities 100 miles in diameter from Holdrege. Such sites are called Greenfield locations since they involve building at new locations. The reason for not

[4] (Argyres 2002)

researching sites beyond 50 miles of the current trade territory is because the management and marketing for these new facilities can be done with the current staff at the main office. This keeps personnel and office expenses at the same level while increasing grain volumes.

The means is the how part of the equation. This is the advantage over the competition that makes the new facility profitable. The advantages over the existing competition are 1) having a new modern facility that is designed to handle the speed at which grain can be harvested and brought to the elevator and 2) higher margins due to a lower cost. The competitive advantage from speed comes from the producer being able to weigh in, dump his load, and then weigh out as fast as possible. Because a new state-of-the-art facility can do this faster than any of the competing elevators, producers can haul more loads out of their fields per day.

The benefits to the producer are threefold. First, the producer finishes harvesting quicker and does not have to maintain any extra hired labor to transport the grain, thus reducing expenses. A second benefit is that once the grain is out of the field, there is no more risk to the crop from hail, wind, or other perils. The third benefit is that the producer has more free time to pursue other interests in their farming operation.

The second part of the competitive advantage is higher margins. A lower cost structure coupled with access to CHS, Inc. global markets and reduced transportation costs lead to higher margins. CHS, Inc. is able to buy and sell large quantities of grain all over the world, as well as having the largest freight deck of shuttle trains on the BNSF railway. The BNSF auctions off shuttle train leases for a one year period. When a company wins an auction, they then have the rights to the train for a year. CHS, Inc.'s freight deck is the compilation of all of the leased trains. With the largest freight deck on the BNSF of any

grain company, being a part of CHS, Inc. makes it easier to get a train into a CHS facility on the BNSF railway, and at the time when needed. Another factor is CHS Inc's global market reach; these factors should allow CHS Agri Service Center to sell the grain for higher prices than the competition combined with cost savings from sharing equipment, rail freight and personnel, which allows it to pay more for grain in the CHS Argi Service Center trade territory.

2.1 Porter's Five Forces Model

With this strategy in mind, it is important to identify how competitive forces shape this strategy. Dr. Michael Porter of the Harvard Business School has a framework already in place that is commonly referred to as Porter's Five Forces.[5]

2.2 Barriers to Entry

The first force is barriers to entry. There are several key factors that fall into this category that need to be thoroughly examined. The first of these barriers is the high expense of building a new grain elevator. This can cost as little as $8 million for a smaller facility, up to and more than $14 million for a facility with rail access for loading 110 car trains. Because CHS Agri Service Center is a member of CHS, Inc., they have access to this amount of capital and can overcome capital constraints that other smaller local grain companies cannot. However, CHS Agri Service Center is the entity that pays these loans back and cannot afford to leverage itself too much. Thus a project of this size can only be done every few years unless the returns are quite high, or risk depreciation expense increasing to high levels. While depreciation is not cash, it does show up on the income statement and is included in the financial ratios CHS, Inc. uses to evaluate CHS Agri

[5] (Porter 2008)

Service Center. In other words, net earnings are used rather than earnings before depreciation, taxes, and interest.

The next barrier to entry is on the supply side, where it is important to have a large amount of grain volume to reduce fixed costs per bushel and obtain economies of size. This may mean that if CHS Agri Service Center decides to enter a new market, they will do so on a large scale, more likely building a facility with rail access and larger grain handling capacity, even though it will be more costly in the short run.

Another barrier to entry is unequal access to distribution channels. However, in this case it is an asset because of the size of CHS, Inc. which operates globally. In addition, CHS, Inc. is the largest owner of rail freight on the BNSF, resulting in better access to shuttle trains. This is important in keeping the grain facilities from filling up with grain at harvest, which can result in turning grain away. Having a large pool of trains to call on is especially important at harvest because as the grain comes in and the elevator fills up, this pool of trains greatly increases the likeliness of being able to get the train placed before the grain elevator goes full. Once the elevator is full, the farmers are forced to take their grain to other grain elevators and that facility has lost out on grain volume.

One last barrier to entry is competitor retaliation. It is very important to consider possible retaliation by the incumbent competitors as they may react adversely to a new entrant in their market. In this case, it is likely that incumbents will raise their prices for grain in the short run, due to increased competition in the area. However, in the intermediate and long run the competing grain companies will try to find new ways to increase their facility speed to match that of the new entrant. At harvest producers are

thinking of speed as much as they are thinking about competitive prices. The competition will have to make these upgrades or accept what they can get in this new market.

2.3 Bargaining Power of Suppliers

A second competitive force is the bargaining power of suppliers. During most of the year the bargaining power goes to the supplier or in this case the producer. This is because the producer has the grain in a protected facility out of the elements so there is less of a time constraint to move the grain, and because there is less of a time constraint, the producer can haul further away than he/she would at harvest time. This gives the producer access to more markets, allowing the producer to have more bargaining power. This means that price is key and attributes such as speed and service are less important. For corn, soybeans, and sorghum this is January through September, and for wheat this is August through June. At some point, the grain will have to move out of farm storage to make room for the new crop but this gives the producer several months to make a decision. The elevator that pays the highest price gets the grain because of this strong price competition. Consequently, the producer is not as worried about how long it takes to get through a facility as much as how much the facility is paying. With this in mind, it is important to look at the harvest time frame when speed is the determining factor that affects the producer's decision of where to deliver their grain.

The elevator that can handle grain fastest at harvest will get the majority of the grain. It is also important to understand that a majority of the crop arrives at harvest. This is because there is not enough on-farm storage to hold the entire crop produced and the surplus grain has to go somewhere. Currently, CHS Agri Service Center facilities are

receiving approximately 70% of the year's grain received at harvest. The ability to fill the elevator at harvest and at harvest price levels is key in competing in this trade territory.

2.4 Bargaining Power of Buyers

The third competitive force is the bargaining power of buyers. This means that CHS Agri Service Center has a competitive advantage over the competition because of the ability to market and move grain through the CHS, Inc. network. If the new facility were a shuttle loading facility, this would give the new grain elevator an advantage over the competition. This is due to the ability to move grain by rail and thus this new facility would be able to take advantage of CHS, Inc.'s global markets.

CHS, Inc. sells grains all over the world to destinations including Mexico, Japan, China, and other large markets, as well as domestic markets in the United States. CHS, Inc. sells the grain to a variety of entities in these markets, ranging from foreign companies to multinationals just like CHS, Inc., and to government trading agencies as well. Because of the large amounts of volumes that are being traded at these levels, the buyers will press for reduced pricing. With the level of competition in the world market, it is a difficult market to trade in for a small firm that is not affiliated with a major multinational company like CHS, Inc.

Without being a part of CHS, Inc., the risks of trading into this market are too great. CHS Agri Service Center does not have the grain volumes to trade on this level. With grain trades at the international level in the millions of bushels each, CHS Agri Service Center would not be able to make many trades, only handling 40 million bushels a year. In addition, if one of these trades went bad it could be financially catastrophic. Some of the risks in these trades are currency fluctuations, oversees logistics, and foreign policy.

2.5 Bargaining Power of Substitutes

A fourth force is substitutes. There are no product substitutes in this case as CHS Agri Service Center is providing a service, but the producers do not have to take their grain to an elevator. There are service substitutes that open up many options for the farmers to sell their grain to a feedlot, competing grain company, or an ethanol plant if they choose. It is important to take into account the impacts of these other competitors, especially in the non-harvest months, when price is the most important factor.

Something else to consider is the ease at which a producer can switch between delivering grain to a grain company or delivering grain to an ethanol plant, feed yard, or another type of end user. As long as the producer's grain is not under contract with the grain company, they are free to take their grain to whatever entity they choose.

2.6 Rivalry

The last of the five forces is rivalry among existing competitors. Initially, there may be a flurry of price competition, but after a small amount of time this should decrease. The reasons for this are the size of the competing companies, production growth, and competition on dimensions other than price. Because of the size of CHS, Inc. and its lower cost structure, the other companies may not be able to compete on price. If they do, CHS, Inc. can match prices and still have the higher return due to its lower cost structure. Furthermore, with the average yield of soybeans and corn increasing, thereby increasing grain volumes, there should be enough grain produced in the area to reduce some of the pressure of rivalry. Speed is another competitive factor for grain facilities, and with a new state-of-the-art facility, other grain elevators in the area may not be able to compete with CHS Agri Service Center on speed. These three factors should be enough to match any

long term price competition, as price competition will negatively affect the other competitors more than CHS Agri Service Center.

2.7 Retail Agribusiness Competitive Environment

The competitive environment in retail agriculture has caused a consolidation of small grain companies into regional sized grain companies in order to be more competitive. The number of cooperatives in Nebraska has fallen in the last 30 years by 75% from around 200 in 1980 to about 50 today. During the last 30 years, the average yield of corn has grown from 85 bushels per acre in 1980 to 178 bushels per acre in 2009, resulting in a yearly average increase of 3.2 bushels.[6] A key reason for the mergers during this period of time was price competition to the point of financial breakeven. As a result, many grain facilities could not afford to add enough storage to keep pace with production increases, creating the opportunities for those companies with the capital to take advantage of them.

During the last few years, there has been a renewed effort by many grain companies to upgrade current facilities, examine Greenfield expansion projects, and add more rail access to obtain or increase access to distant markets. In 2007, Scoular Company built a 1.7 million bushel Greenfield site in Holdrege, Nebraska within seven miles of three other grain facilities, two of which are in the same town.[7] The reasons Scoular Company did this were that they believed there was enough surplus corn in the area to support their new facility, and Scoular Company had negotiated rail rates to Colorado with the Nebraska, Kansas, and Colorado Railroad (NKCR), a short line railroad, that provides them a competitive advantage in pricing within the region. Access to the Colorado market was

[6] (Nebraska Corn Board n.d.)
[7] (Scoular Company 2007)

important to them as it has traditionally been a deficit corn market and pays a premium for corn.

ADM is another large grain company that is in an expansion mode in Nebraska. They announced on December, 9th 2010 that they would be adding two Greenfield sites, one in Fullerton and the other in Newman Grove, Nebraska, each with a capacity of 3.5 million bushels.[8] These two elevators will be truck only facilities, meaning they will not have the capability to load shuttle trains. The rationale for these facilities is to use them as supply depots for their ethanol plant in Columbus, Nebraska.

Gavilon, another grain company that operates in Nebraska, has announced plans for a Greenfield shuttle loading facility in Benkelman, Nebraska on August 23, 2010. They plan on building a facility with 4.8 million bushels of storage capacity.[9]

This phenomenon is not just in Nebraska; new grain facilities are being constructed in other states as well. Gavilon and Wheat Growers are two grain companies that have been active in adding Greenfield shuttle loading facilities. Gavilon recently announced plans to build another new shuttle loading facility in Chester, Montana. They decided to go with 600,000 bushels of concrete storage, with the rest of the storage coming from a large ground pile. This is small for a shuttle loading facility, but the cost structure is very low for this type of shuttle loader.[10] Gavilon also made headlines in October with the buyout of DeBruce grain, a large grain company with storage capacity of 140 million bushels.[11] Wheat Growers added a shuttle loading facility at Andover, South Dakota that has 3.1 million bushels of capacity and more than tripled the capacity of a facility at Roscoe, South

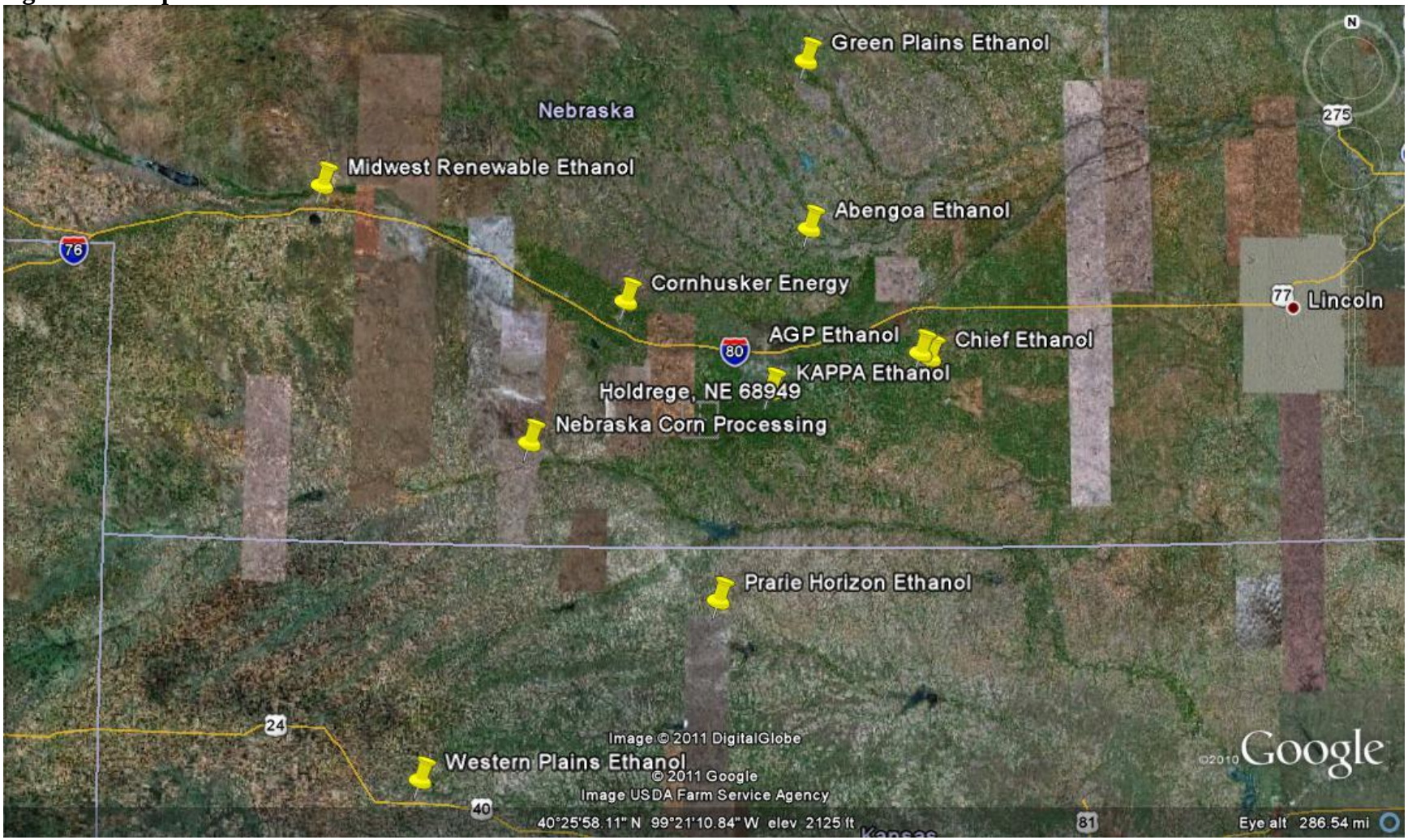
[8] (ADM Media Relations 2010)
[9] (Gavilon Benkelman 2010)
[10] (Gavilon Greenfield Site Chester Montana 2010)
[11] (Gavilon Acqusition of DeBruce 2011)

Dakota, as well as adding a one mile long circle track to make the Roscoe facility a shuttle loader. This $40 million project by Wheat Growers is only the first of two phases, as Wheat Growers will also be spending another $47 million to upgrade 11 more facilities in South Dakota.[12] These companies are acting now to gain new territories and advantages over competitors.

Another competitor that has been increasing its size and use of corn in these regions are the ethanol plants. In the 100 mile radius around Holdrege, there are 10 ethanol facilities, many of which have expanded their facilities in recent years. These ethanol plants can be seen on a map in figure 2.1. The ethanol plants can be rewarding and challenging as a competitor. On one hand, they need large volumes of corn year round to operate. For a grain company, this provides a good home for corn if a better margin cannot be found in another market. On the other hand, the grain that once went into the grain companies may now be going directly to the ethanol plant. During harvest this is not a big problem as most grain companies have all the grain they can handle at this time of the year. However, during the rest of the year it only makes the fierce competition that is seen in the grain industry even more fierce and cuts deeper into margins.

[12] (Schmit 2010)

Figure 2.1: Map of Ethanol Plants in South Central Nebraska



2.8 Alternative Strategy for a Greenfield Site

If, at the end of this project it is decided that there are no ideal sites for building a Greenfield elevator, there are other options that can be pursued in this market place. One of these is to ally with a competitor through long term contracts, a joint venture, or merger. An alliance might allow a scenario to be feasible when without cooperation it would fail. These agreements must be mutually beneficial to all entities, most likely reducing the risk and capital cost for all involved.

CHAPTER III: THEORY

Because capital is a finite resource, it is important when picking an investment project that the project is the best use of capital. This means that the project needs to have a higher return than the cost of capital. CHS Agri Service Center has several projects that it is considering. Since CHS Agri Service Center has a limited amount of investment capital from earnings, they cannot fund every project that is profitable. Therefore the best project needs to be discovered.

To determine if a project will move forward, Net Present Value (NPV) is used. Net Present Value is the difference between the project's value and the project's cost. NPV is a well-known tool because it takes into account the time value of money, which means that a dollar today has more value than a dollar tomorrow. In addition, the opportunity cost of capital is taken into consideration. This is the expected return that is foregone by investing in a project rather than a comparable financial security.[13]

Another financial tool that can be used to determine the feasibility of a project is Internal Rate of Return or IRR. IRR is the rate of discount that makes NPV equal to zero. The idea behind IRR is to accept the project if the opportunity cost of capital is less than the internal rate of return. Using NPV in conjunction with IRR shows the level of cost of capital at which the projects have a positive NPV. If this level of cost of capital is above the minimum level of cost of capital set forth by CHS, Inc. then the project will move forward. CHS, Inc. has a minimum level of cost of capital set at 12%. While somewhat simplistic, this is a common method incorporated in economic and finance theory for valuation of corporate investments. The next chapter provides information on the data methods.

[13] (Allen, 2008)

CHAPTER IV: DATA AND METHODS

The parameters of this project are to find a location or locations to build Greenfield grain handling facilities that are profitable enough to earn at least a 12% ROA, and are close enough to CHS Agri Service Center's current trade territory so the new facilities can be managed and operated from the current main office in Holdrege, Nebraska. The maximum distance for these sites was decided by drive time. The projects need to be within an hour and a half of Holdrege (roughly 100 miles). This is so the facility is close enough to Holdrege that it can be a part of the group of locations that CHS Agri Service Center currently has, and close enough so a new location would not be in a different marketing area. Having locations close together enables the sharing of equipment and personnel, which is important in keeping costs down. A new location built in a market that is understood also saves time, reduces the risk of a bad trade, and maximizes margins.

The first step in data collection was to determine grain supply and the production levels for all of the grains grown in the area. This data shows by county exactly what types of grain and quantities of those grains grown. The next step was to obtain demand numbers for this area, specifically how much grain is going to livestock, ethanol, and competing grain companies already in these counties. With the supply and demand numbers known, a clear picture county-by-county appears as to where the grain surpluses are as well as the location of grain deficits. After identifying counties that have surplus grain, a more in-depth study of these counties was undertaken to find the best location for a new facility.

Table 4.1 shows how the supply and demand data for each county is compiled to produce a net grain surplus or deficit in the county. Viewing all of the counties together conveys an idea of grain surpluses and deficits over a regional area. The first step in the

calculation of supply is to add all of the grains together. The grain bushels are three-year averages. The next step is to compile all of the demand factors for the county, whether feedlots, ethanol, or other grain companies. The last step is to subtract the demand bushels from the supply bushels to obtain the net grain total. A negative number represents a deficit grain total. The supply data were obtained from the U.S. Department of Agriculture National Agricultural Statistics Service and the demand data were obtained from BeefSpotter[14], ethanol plant websites, Kansas Grain and Feed Association[15], and Nebraska Grain and Feed Association.[16]

[14] (Publications 2010)
[15] (K. G. Association 2010)
[16] (N. G. Association 2010)

Table 4.1: Surplus and Deficit County Data for the Kansas Region

DECATUR COUNTY		NORTON COUNTY		PHILLIPS COUNTY		SMITH COUNTY		JEWELL COUNTY	
CORN	5,620,750	CORN	6,145,433	CORN	3,179,733	CORN	2,496,433	CORN	1,489,550
WHEAT	4,934,000	WHEAT	3,320,500	WHEAT	3,957,500	WHEAT	4,962,000	WHEAT	5,349,000
SOYBEAN	0	SOYBEAN	313,800	SOYBEAN	390,500	SOYBEAN	1,198,400	SOYBEAN	2,387,967
SORGHUM	898,950	SORGHUM	1,658,900	SORGHUM	3,842,400	SORGHUM	6,282,933	SORGHUM	5,906,400
FEEDLOT	3,160,000	FEEDLOT	237,000	FEEDLOT	79,000	FEEDLOT	78,921	FEEDLOT	394,921
GRAIN CO.	5,574,000	GRAIN CO.	2,657,000	GRAIN CO.	4,644,000	GRAIN CO.	4,545,000	GRAIN CO.	2,118,000
ETHANOL	0	ETHANOL	0	ETHANOL	14,800,000	ETHANOL	0	ETHANOL	0
NET GRAIN	2,719,700	NET GRAIN	8,544,633	NET GRAIN	-8,152,867	NET GRAIN	10,315,846	NET GRAIN	12,619,996
SHERIDAN COUNTY		GRAHAM COUNTY		ROOKS COUNTY		OSBORNE COUNTY		MITCHELL COUNTY	
CORN	17,994,000	CORN	2,203,400	CORN	511,733	CORN	1,239,000	CORN	951,133
WHEAT	4,020,500	WHEAT	2,496,000	WHEAT	3,854,000	WHEAT	4,651,000	WHEAT	8,085,500
SOYBEAN	484,400	SOYBEAN	130,150	SOYBEAN	544,000	SOYBEAN	740,500	SOYBEAN	1,302,200
SORGHUM	2,286,700	SORGHUM	4,602,933	SORGHUM	4,695,533	SORGHUM	4,637,400	SORGHUM	5,425,133
FEEDLOT	4,187,000	FEEDLOT	0	FEEDLOT	711,000	FEEDLOT	237,000	FEEDLOT	1,303,500
GRAIN CO.	3,706,000	GRAIN CO.	1,944,000	GRAIN CO.	3,835,000	GRAIN CO.	5,554,000	GRAIN CO.	10,627,172
ETHANOL	17,800,000	ETHANOL	0	ETHANOL	0	ETHANOL	0	ETHANOL	0
NET GRAIN	-907,400	NET GRAIN	7,488,483	NET GRAIN	5,059,267	NET GRAIN	5,476,900	NET GRAIN	3,833,295

4.1 Calculation of the Supply of Grains

Yield statistics for the selected counties came from the USDA. The National Agriculture Statistics Service has data by county dating back to 1863. Because of the changes in seed technology, only data for the years 2006 through 2009 were used in the calculation to establish if the county is net surplus or deficit grain. The grain production is listed by county and by grain type. This data was averaged over this time period to remove variability due to drought, hail, disease, or crop rotation. This process was used for each county to determine reliable production numbers. Because the trend yield for the crops increases yearly, using the average does not capture the full yield increase over the three years and should result in a conservative yield estimate.

4.2 Calculation of the Demand for Grains

Calculating the use of grains or demand is a more difficult task than estimating the supply. The demand for grain comes from grain companies already in the area, feed yards, and ethanol plants. The grain companies have a limited amount of storage space and that capacity number is used in the calculations for grain company demand. Grain companies typically turn over an elevator more than one time per year. In fact, CHS Agri Service Center turned over its facilities 1.65 times in 2009. The reason elevator capacity was not multiplied by 1.65 times in the demand model is that at least some of the grain delivered to the elevators is sold to ethanol and feed yards. If this multiplier were used, the grain demanded by ethanol and feed yards would be overstated. Hence, the data for demand is likely to understate demand. This formula is based on volumes moved out of the area by rail and therefore cannot go to local demand sources.

The next step in determining demand is to determine the number of feed yards and their capacities. Knowing the cattle and/or hog capacity allows for the calculation of how much grain they can consume. To feed a 600 pound steer to completion takes 60.7 pounds of corn.[17] However, 35% of this corn ration is to be fed as distillers grain reducing the actual corn use to 39.5 bushels per head. It takes approximately 185 days to achieve this growth and the feed yard could feed out two steers each year.[18] This suggests that for every head of capacity, there is a potential use of 79 bushels of corn. This formula is the typical ration for growing and finishing cattle in the area.[19]

In order not to count demand for corn between the ethanol plants and the feed yards twice, the amount of distiller's grain substituted for corn needed to be adjusted for. Based on feedlots in the Holdrege, Nebraska area, it is common for these feedlots to use a 35% feed blend of dry distiller's grain and feeders can use up to 50% dry distiller's grain in the cattle's diet.[20] The 35% level of dry distiller's grain substitution was used in place of corn because it is cheaper and at this level it does not negatively affect the health or weight gain of the animal.[21]

Since a feedlot can turn over its cattle two times in a year, this multiplier was used in the calculation of feed yard demand. Even though prices for grain are high, there has not been a decline in cattle numbers in feedlots. In fact, there was a significant increase in year over year cattle on feed numbers. Cattle and calves on feed for slaughter market in the United States for feedlots with capacity of 1,000 or more head totaled 11.6 million head on

[17] (Erickson 2008)
[18] (Erickson 2008)
[19] (Erickson, 2008)
[20] (Feeding Co-Products)
[21] (Feeding Co-Products)

February 1, 2011. The inventory was 6 percent above February 1, 2010.[22] Because of this increase, it is assumed in the demand calculation for feedlots that the feedlots are running at full capacity; therefore the calculations for feedlot demand reflect that as well. There is only one firm that feeds hogs near Holdrege and this corn use must be accounted for in the analysis. Dr. Rob Musser explained that feeder hogs eat a diet of 25-30% dried distiller's grain with 5-10% soybean meal, and 60% corn. There are other nutritional additives, but since they are negligible in the overall percentage weight of the diet, they have been left out of the calculation for corn demand. Dr. Musser is the Director of Sales and Services at NutriQuest which focuses on nutritional additives for livestock feed. Hogs consume about 5 pounds of total feed rations per day, with corn being 60% of this amount (3 pounds). Each hog uses 3 pounds of corn per day, multiplied by 365 days, thus equaling 1095 pounds per head per year or 19.55 bushels per head.[23] In the calculation for corn use, the hog pens were determined to be at full capacity, therefore the amount of hogs was multiplied by 19.55 bushels to calculate the corn use for hogs in the area.

The last demand factor is ethanol use. One bushel of corn produces 2.7 gallons of ethanol. To determine the demand for each plant, the maximum ethanol production of each ethanol plant was determined and divided by 2.7 to get the amount of bushels needed for full capacity. Even with the historically high prices, ethanol plants are able to operate close to breakeven. Because of this, the demand calculations for ethanol were calculated at full capacity. Table 4.2 shows an example of how the supply and demand factors for each county created a surplus or deficit grain position.

[22] (USDA, 2011)
[23] (Rob Musser, 2011)

Table 4.2: Supply and Demand Factors in Buffalo County Nebraska

SUPPLY

CROP	CORN	WHEAT	SOYBEANS	SORGHUM
2007	38,774,300	403,800	2,779,400	148,900
2008	34,101,200	379,200	3,588,200	0
2009	38,643,700		4,477,800	0
AVERAGE	37,173,067	391,500	3,615,133	49,633

DEMAND

	NAME	**CITY**	**SIZE**	**BU/HEAD**	**TURN OVER/YR**	**TOTAL CORN USED**
FEEDLOTS	LEWIS FEEDLOT	KEARNEY	12000	39.5	2	948,000
	MOO FEEDLOT	KEARNEY	3000	39.5	2	237,000
	PLATTE VALLEY FEEDERS	KEARNEY	13000	39.5	2	1,027,000
						2,212,000
				RAIL LINE	**TRACK CAP.**	**FACILITY CAP.**
GRAIN CO.	CHS	ELM CREEK		UPRR	100	3,504,000
	KAAPA	ELM CREEK		UPRR	100	5,500,000
	CARGILL	GIBBON		UPRR	100	5,803,000
	B4 GRAIN	KEARNEY				564,000
	PEAVEY	KEARNEY		UPRR	100	2,270,000
	CARGILL	RAVENNA		BNSF	54	1,000,000
	CARGILL	SHELTON		UPRR	100	5,113,000
						23,754,000
				CAPACITY	**BU/GALLON**	
ETHANOL	ABENGOA BIO	RAVENNA		88,000,000	2.7	32,592,593
					NET COUNTY	-17,329,259

4.3 Google Earth

Another tool used to determine the location for a new facility was Google Earth. This tool allows for close detailed views of satellite pictures. This program was effective in showing where farmland was, including which land has irrigation pivots on them. Once a county with a large amount of surplus grain was found, this tool was used to pinpoint where, within that county the best site for a new facility may be. Being able to locate the facility near large amounts of grain production reduces the distance for producers to haul their crop from the field to the elevator.

4.4 Calculation of Shuttle Loading Facilities

Cost estimates on two mock shuttle loading facilities were examined using cost data from recent CHS, Inc. projects and current operations as a guide. The cost of the track and switches (a rail switch is a mechanical device that allows rail cars to be guided from one track to another) was removed to get the estimates for truck shipment only facilities. At this point the NPV and ROA were constructed using Microsoft Excel, determining whether any potential sites and facilities would be financially feasible given the parameters of the overall project.

Another important aspect to understand is whether or not the grain companies have rail access and how many cars they can ship at one time. This is very important when determining the potential competitiveness of a grain company. Because of the size and speed that a full shuttle train (100 or 110 cars) can move grain and the added market reach this enables them, it is important when considering a new location. Even locations that can load 27 car units see some benefits in the cost of shuttle movements, as well as being able to sell grain to additional markets. These rail lines can be seen on Figures 4.3 and 4.4, for

Nebraska and Kansas respectively. These rail lines were an important tool in site selection as rail access increases the competitiveness of a facility.

4.5 Cost Estimates for Greenfield Facilities

Cost estimates for two types of structures that are referred to as project A and B were calculated. Estimates were taken from engineering cost information derived from constructing new facilities. Each project included an analysis of rail and truck access. It was apparent that projects A and B would need to have rail access to be feasible.

Project A includes 120 car rail loop track, 600,000 bushel concrete house, 7000 bushel per hour dryer, 160,000 bushel steel wet tank, 600,000 bushel steel tank, 1.5 million bushel ground pile, office, and scales. Project B includes 120 car rail loop track, 600,000 concrete house, 7,000 bushel per hour dryer, 160,000 bushel concrete wet tank, 600,000 bushel concrete tank, 1.5 million bushel ground pile, office, and scales. The difference between the two projects is that Project A has a 600,000 bushel steel tank, whereas Project B has a concrete tank. The reason for this difference is that concrete is depreciated over 40 years and steel is depreciated over 20 years. This difference in depreciation may lead to better margins due to a smaller yearly depreciation expense for project B. Rail access is a critical factor for speed and future expected yield increases.

The next chapter describes the results.

Figure 4.3: Nebraska Geographical Region Studied.

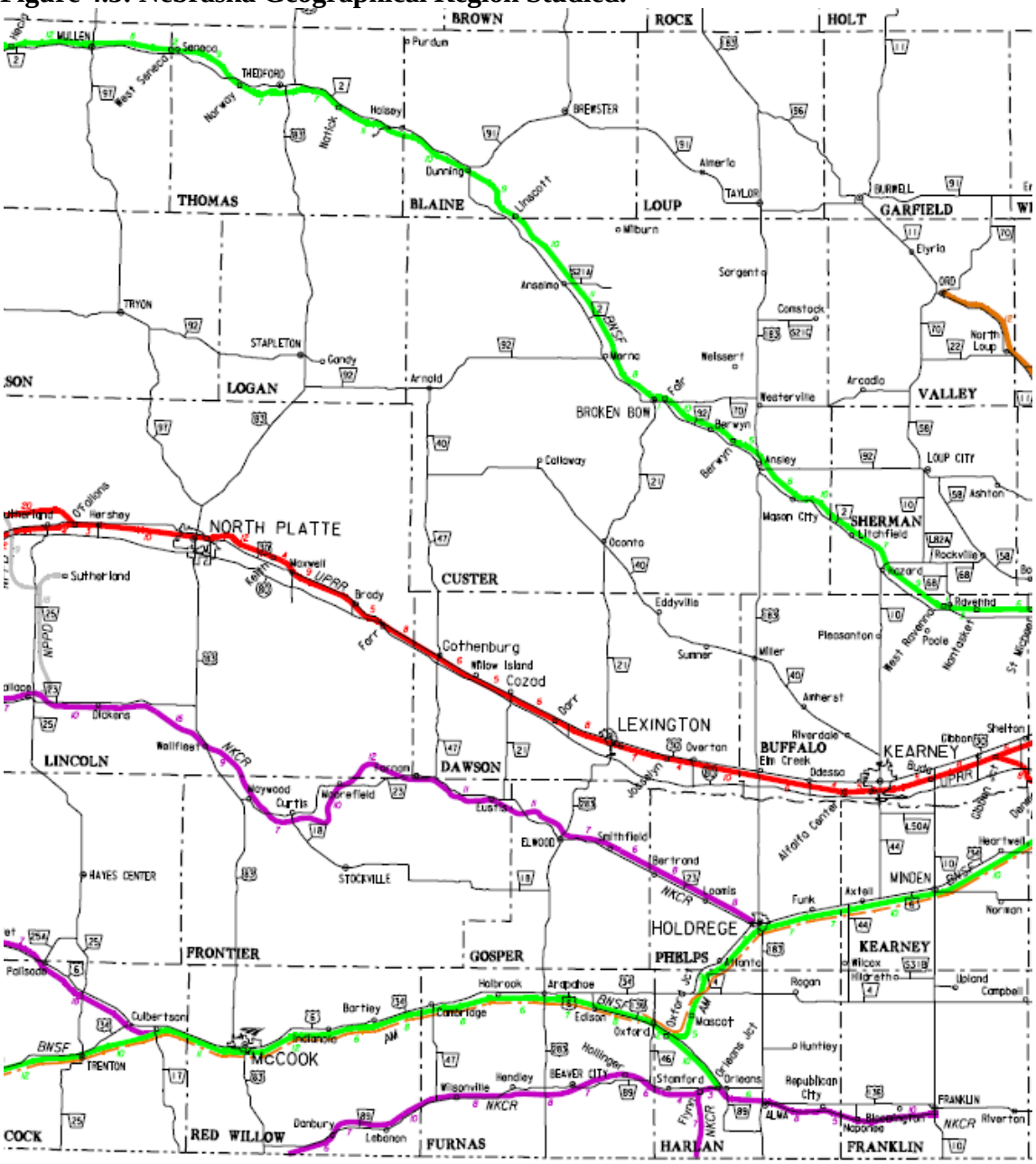
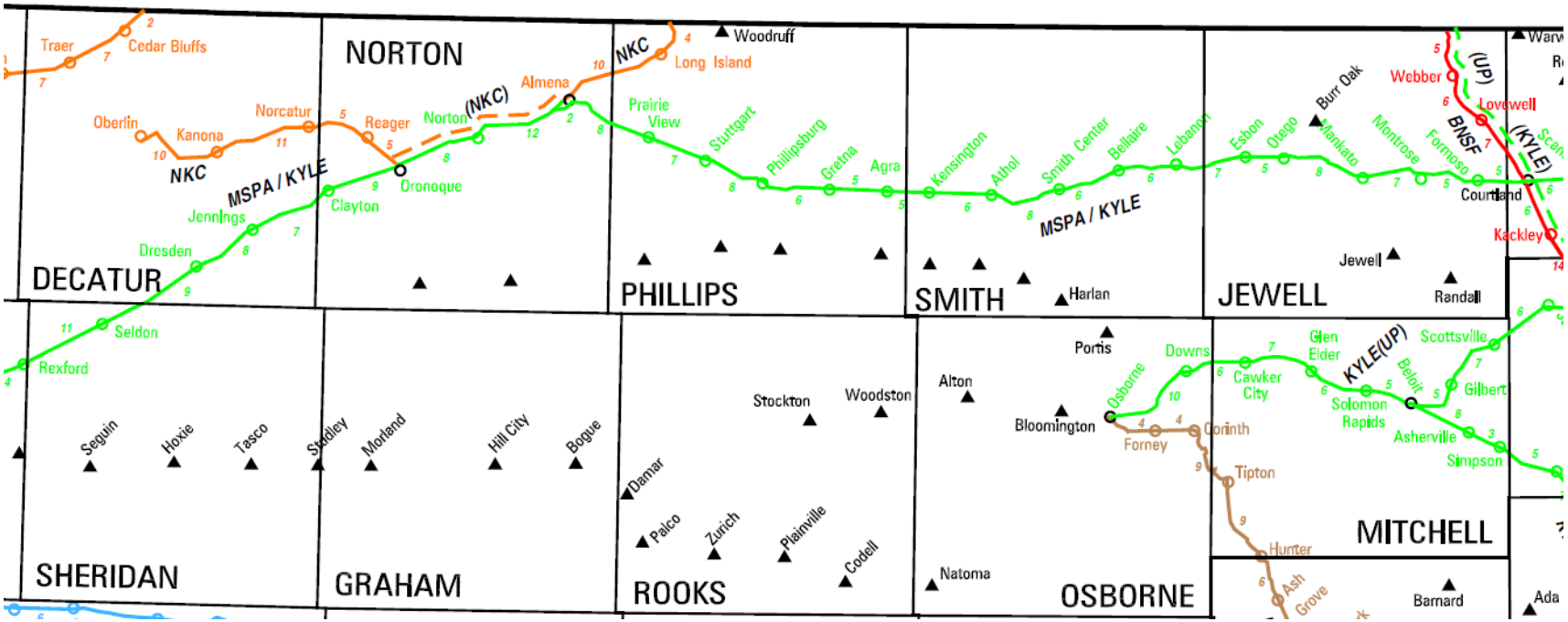


Figure 4.4: Kansas Geographical Region Studied.



CHAPTER V: RESULTS

Three parameters were used to determine the exact site of a new facility. First, the facility should be placed in an area that has a large amount of surplus grain. Figure 5.1 is a list of all counties that were researched for this thesis with data on crop production, uses of the grain, and a net value for each county. Second, the facility should be near rail lines so loading a shuttle train would be possible. A shuttle train is a 100 or a 110 unit car train, and because of this size the railroad can move a large quantity of goods efficiently, allowing the railroads to pass on these cost savings to the shipper. Another benefit to loading shuttle trains is access to more markets. Typically, these distant markets pay more for grain than local markets because they have deficit amounts of grain, whereas the local region is surplus grain.

Table 5.1: Net Production by County

County	Production	Ethanol Use	Feedlot Use	Grain Companies	Net Production
Thomas	0	0	0	0	0
Blaine	242,000	0	0	0	242,000
Loup	1,270,100	0	0	0	1,270,100
Garfield	1,813,667	0	790,000	0	1,023,667
Logan	3,657,567	0	0	0	3,657,567
Custer	43,733,316	0	8,532,000	4,809,831	30,391,485
Valley	13,872,500	18,500,000	553,000	5,042,000	-10,222,500
Sherman	15,013,367	0	0	1,236,000	13,777,367
Lincoln	37,186,167	10,400,000	9,440,500	6,890,000	10,455,667
Dawson	40,952,717	14,814,815	12,213,400	11,622,000	2,302,502
Buffalo	41,229,333	32,592,593	2,212,000	23,754,000	-17,329,260
Frontier	15,844,500	0	0	6,631,000	9,213,500
Gosper	16,792,201	0	0	827,000	15,965,201
Phelps	41,213,234	0	8,508,300	20,036,652	12,668,282
Kearney	36,066,867	20,370,000	2,607,000	16,268,000	-3,178,133
Adams	38,167,301	42,260,000	3,950,000	35,712,000	-43,754,699
Red Willow	17,000,834	0	2,054,000	10,586,671	4,360,163
Furnas	19,494,333	16,300,000	0	10,436,000	-7,241,667
Harlan	19,555,650	0	790,000	6,476,000	12,289,650
Franklin	18,228,666	0	0	5,337,000	12,891,666
Webster	15,844,367	0	3,792,000	6,974,000	5,078,367
Decatur	11,453,700	0	3,160,000	5,574,000	2,719,700
Norton	11,438,633	0	237,000	2,657,000	8,544,633
Phillips	11,370,133	14,800,000	79,000	4,644,000	-8,152,867
Smith	14,939,766	0	78,921	4,545,000	10,315,845
Jewell	15,132,917	0	394,921	2,118,000	12,619,996
Sheridan	24,785,600	17,800,000	4,187,000	3,706,000	-907,400
Graham	9,432,483	0	0	1,944,000	7,488,483
Rooks	9,605,266	0	711,000	3,835,000	5,059,266
Osborne	11,267,900	0	237,000	5,554,000	5,476,900
Mitchell	15,763,966	0	1,303,500	10,627,172	3,833,294

The third parameter for site selection is to study satellite imagery to determine where cropland is located in the counties. This tool allows for detailed views of farms to determine where farmland is, including which land has irrigation pivots on it. Once a county with a large amount of surplus grain was found then this tool was used to pinpoint exactly within that county where the best site for a new facility would be. The advantage of this tool is being able to locate a facility near large amounts of high yield land, reducing the distance for a majority of the producers to get their crop from the field to the elevator, in turn reducing the transportation cost for the producer and increases the likelihood that the grain will go to that facility, maximizing grain volume.

With all of the county data researched, it was apparent that there were only two counties that that were good candidates to have enough surplus grain to support a Greenfield facility. These counties had the most surplus grain either within the county or surrounding the county that would be needed to reach the volumes necessary for a profitable grain facility. The two cities that were picked to be the best locations based on grain surplus, nearby farm land, and access to rail and highway, were Merna, Nebraska and Esbon, Kansas. These locations satisfy the conditions stated earlier in that both are located 100 miles or less from Holdrege, have rail access, and are in a surplus region for grain.

The reason that Esbon was picked as a Greenfield site was that Jewell County has the highest amount of surplus grain of all the Kansas counties researched, with 12,619,996 bushels. Esbon is also near the county line, only a few miles from Smith County, which has the second largest amount of surplus grain in the Kansas counties researched, with 10,315,846 bushels, and Esbon is located on the KYLE short line railroad. The reasons that Merna was chosen is that it is in a county with the most grain surplus of all 31 counties researched, is located on the BNSF

mainline, and is centered in the heart of the best farmland in the county. Aerial views of these two sites can be seen in figure 5.1 and 5.2.

Once the sites for the potential new facilities were selected, crop yield data was studied, specifically to predict how much the yield of corn, soybeans, wheat, and sorghum may change over the life of the project. Twenty years were assumed for the life of the project because that is the amount of time it would require to repay the loan, and project types with steel bins would be fully depreciated in 20 years. The process of predicting future yield statistics started with obtaining yield data history. The yield data indicate a linear trend across all grains over a 70-year time frame, with the one exception being in Jewell County. For Jewell County, the corn production data only went back as far as 1958 but the trend line from 1958 to 2009 was linear as well. Corn yield data for the CHS Agri Service Center has been increasing at an average rate of 2.56% per year. However, corn bushels delivered has been increasing at a rate of 4% per year. Some of this discrepancy may stem from a lack of new on-farm storage, which means that a greater percentage of the producer's crop has to be brought in at harvest, leaving the same amount of bushels on farm to deliver later. CHS Agri Service Center has a better chance of getting the grain at harvest rather than after, because of the increased competition for the grain after harvest.

With trend yield for corn increasing yearly this would suggest that 1 million bushels of production today should increase to 1.57 million bushels produced 20 years from now. The reasons for these yield increases are improved hybrids, fertilizers, equipment, and soil improvement techniques. Since the life of the project is 20 years and the production of grains at the beginning of the project compared to the end of the project are going to be very different, it is important to consider these increased production levels. To do this, the production numbers were

increased over a 20-year period using the trend increases for the area being studied and for each grain type.

Figure 5.1: Google Earth Map of Custer County

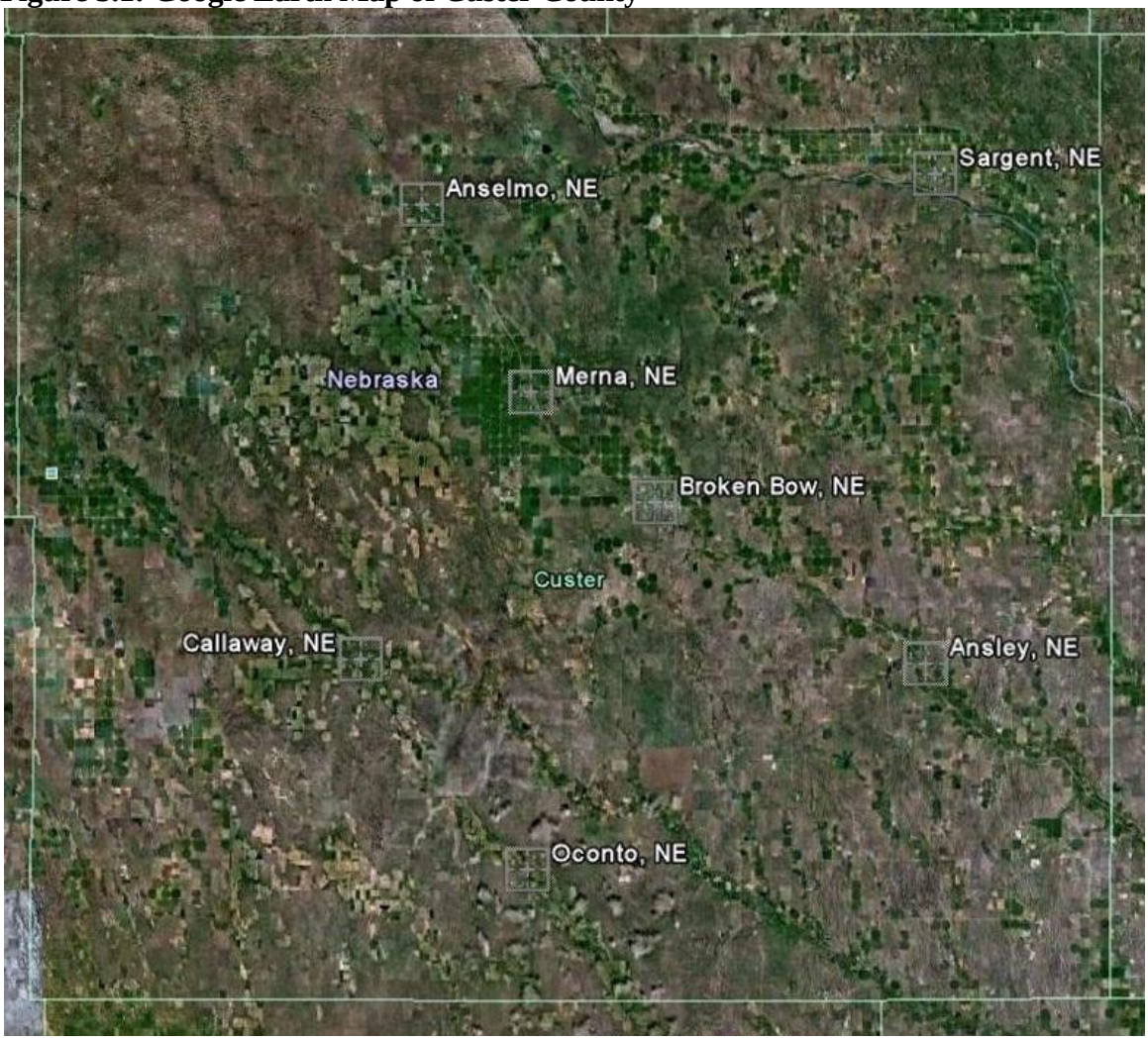


Figure 5.2: Google Earth Map of Jewell County

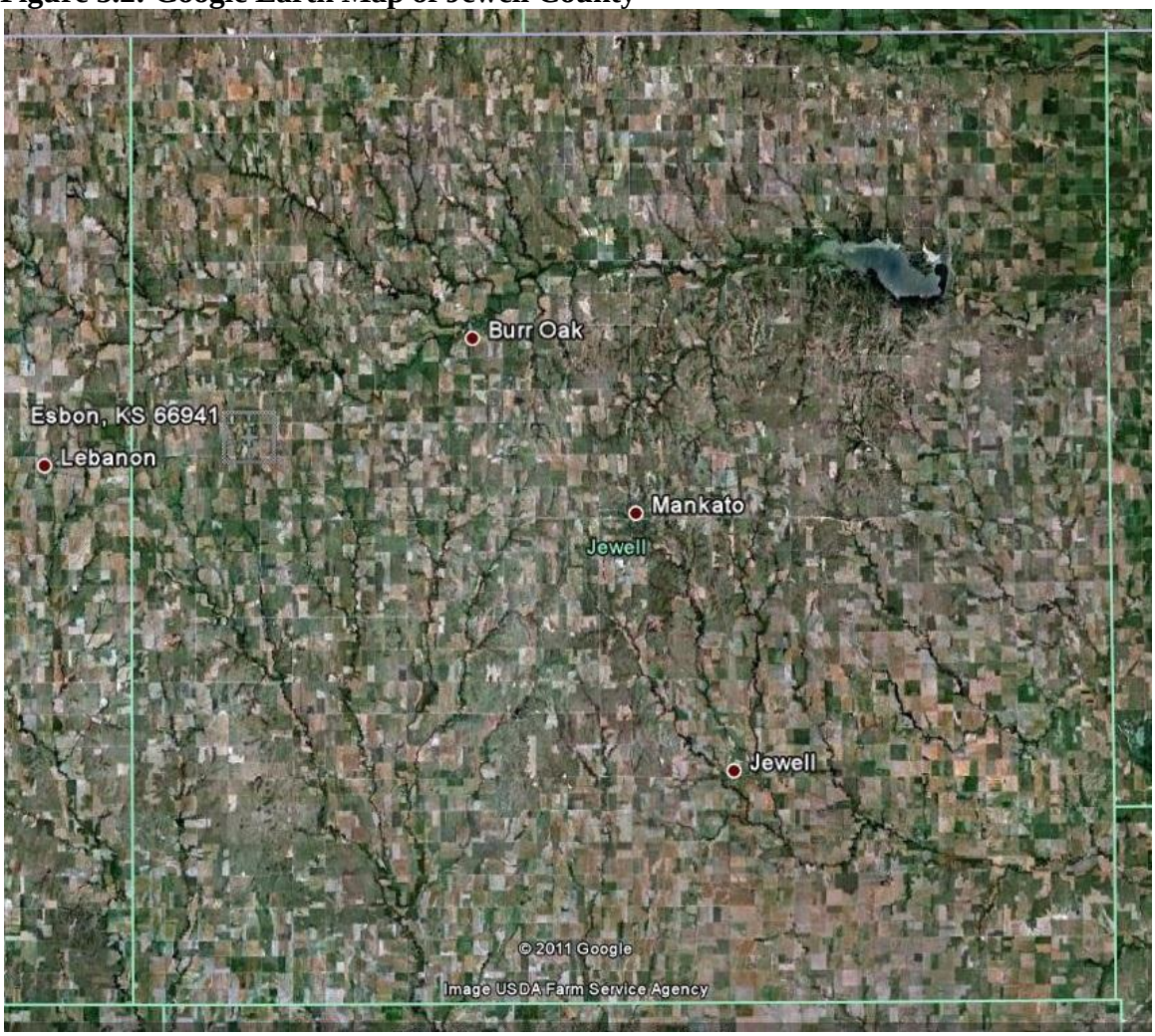


Figure 5.3 illustrates the estimated trend yield increase for corn at Merna, and Figure 5.4 illustrates the trend yield for all grain at Esbon, based on trend data from 1940 and projecting out to 2030. The historical yield data for corn at Merna has a high level of correlation to the trend line, showing little volatility year to year. In fact, on average there is only a 2.86% variance between the trend yield and the actual yield between 1940 and 2010. The historical yield data for corn at Esbon are not positively correlated and show that there is a lot more volatility. The average variance from the trend yield at Esbon is 30.54% and this translates into a greater amount of risk when predicting grain volumes. For this project, that means that there may be more error involved

in the calculation of trend yields at Esbon. This is why a data period of 70 years was used, in hopes of reducing this error by using a larger sample.

It is very important to take into consideration the increasing grain yield over the life of the project. In the cases of the Merna and Esbon locations, the trend yield increases correspond to an estimated increased grain volume around 5 million bushels by the year 2030 for each location. The projects are mutually exclusive based on the boundaries of this research project.

Figure 5.3: Corn Yield for Custer County Nebraska

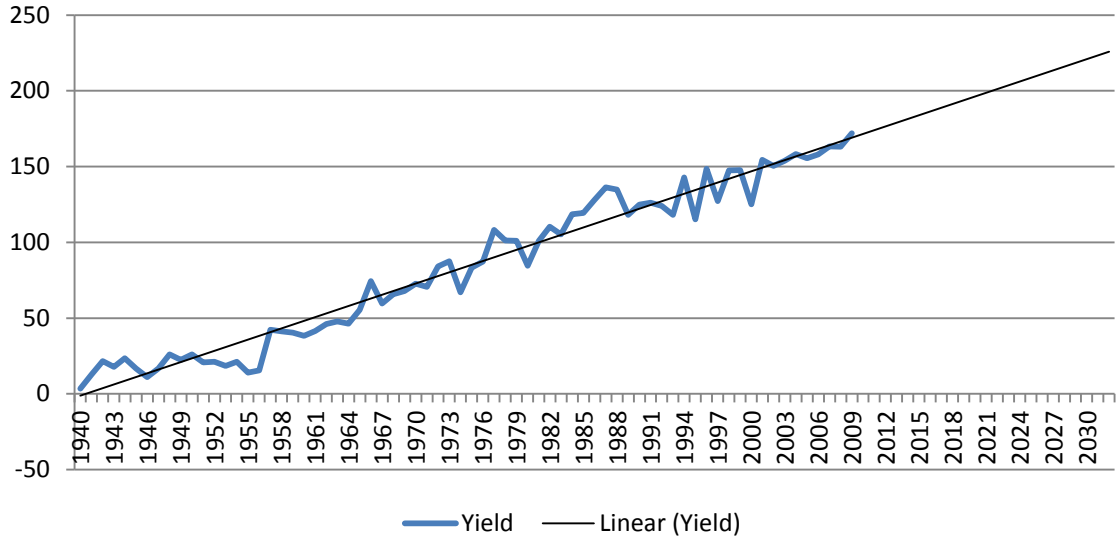


Figure 5.4: Crop Yields for Jewell County Kansas

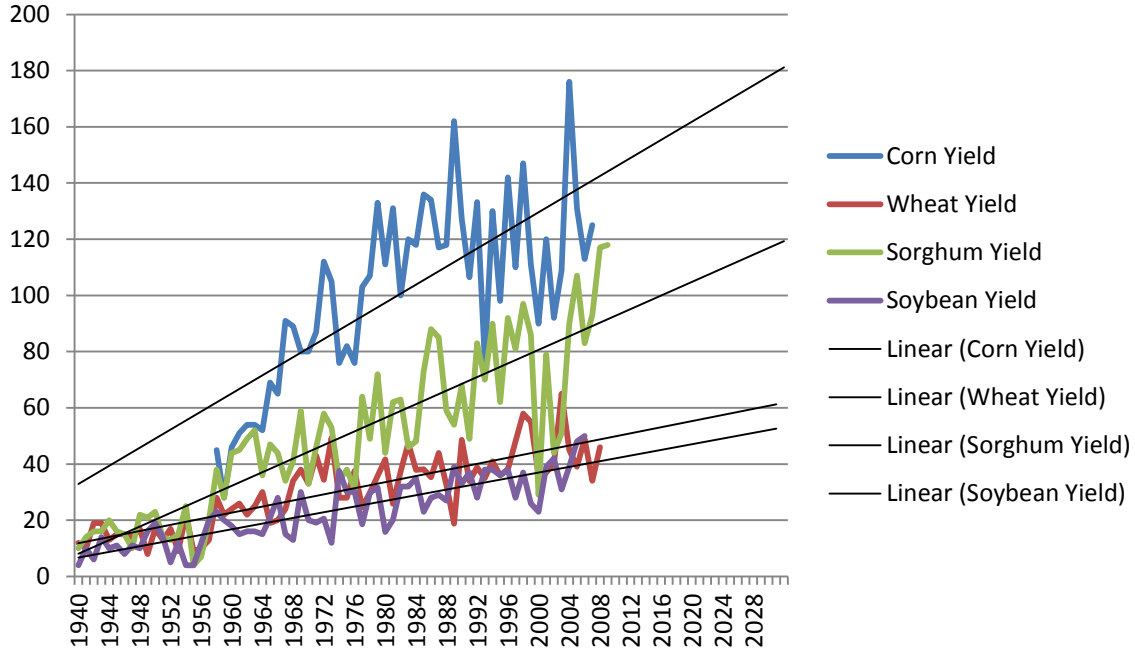


Table 5.2 shows the NPV calculation for each site. Neither Merna, nor Esbon would handle enough grain to be profitable at a 12% or better ROA. It did not matter what type of facility was built, whether it was steel or concrete. It did not make enough difference to reach the 12% ROA hurdle. Being able to load rail was better in both project types and this shows just how important having access to the rail markets is in being profitable. However, rail access did not make enough difference to justify building a new grain facility. Since neither project types could return 12% ROA, only the project type with the highest rate of return is reviewed here. The project that came out ahead was Project B because it is the lowest cost facility to build (it is all concrete and can be depreciated over a longer period of time than a steel facility).

Table 5.2: NPV Calculation for Project B at Esbon and Project B at Merna

	Rail Cost	Interest Rate	Year on Loan	Dryer/Wet Bin Addition	Opportunity Cost of Capital		
	$2,408,472	5.00%	20	$2,300,000	7.5530% IRR		
Esbon Project B		**Year**		**Bushels Produced**	**Income**	**Expenses**	**Net Income**
Project Cost	$14,433,138	C0	($14,433,138)				
		2011	$907,271	7,639,063	$3,047,986	2,140,715	907,271
Margin Cents/Bushel	$0.29	2012	$970,102	7,830,039	$3,124,186	2,154,084	970,102
Storage cents/bushel	$0.07	2013	$1,034,504	8,025,790	$3,202,290	2,167,786	1,034,504
Drying cents/bushel	$0.04	2014	$1,100,516	8,226,435	$3,282,347	2,181,831	1,100,516
Total Cents/Bushel	$0.40	2015	$1,168,179	8,432,096	$3,364,406	2,196,227	1,168,179
# of Trains Loaded	22	2016	$1,237,533	8,642,898	$3,448,516	2,210,984	1,237,533
		2017	$1,308,621	8,858,971	$3,534,729	2,226,109	1,308,621
		2018	$1,381,486	9,080,445	$3,623,097	2,241,612	1,381,486
		2019	$1,456,172	9,307,456	$3,713,675	2,257,503	1,456,172
Annual Facility Cost	$1,158,152	2020	$1,532,726	9,540,142	$3,806,517	2,273,791	1,532,726
Labor Cost Per Bushel	0.04	2021	$1,611,194	9,778,646	$3,901,680	2,290,486	1,611,194
Maintenance/MISC	75,000.00	2022	$1,691,623	10,023,112	$3,999,222	2,307,599	1,691,623
Utilities Per Bushel	0.03	2023	$1,774,063	10,273,690	$4,099,202	2,325,139	1,774,063
Total Cents Per Bushel	0.070	2024	$1,858,564	10,530,532	$4,201,682	2,343,118	1,858,564
Annual Truck Expense	$12,000	2025	$1,945,178	10,793,795	$4,306,724	2,361,546	1,945,178
Annual Depreciation	$360,828	2026	$2,033,957	11,063,640	$4,414,392	2,380,436	2,033,957
		2027	$2,124,955	11,340,231	$4,524,752	2,399,797	2,124,955
		2028	$2,218,229	11,623,737	$4,637,871	2,419,642	2,218,229
		2029	$2,313,834	11,914,330	$4,753,818	2,439,984	2,313,834
		2030	$2,411,829	12,212,189	$4,872,663	2,460,834	2,411,829
		NPV	$57				

	Rail Cost	Interest Rate	Year on Loan	Dryer/Wet Bin Add On	Opportunity Cost of Capital		
	$2,408,472	5.0%	20	$2,300,000	2.954% IRR		
Merna Project B		**Year**		**Bushels Produced**	**Income**	**Expenses**	**Net Income**
Project Cost	$14,433,138	C0	($14,433,138)				
		2011	$922,936	7,634,591	$3,063,338	2,140,402	922,936
Margin Cents/Bushel	$0.212	2012	$969,880	7,820,875	$3,123,322	2,153,442	969,880
Storage cents/bushel	$0.070	2013	$1,017,969	8,011,704	$3,184,769	2,166,800	1,017,969
Drying cents/bushel	$0.040	2014	$1,067,231	8,207,190	$3,247,715	2,180,484	1,067,231
Total Cents/Bushel	$0.322	2015	$1,117,695	8,407,445	$3,312,197	2,194,502	1,117,695
# of Trains Loaded	22	2016	$564,391	8,612,587	$2,773,253	2,208,862	564,391
$27500/Train Rebate (5Yr)	$605,000	2017	$617,348	8,822,734	$2,840,920	2,223,572	617,348
		2018	$671,597	9,038,009	$2,910,239	2,238,641	671,597
		2019	$727,170	9,258,536	$2,981,249	2,254,078	727,170
Annual Facility Cost	$1,158,152	2020	$784,099	9,484,444	$3,053,991	2,269,892	784,099
Labor Cost Per Bushel	0.040	2021	$842,417	9,715,865	$3,128,509	2,286,091	842,417
Annual Maintenance/MISC	75,000.000	2022	$902,158	9,952,932	$3,204,844	2,302,686	902,158
Utilities Per Bushel	0.030	2023	$963,357	10,195,784	$3,283,042	2,319,686	963,357
Total Cents Per Bushel	0.070	2024	$1,026,049	10,444,561	$3,363,149	2,337,100	1,026,049
Annual Truck Expense	$12,000	2025	$1,090,270	10,699,408	$3,445,209	2,354,939	1,090,270
Annual Depreciation	$360,828	2026	$1,156,059	10,960,474	$3,529,272	2,373,214	1,156,059
		2027	$1,223,452	11,227,909	$3,615,387	2,391,934	1,223,452
		2028	$1,292,490	11,501,870	$3,703,602	2,411,112	1,292,490
		2029	$1,363,213	11,782,516	$3,793,970	2,430,757	1,363,213
		2030	$1,435,661	12,070,009	$3,886,543	2,450,881	1,435,661
		NPV	$24				

Using the NPV function for the Esbon project vs. a 12% opportunity cost shows that Project B (assuming a 20 year facility life) has a net present value of -$4,467,601, meaning that this project should not be built. Building the project without rail would result in a net present value of -$10,882,280, suggesting that this would not be the best way to spend the capital either. If this is considered in terms of IRR, Project B at Merna is only feasible with a cost of capital rate of 2.954% and the same facility at Esbon would have a cost of capital rate of 7.553%. While Project B at both locations would be profitable, there are better ways to use this investment capital that will generate better returns. To bring these returns into perspective, the average return of the S&P 500 over the last 60 years is 6.8%. Only Project B at Esbon would have a return over 6.8%.

The two factors that the projects are going to be sensitive on are grain volume and opportunity cost. Grain volume has a large impact on the outcome of the NPV model since every bushel has a margin, more bushels will mean more income and a higher ROA. The grain handle factor is difficult to predict since it has multiple variables in its calculation, and each calculation with its own room for error. One such place where an error could occur is the estimated area of draw. This is the area around the proposed Esbon and Merna facilities. This surrounding area that the draw of grain is figured from is based on current trends that CHS Agri Service Center typically has at its locations. However, just because this area of draw is predictable with current CHS Agri Service Center locations, does not mean that a new region would have the same draw.

Another variable in the grain handle factor is the increase of yield where Esbon has a 1.56% per year (an average increase of four types of grains grown in the area). This is based on county yield data for the last 70 years. Since the area around Esbon produces four

grain types, the changing of ratios between the crops grown year to year will increase the likeliness of an error in this calculation. For example, corn yields are 131 bushels per acre and soybean yields are 42 bushels per acre. If there were a large acreage shift from one of the crops to the other, this would have a large impact on the production numbers for the county. With the grain handle in the Merna area, the margin of error should be smaller than with the Esbon project. This is because at Merna there are only two crops grown, corn and soybeans, and corn is 87.7% of crop production. This should lead to more reliable data when calculating the yearly increase in grain yields and the net grain production for the county.

The opportunity cost is another factor that is very sensitive in this model. In all of the grain facility project types, the opportunity cost of capital has been set at 12%. This is because anything under 12%, CHS, Inc. will decide not to fund. If it is decided that the opportunity cost should be lowered, then one of these projects may be feasible at that lower level of opportunity cost.

CHAPTER VI: CONCLUSIONS AND IMPLICATIONS

The goal of this project is to find the best way to increase grain volume and profitability at CHS Agri Service Center. There are two main ways to do this. One is to upgrade old facilities by increasing capacity and/or speed at which grain can be moved. The other way is to build a new facility. This project research only focuses on the feasibility of Greenfield expansion. Because of all the new facilities being built across the United States, there is a concern that if Greenfield expansion was not looked into right away, then a competitor may build a site and move into or near to the CHS Agri Service Center territory. For that reason, upgrades and expansions will come second to any Greenfield site that meets the financial criteria for building a new grain facility.

CHS, Inc. has established that in order for a capital project to move forward there must be a return of at least 12% ROA. This means that in order to build a new grain facility, there must be sufficient evidence to show that the project will return a minimum of 12% ROA. In order to present this evidence, research into an area of 100 miles radius around Holdrege, Nebraska was conducted. The reason this distance was chosen was so that the same management and marketing personnel could be utilized, saving costs. The research that was conducted in this region had two goals; the first to find out the supply of grain in each county in the research area, and the second to find out what the demand is for the grain in the same area. The supply data was found by county on the National Agricultural Statistics Service website. The demand data, which is the amount of grain used by ethanol plants, feedlots, and grain companies, was found using information from the ethanol plant's websites, the BeefSpotter[24] publication, which provided capacity

[24] (Publications 2010)

information for the feedlots, Kansas Grain and Feed Association,[25] and Nebraska Grain and Feed Association,[26] which provided capacity data on the grain facilities.

Two locations were identified as possible Greenfield sites, one at Esbon, Kansas and the other at Merna, Nebraska. Based on research data and costs from two facility models neither location is feasible. This conclusion became clear through the use of an NPV and IRR model which found that neither site would meet the minimum threshold for investment. Esbon had an IRR of 7.553% and Merna had an IRR of 2.954%. These IRR numbers need to be above 12% to meet the minimum return required.

6.1 Limitations of this Research

One limitation of this project is the scope of counties used. It is helpful when determining a Greenfield site to know the grain flows in the region. Grain will flow from a surplus county to a nearby deficit county. It would have been beneficial in this thesis research to have researched one or even two counties beyond the scope of the project, in order to understand the flow of grain in the counties in the scope of the project. Because of this oversight the surplus or deficit nature of the outlying counties researched are not fully understood. Potential Greenfield sites on the border counties of the research area could have been missed entirely or even misinterpreted as having surplus grain when that grain flows out of the county.

Another problem that would need to be addressed before proceeding any further with the Esbon location is rail service. The short line railroad KYLE has not been contacted to determine if they can provide shuttle loader service at this location. Two

[25] (K. G. Association 2010)
[26] (N. G. Association 2010)

important questions are: Can their track handle heavy cars? Do they have the power and personnel to spot trains in the window that they will be required by the UP or BNSF railroads? The Kyle railroad has access to both Class I railroads, and it would be important to know if the new facility would have access to one, both, or any of the class one railroads.

Another oversight in this thesis was the facility models that were used to get cost estimates. The facility models that were used were too similar to each other and were constructed based on what a grain company would want in a facility and no models were constructed to show a minimalistic approach. Just for the sake of determining if a minimal cost structure would be financially feasible at either location a rough estimate of $10 million was used for the cost estimate. Using this cost estimate the IRR for Esbon is 11.954% and the IRR for Merna is 7.000%. A facility with a $10 million cost would fall just short of the 12% ROA minimum required for Esbon and 5% short at Merna. In future research this model needs to be estimated to reflect all possibilities for Greenfield sites.

6.2 Suggestions for future Research

There needs to be more research done at the Esbon location to determine if a cost estimate for a facility can be put together and come in under $10 million. Based on the simplistic math calculation, a project would have to come in just under $10 million to get the ROA above 12%. The other issue at Esbon is the railway problem. The KYLE railroad needs to be contacted and details on track conditions and service need to be addressed confidentially.

Based on current data the returns on even a bare minimum facility at Merna do not come close to the minimum 12% ROA required and no amount of changing of facility types is able to close that gap. The next step at Merna would be to determine if a strategic

alliance of some sort would be feasible at this location. The best case scenario would be a merger with the Farmers Coop in Merna. In this case Farmers Coop already has a 54 car loading facility. Investments would need to be made in the amount of rail siding, the capacity of the elevator, and the speed of the load out facility. There are many benefits to this, which include a reduced cost in building up the current facility rather than building a Greenfield site, less competition because of the merger, and the customer base is already established. Using an upgrade cost of $7 million and the original amount of bushels from the research data this merger would have a ROA of 11.848%. More research needs to be done to determine what the actual costs of upgrading this facility would be and whether or not to include the grain bushels from the Farmers Coop facility on top of the estimated bushels that a Greenfield site would receive.

WORKS CITED

ADM Media Relations. "ADM News." *ADM.* December 9, 2010. http://origin.adm.com/en-US/news/_layouts/PressReleaseDetail.aspx?ID=280 (accessed January 20, 2011).

Argyres, Nickolas & McGaha, Anita M. "Introduction: Michael Porter's Competitive Strategy." *Academy of Management Executives*, 2002: Vol. 16, No. 2, Pgs. 41-57.

Association, Kansas Grain and Feed. *2010 Kansas Official Directory.* Topeka: Kansas Grain and Feed Association, 2010.

Association, Nebraska Grain and Feed. *2010 Directory.* Lincoln: Nebraska Grain and Feed Association, 2010.

Brealy, Myers, Allen. *Principles of Corporate Finance.* McGraw-Hill Irwin, 2008.

Erickson, Dr. Galen. *Beef Cattle Production.* December 15, 2008. http://beef.unl.edu/FAQ/200812010.shtml (accessed March 6, 2011).

Feed, USDA Cattle on. *Cattle on Feed Report.* February 18, 2011. http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1020 (accessed March 6, 2011).

"Gavilon Acqusition of DeBruce." January 3, 2011. http://www.gavilon.com/news/gavilon-llc-completes-acquisition-debruce-companies (accessed JANUARY 20, 2011).

Gavilon Benkelman. August 23, 2010. http://www.gavilon.com/news/gavilon-grain-announces-new-construction-project-southwest-nebraska (accessed January 20, 2011).

"Gavilon Greenfield Site Chester Montana." *Gavilon.* November 4, 2010. http://www.gavilon.com/news/gavilon-grain-announces-greenfield-project-chester-montana (accessed January 20, 2011).

Nebraska Corn Board. http://www.nebraskacorn.org/main-navigation/corn-production-uses/production/ (accessed January 20, 2011).

Org., Nebraska Corn. *Feeding Co-Products.* http://www.nebraskacorn.org/main-navigation/grain-traders/feeding-corn-co-products/ (accessed March 6, 2011).

Porter, Michael E. "The Five Competitive Forces That Shape Strategy." *Harvard Business Review,* 2008: 79-93.

Publications, Spotter. *Beef Spotter 2010.* Amarillo: Spotter Publications, 2010.

Rob Musser, PhD, interview by Michael Wisner. *Director of Technical Sales and Marketin at NutriQuest* (January 25, 2011).

Rukstad, David J Collis & Michael G. "Can You Say What Your Strategy Is?" *Harvard Business Review*, 2008: 82-90.

Schmit, Richard. "South Dakota Wheat Cooperative Upgrades Several of its Sites." *Aberdeen American News*, August 22, 2010.

Scoular Company. June 1, 2007. http://www.scoular.com/news/HoldregeNE5-31-07.asp (accessed January 20, 2011).

USDA. 2010. http://www.ers.usda.gov/StateFacts/ (accessed April 10, 2011).

USDA. 2011. http://www.nass.usda.gov/Data_and_Statistics/index.asp (accessed January 20, 2011).