FINANCIAL ANALYSIS OF AN OAT MILL LOCATION AND TIMING OF THE INVESTMENT

by

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ABSTRACT

The oat processing industry is a competitive industry and maintaining a cost advantage is important for the industry supply chain. General Mills continuously looks to maintain a competitive advantage in the oat supply chain because it is important for strategic short and long term planning.

The purpose of this thesis is to analyze supply chain scenarios to determine where future investments should be made. The analysis looks at an existing location, a refurbished location and a Greenfield site. The analysis projects income statements and net cash flows to determine the conclusions using Net Present Value. The question answered is "Should the company continue to invest in the existing supply chain or should it look to different alternatives in the form of a refurbished or Greenfield plant site for production of oat flour?"

The analysis found important relationships between the variables that can influence net cash flow and ultimately NPV. However, given the information from this analysis, a determination was made that the existing facility is still the best investment. Future analysis should be used and the company should plan to analyze this issue again in a five to ten year time frame to maintain its competitive advantage.

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CHAPTER I: INTRODUCTION

The issue chosen for this thesis is to determine if using an existing oat mill is preferable to finding a location for a new oat flour mill. If a new location is more feasible then what is the timeline and where does it make sense to locate? This is important as future planning and timelines allow for better preparation by the company instead of short term decision making and reactive planning.

The project will address the feasibility of an existing facility versus transitioning to a new facility, when to transition from an existing facility to a new facility and then explore possible locations of a new oat milling facility for use in food production. The analysis will use Net Present Value (NPV) in combination with annualized return methods (Brealey, Myers and Allen).

The objective is to use financial tools to analyze a strategically important decision for the future of the oat supply chain. The financial analysis and feasibility of the existing plant location versus a new plant location would be considered step 1 for the project and step 2 is to determine '<u>when</u>' a company should position itself for a new oat product manufacturing location using different timeline analysis.

The issue of accurate supply chain financial analysis draws from another perspective as it allows a company to increase its competitiveness and provide superior financial performance versus its competitors. The decision making that is used is based on sound financial principles.

The oat product business is involved in both mature and emerging markets. Superior use of the oat product supply chain will help redefine the way in which business is

conducted in the oat products market and allow the company to maintain and stretch superiority in this venue.

Strategic positioning for a timeline to move from the ‘old facility’ to a ‘new facility’ will allow preparation for a quicker alignment of resources and financial needs if determined to be the best financial option. The company can use the model developed for capital planning needs, financial advantage, personnel planning, engineering resource planning and human resource planning and management resource planning to gain superior performance with a long term vision.

General Mills is an international company with a diversified portfolio of products. The company has been involved in many different products such as clothes, military products, restaurants and multiple food products through its history. The company has a long history of innovation, engineering and technical achievement. General Mills has used this capability to develop a large portfolio of strong brand names, known globally. The portfolio grew larger in 2001 when the company purchased The Pillsbury Company. The purchase brought a new set of well-known brands and growth to General Mills. General Mills is one of the largest food companies in the world with multiple well-known brands and a long history of knowledge with these brands. The cereal franchise is one division of the company that has performed well in the marketplace. One of the most respected brand names for the company is ‘Cheerios’. It has been part of the company for over 70 years. The oat products business that supports the Cheerios franchise is the focus for this project.

The supply of most oat products is conducted internally within the General Mills supply chain. Other oat products (additional volume) potential exists within the company.

The use of current product supply needs, possible extension of other product lines and future potential new oat products all play a role in the timeline and decision on the best location of the future oat product plant. A second item includes the layout and use of the two current locations and what the timeline, expansion and future of these locations will look like within the supply chain.

The importance of the strategic vision centers on a company's regional planning and how the current customer supply chain shapes itself in the future. The feasibility of using current locations and/or a new location or some other form of ideal strategy/layout of the supply chain for the future mix of locations and products is a critical question to answer.

A new oat mill location has to be considered within the framework of the existing financial data and the efficiency of the current oat products and their cost of production to the internal supply chain. Current and future logistics used for sourcing and the financial costs that provide the main source of ingredients for the oat product manufacturing (the grain that is used) is a key strategic part of an analysis. The logistics, distribution, location and volume percentages of current customers and potential future customers help determine the customer base and information for the business (the internal/external oat product customers) to determine where it can be supplied more efficiently versus the current supply chain model. The use of an optimization model to bring these factors together to determine supply chain profitability may be important. NPV theory and its application are used to determine timing and return on investment for a new location. A financial question related

to the location of a new mill from a strategic feasibility standpoint – Is it more cost effective to look at a Greenfield site or refurbish some existing site within the desired region? The importance of the question "Which scenario (existing site, refurbished site or Greenfield site) is most financially beneficial?" will drive strategic thinking to determine the best course of action for General Mills.

1.1 Issue Identification

The objective of the project is to strategically stretch the boundaries of supply chain management and use tools in an analysis that provides a new and important vision for the future of the oat products business. The objectives are to use financial techniques and continuous improvement thought processes to strategically define competitive positioning and the timing of 'when' to consider a new oat product manufacturing location. The important issue defined here is 'when does a company stop using an existing older facility and switch to a new future facility, either an existing refurbished or 'Greenfield' facility. The timeline will also be defined and presented in a manner that is acceptable to the senior management of the company. Financial analysis is the preferred method in the company and is used to make decisions based on sound economic theory. The company prefers to base decisions on sound data and analysis versus personal views and thoughts as the only part of the decision making process. The company is accustomed to viewing information in a financial analysis and this provides the framework for most decision making today.

1.2 Issue Definition

The issue centers on the supply chain management strategy and the development of a template for the future of the oat products business. The analysis will determine the most

strategic time for construction and/or refurbishment of a new location for an oat product manufacturing facility.

Three plant scenarios are considered using cash flow analysis on different cost factors. The use of a continuous improvement tool and the mapping format tool in conjunction with the financial tools of Net Present Value and net cash flow analysis will define a new strategic financial vision for the oat products business.

Practical applications of information gathered for plant location and economic choice factors are available for study. The information gathered from an internal company project is used in this analysis. The information includes work on labor costs, plant/property acquisition costs, management theory, NPV, cost analysis of existing plant versus new plant locations, input costs for capital requirements, sourcing and input costs and information from consultants that provide external ideas for consideration. Geographic considerations and joint ventures, purchasing land and an elevator, existing sites versus Greenfield sites and internalizing other products for production were considered in this project analysis. The project was conducted in the 2003 timeframe and updating of information for this project is necessary for the timeliness of information.

The examination of an existing oat mill within the supply chain is the subject of this thesis. NPV modeling with a mapping tool to define the scope of the financial impacts involved in the analysis are used. There is some estimation that will be made and consideration for factors that are outside the scope of this analysis will be discussed in the sensitivity section (Chapter 5). The conclusion in Chapter 6 will summarize the process and help determine the best course of action for the oat product business.

CHAPTER II: LITERATURE REVIEW

2.1 Introduction

The oat milling industry has gone through many periods of expansion and awareness with American consumers throughout time. Oats have traditionally been used for animal feed – horses and other livestock. The food industry side of the oats business has created new opportunities for the oat industry and its commodity placement. The food industry has used oats to produce products for consumer purchase for decades. The 1980s brought oats back into the food marketplace with awareness of health benefits to consumers and large marketing campaigns. The initial rush much like the 'Gold Rush' and others subsided when other diet fads and trends developed. Through it all, the health benefits of oats have remained and are stronger than ever today (Agriculture and Agri-Food Canada, pg 1).

Oats are grown in North and South America, the Scandinavian countries (Finland and Sweden) and Australia. The estimated world production of oats is approximately 24.0 million tonnes (Table 2.1).

Table 2.1: Total World Production Quantity – Oats, Tonnes

2007	2008	2009	2010	2011	2012	2013	2014
25,805,581	25,862,841	23,344,913	19,718,887	22,358,918	21,349,886	23,881,333	22,965,903

Source: FAOSTAT

Canada produces an average annual estimated 3.4 to 3.8 million tonnes of oats (Agriculture and Agri-Food Canada, pg 1). The 2007 and 2013 crop years were much larger production years for Canada with an estimated 4.6 million tonnes in 2007 and 3.9 million tonnes of oats produced (Table 2.2).

Table 2.2: Canadian Oat and grain production, Tonnes

	2012	2013	2014	2015
	Field and special crops (Production)			
Field crops				
All wheat	27,205.2	37,529.6	29,419.6	27,594.1
Canola	13,868.5	18,551.0	16,410.1	17,231.2
Barley	8,012.3	10,237.1	7,119.0	8,225.7
Oats	2,829.6	3,905.6	2,979.0	3,427.7
Flaxseed	488.9	730.7	872.5	942.3
Rye	336.6	222.9	217.5	225.5
Soybeans	5,086.4	5,358.9	6,048.6	6,235.0
Corn for grain	13,060.1	14,193.8	11,486.8	13,559.1
Tame hay	25,258.8	26,404.6	25,960.0	22,526.3
Special crops				
Canary seed	149.7	131.0	124.9	148.6
Lentils	1,537.9	2,261.7	1,987.0	2,372.9
Sunflower seed	86.9	51.9	55.0	72.6
Mustard seed	118.6	154.5	198.0	123.4
Dry peas	3,340.8	3,960.8	3,810.1	3,200.7

Source: Statistics Canada, CANSIM, table 001-0010 and Catalogue no. 22-002-X.
Last modified: 2015-12-04.

The United States produced 91.6 million bushels in 2007 (Agriview pg. 1) and the same in 2015 (Index Mundi). The United States produced an estimated 107 million bushels in 2006 down from 384 million bushels in 1986. The United States production in 2011 hit a low of approximately 50 million bushels (Index Mundi). Food production oats are nearly all imported by the United States today. Since the early 1990s, nearly half of the oat mills in the United States have closed and/or moved to Canada. The Farm Program and economics in the United States have played a large role in this decline as the production of corn and soybeans have taken over the acreage (North American Millers Association 2007 Annual Report pgs 3 & 4). Canada accounts for approximately 70 to 80% of the world's exports of oats. Predominantly those exports are to the United States. The United States

actually used 100% of Canada's exports in January/February 2015/2016. The United States accounts for approximately 84% of the World Oat imports (Agriculture and Agri-Food Canada, pg 2 & Table 2.3).

Table 2.3: World Oats Trade, October/ September year, thousands of metric tons

	2011/12	2012/13	2013/14	2014/15	2015/16 Jan	2015/16 Feb
TY Exports						
Argentina	13	2	2	2	5	5
Australia	174	240	270	250	350	350
Canada	1,763	1,351	1,732	1,726	1,600	1,600
Chile	106	41	49	84	75	75
EU-27	176	126	291	231	150	200
Russia	18	4	6	15	10	10
Ukraine	2	2	6	46	10	70
Others	7	10	14	8	10	10
Subtotal	2,259	1776	2370	2362	2210	2320
United States	28	18	29	23	30	30
World Total	2,287	1,794	2,399	2,385	2,240	2,350
TY Imports						
Albania	0	0	0	5	0	5
Algeria	9	7	12	24	10	30
Bosnia and Herzegovina	3	2	3	4	5	5
Canada	11	9	26	12	10	10
China	68	87	116	162	250	250
Colombia	1	1	2	2	5	5
Ecuador	22	19	21	21	20	20
EU-27	3	4	3	4	5	5
Japan	54	51	46	47	50	50
Mexico	134	111	93	86	100	100
Norway	49	36	38	2	40	40
Serbia	2	2	2	3	5	5
South Africa, Republic of	11	11	19	50	25	25
Switzerland	56	44	51	49	50	50
Turkey	4	0	0	5	5	5
Others	15	6	8	8	5	5
Subtotal	442	390	440	484	585	610
Unaccounted	115	49	93	142	55	140
United States	1,730	1,355	1,866	1,759	1,600	1,600
World Total	2,287	1,794	2,399	2,385	2,240	2,350

Source http://apps.fas.usda.gov/psdonline/circulars/grain.pdf **,** February 2016

2.2 The project

Understanding world oat production allows one to understand the input and its relevant geographic relationship for transportation costs that are important to food production oat processing plants. Location theory on manufacturing facilities has provided research on areas such as mathematical optimization models and many articles can be found in this area of research (Greenhut; Shieh; and Beckmann are examples). Mathematical equations to determine optimal locations for a plant are based on a multitude of factors including input raw materials, customers, transportation and others.

Location theories were also taken and an additional concept was added. The additional concept was based on FOB (Free on Board for buyer or seller) pricing and its influence on location choice being relevant or not based on linear demand that is non-uniform (Shieh). The concept exists for reference but is outside the scope of this particular project.

Multiple resources use theory based principles for plant location analysis. Internet and library materials found (Greenhut; Henderson; and McNamara) that past studies base most of plant location theory and practices on the concept that least cost analysis is not a choice for determining plant location. Other factors, in addition to least cost analysis, include size and shape of market area desired, pricing, transportation and processing costs. These are all factors used in most capital market driven theories. Another topic of interest that was discussed dealt with the concept of the 'personal factor' that weighs the decisions of plant locations (Greenhut). The personal factor discusses individuals and senior

managers who may have their own preferences that can become part of the overall decision making process when determining a plants' actual location.

Spatial pricing economic theories exist on mill pricing advantages versus uniform pricing. Mill pricing has less administration to worry about and is less than a delivered price (Beckmann). The choices of transportation and the costs involved weigh heavily in today's decision making process as the cost of transportation, inventory carry and customer influences on preferred delivery arrangements have changed in the past decade. Just in time delivery, direct ship, and inventory management systems are all part of today's landscape and are important areas of consideration and strategic thinking in plant location choices (Chopra and Meindl; Wisner and Stanley; and Kim and Mauborgne).

Food manufacturers are important generators of jobs and output and the economic benefits are strong enough that economic development agents have advocated the attraction of food processing plants as a development strategy for rural areas. Studies have indicated that agriculture manufacturers have general tendencies to locate in commodity areas if they are a supply driven manufacturing plant and they have general tendencies to locate where customers are if they are demand driven manufacturers. The factors become crucial for communities and manufacturing facilities to consider in partnerships or locale choice and include labor, commodity sourcing, transportation, and infrastructure capabilities. (Henderson and McNamara). There are opportunities for communities and manufacturing producers alike to partner and work together for mutual benefit. The opportunity is a factor or influence that should be considered in the development of the location for an oat production facility.

CHAPTER III: THEORY

The understanding of supply chain efficiency and use of a value added process for this thesis will base strategies on sound supply chain management principles using financial analysis for decision making. Internal General Mills documents are used to determine the financial parameters. Consideration of a Greenfield site, existing site and a new site with an existing manufacturing facility for refurbishment will be part of the analysis in this project. A Greenfield site is a new property purchased with no existing structures to be refurbished. A company would need to build infrastructure and buildings from the beginning to the end to set up a manufacturing location. Refurbished sites that are new to the company are purchased and typically have some infrastructure and/or buildings that can be used as part of the manufacturing location. A company may have fewer infrastructures and building work to do to prepare this type of site for their future manufacturing process. The third type is the existing facility that the company is using for the manufacturing process. Existing facilities may have issues with current location geographically, may not have room for expansion and other considerations that become part of the decision making process.

3.1 Issue Identification, Definition and Rationale

The tool used is based on the concept of Planning, Briefing, Executing and Debriefing (PBED). The PBED tool is used to help determine the map that defines the inputs for the cash flow analysis. The map is developed (Planning), the information needed is shared with the key stakeholders in each area (Brief), key stakeholders gather and develop the information (Execute) and then a follow-up process is used with all stake

holders to ensure information and the map accounts for all necessary information and that the cash flow analysis can then proceed (the Debrief). The PBED concept allows for an accurate consensus process and allows the map to be used to update the analysis and to ensure a high degree of accuracy and consensus among key stakeholders in the process. The process can be updated at any point in time with new stakeholders by using the same process and inputting the information into the model. The map allows for the process to be duplicated gaining alignment each time a variable changes or a newly defined variable is introduced in the future.

3.2 Issue Rationale

3.2.1 Why NPV for the decision process?

NPV uses a discount factor and is based on the concept that a dollar today is worth more than a dollar tomorrow. This is often expressed as opportunity cost of capital or the companies cost of borrowing money or competing investment alternatives that are available (Chopra and Meindl).

NPV converts all future cash flows into present values. The present values are then summed for the length of the investment and the length of the returns that are expected. The NPV analysis allows for the concept of the time value of money to be accounted for. Competing financial tools that can be considered are: the Internal Rate of Return (IRR), payback method and book rate of return.

IRR is a useful tool for analysis. However, it does not deal with mutually exclusive investment alternatives. IRR analysis is problematic with a fluctuating opportunity cost of

capital in the near term versus future years that make the calculation difficult and multiple rates of return may result.

The payback method doesn't consider the time value of money and doesn't account for income after the payback period is attained. The book rate of return uses accounting profit that includes non-cash income and expenses. It is based on the values that are on the books and doesn't reflect true market values.

NPV has pitfalls as well. NPV assumes future nominal cash inflows and outflows are known with certainty – this isn't always true. We speak in terms of expected cash flows for this issue. NPV doesn't account for different risks that different investments may have. This can be dealt with by adjusting the discount rate used in the NPV calculation.

3.2.2 NPV rule

If NPV is positive, it is a good investment for the company. The NPV analysis includes cash activities only. For example, depreciation is not included as it is not a cash expense and is accounted for in the capital model. Tax effects would be included as it affects cash flow either in cost or savings.

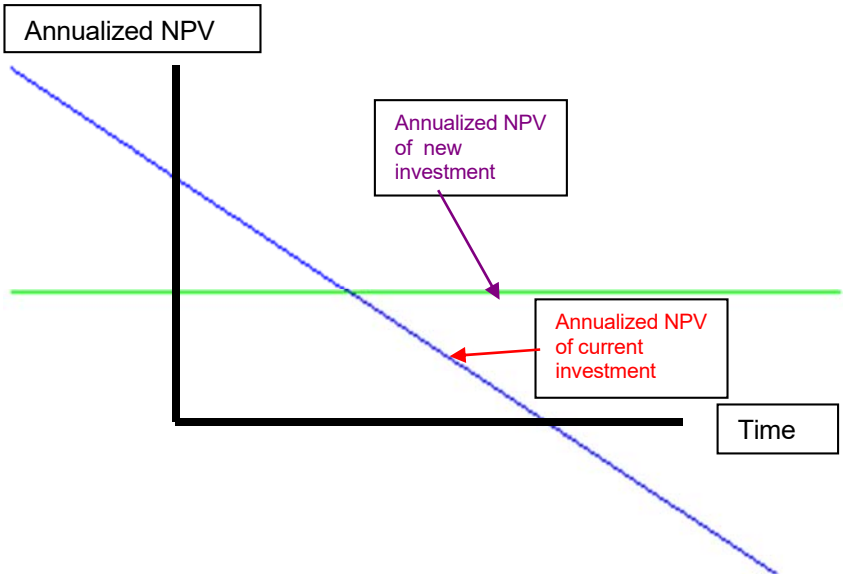
Another rule to follow with NPV analysis is to make sure you are consistent with inflation. For example, we want to use nominal cash flows and nominal interest rates or real cash flows with real interest rates but not a combination of nominal and real numbers. This provides consistency and accuracy in the NPV calculation (Brealey, Myers, and Allen).

Net cash flow can only be accurately determined with the use of accurate information. The impacts on cash flow will be analyzed. Critical thinking makes it

important to identify the most critical bottlenecks and how they impact net cash flow. It is important to know how things work and how they change to determine the effects on the solution (when to stop use of the existing (old) facility and switch to a new strategic location for the oat products business). A model with decision and financial analysis using NPV and net cash flows helps accurately use problem solving tools to define an answer for a timeline for when investments should be made.

The model below shows the concept in pictorial format. Data that are generated is put in a model format and the timeline can define when the NPV results are lower than those for a new investment. The decision of 'when' can then be answered with this method.

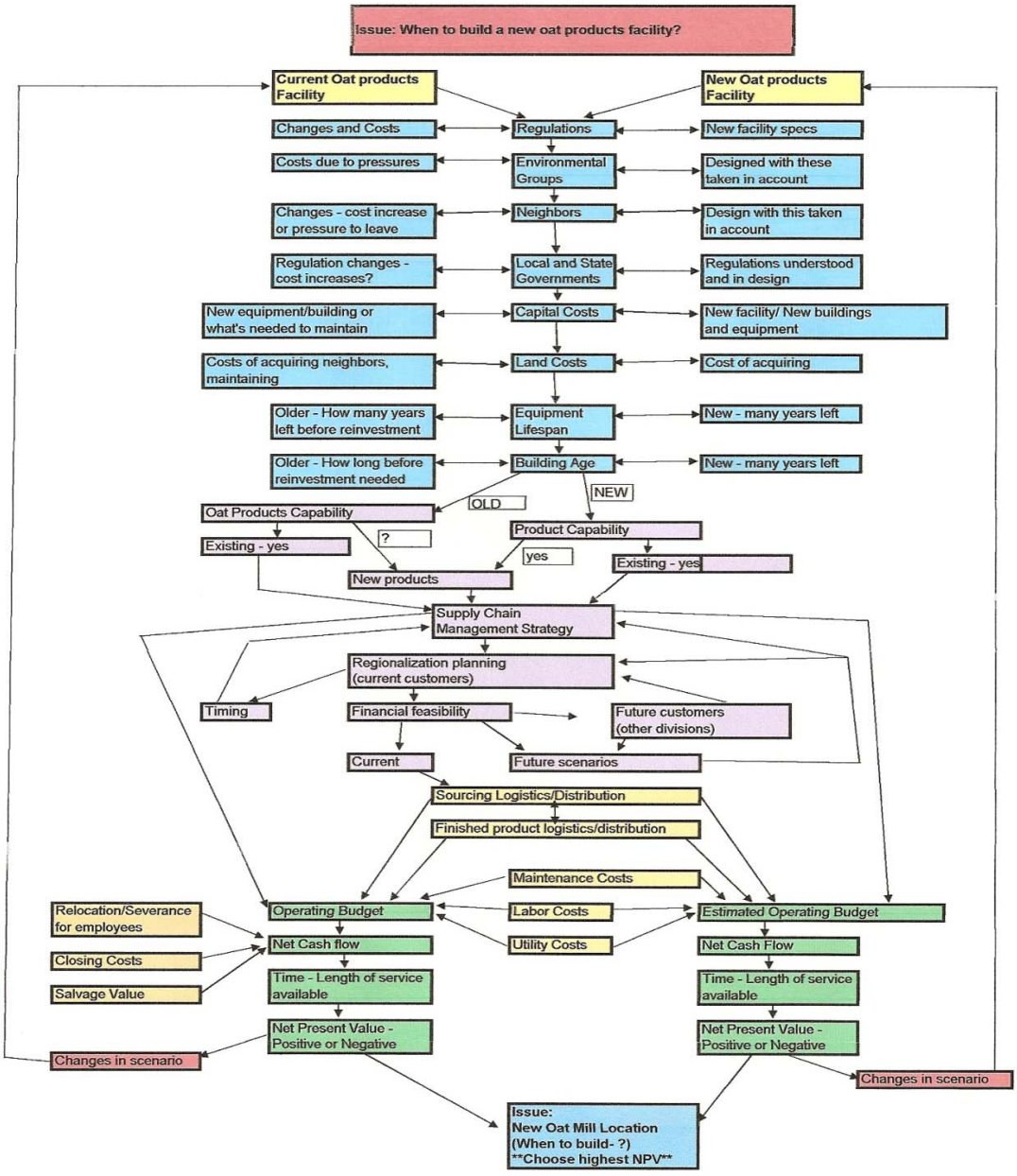
Figure 3.1: NPV Model of decision timeline



The generation of the data that is entered into the model above (figure 3.1) is determined by gathering all strategic information needed. The process of net cash flow analysis and NPV used for the solution are combined with the mapping tool and the PBED

process to ensure all steps and data are collected allowing for an accurate assessment of the issue. The mapping and PBED tools used together determine the analysis process and define external and internal variables affecting the issue solution. The mapping model (Figure 3.2) below shows this process. The map was built to list known factors that influence costs and become part of the process to determine the NPV of the facility scenarios. The PBED process allows for changes to the map (deletions or additions) if new knowledge or other factors become part of the process in the future.

Figure 3.2: Issue Map



3.3 External Variables

Exogenous variables (external issues that may arise) are an important part of understanding how to solve the issue. Regulations, environmental groups, neighbors, local

and state governments, capital costs, land costs, equipment lifespan and building age are all important variables that affect the external environment. These variables are all outside influence variables that affect net cash flow.

Regulations that affect plant operations can determine how competitive the facility remains or in some cases whether the facility can remain open versus the expense of meeting regulations. The influences in this arena can be small or large but will certainly affect net cash flow and must be accounted for in a financial analysis. Environmental groups, neighbors and local and state governments all have a positive or negative influence on a facility much like the regulation mentioned. The external influences can change in a short amount of time and thus, it is greatly important to maintain a 'finger on the pulse' of these external variables. It is important to make necessary changes in the financial analysis on a frequent basis to maintain a current competitive vision. Failure to do so may lead to misunderstanding of the timeline and thus a loss in competitive advantage.

Capital costs, land costs, equipment lifespan and building age are all important influences on net cash flow analysis and the time portion of the analysis. The ability to understand capital needs and potential land acquisition costs (for the new facility) and/or land costs to explore expansion or protectionism (to ensure neighbors, other businesses don't pose problematic issues) for the existing 'older' facility on a frequent basis (annually or as needed) allows for strategic planning and improved financial competitiveness when accurately gathering net cash flow analysis.

Capital costs fluctuate with outside influences and material/building cost changes. The importance of updating capital information regularly and obtaining current information

is critical to an accurate analysis process. The net cash flow analysis may change the Net Present Value calculations. The scenarios drawn around expected equipment lifespan and building age are important determinants for a timeline and they influence potential capital costs and land costs. The importance of the variable interactions mentioned is that the variables affect each other and the strategic planning involved for the financial analysis.

3.4 Management Variables

Facility capabilities, supply chain management strategies, future customers and/or products and existing products are all factors that influence net cash flow. The inclusions of the strategic management decisions for the future supply chain and the effects they have on the role of developing the solutions desired for General Mills' vision of the future is key to providing an accurate analysis of net cash flows for financial understanding and competitive advantage.

Supply chain strategies that change over time influence how a facility operates and what products it produces, the volumes required to produce, the ability to produce existing products and the strategy of whether to produce new products or upgrade existing products influence the net cash flow of the facility.

The importance of strategic vision also includes current plans that General Mills is using for regional planning of the oat product customer supply chain. The regional plan chosen will affect how the customer supply chain shapes itself in the future. The feasibility of using current locations and/or a new location or some other strategy or layout of the oat

product supply chain for the future mix of locations and products is a critical question for General Mills to answer for the net cash flow analysis.

The analysis will include the location/supply chain configuration with current products, potential expansion of other in-house products and expansion/utilization of a facility for future value added products in the oat product supply chain. The expansion of oat product lines (inclusion of enrobing oat products such as granola bars as an example) or other future value added technology are important external influences to each plant and their net cash flow analysis. A key strategic financial decision to determine location of the new mill from a strategic feasibility standpoint – Is it more cost effective to look at a Greenfield site or refurbish some existing site within the desired region? The analysis will use net present value and annualized returns for a Greenfield site, refurbished site and the existing site.

The capabilities of the facility and the influences of the management strategies adapted influence each variable and drive management decisions based on the relationships each variable has to another. The influences also drive potential changes to the external variables first described in the mapping process. In other words, they may influence land costs, regulations, neighbors, etc. The relationship that the mapped external, internal and management variables have on each other are all intertwined and can be analyzed properly when connections are understood.

Ultimately, understanding these connections and driving them via one single analysis of net cash flow drives a strategic advantage by increased accuracy of data used in net cash flow analysis. General Mills doesn't need to constantly debate which scenario is

advantageous over another. The company merely needs to address the influence the variables have on net cash flow, gather that data and use it to determine the net cash flow and move to the Net Present Value calculations for a strategic solution.

3.5 Plant Specific Internal Variables

The next steps are to analyze facility specific internal (endogenous) variables and their operation in the current or predicted future state. The internal variables include sourcing logistics/distribution, maintenance costs, utility costs, labor costs and finished product logistics/distribution. The internal variables described are a main component of net cash flow for each facility and are typical costs included in most financial models. Internal plant costs provide the backbone of a good financial analysis.

The format of net cash flow analysis readily adapts the information for the solution process. The main consideration is to ensure that all plant costs are included in the net cash flow analysis. The relevant format referred to will be to develop internal cost analysis separately for the existing older location and the new future facility. For example:

- Labor costs are collected for the current location and a separate analysis is developed for another future geographical location.
- Utility costs analyzed for the current location but are analyzed separately for the new geographic region for the new facility.
- Maintenance costs vary and are different in the existing older facility versus what they would be in a new future facility.
- Logistics data are different in both scenarios due to distance differences for sourcing and distribution of raw product versus finished product. A pictorial

reference for this is included in Figure 3.3 that shows the variability of oat prices. Oat prices can influence savings or loss based on futures price and the delivery capability (including the distance from origin to plant, storage costs and other factors) from the input grain source. Input variable costs shown in Figure 3.3 and Figure 3.4 below are influenced by market prices. Market price variability can cause inaccurate net cash flow analysis on input variables if not analyzed correctly (oat prices at $5.60 per bushel for one year vs average of $3.00 over 10 year period, for example). The information utilized in from the Figure 3.3 and 3.4 data should be an average expectation for pricing versus using a price from one day in time to ensure accuracy in the net cash flow analysis.

Figure 3.3 Oat Futures 6 Year Historical Chart

Source: http://ccstrade.com/historical/oats
Capital Commodity Services, INC accessed 2/18/16

Figure 3.4 Oat Futures Historical Chart

Geographic and other influences provide data for the older facility analysis versus the new facility analysis. Gathering accurate data for each scenario is important for the accuracy of the net cash flow analysis. The older facility has additional costs included in the net cash flow calculation versus the new facility to provide accurate consideration of the financial influences when the facility is closed. The costs considered include salvage costs, relocation costs and closing costs when the decision is made to use a new facility. The costs are important due to their influence on total cost analysis in determination of net cash flow that is pertinent to the Net Present Value calculation.

Inclusion of external influence cost variables, strategic supply chain management variables and internal plant cost variables are important in creating the financial analysis that will drive a competitive advantage and vision.

CHAPTER IV: METHODS

4.1 The Tools

The analysis/solution is determined using financial analysis. The common approach to decision analysis is to use Net Present Value (NPV) concepts based on annualized net cash flow analysis. NPV allows problem definition and decision making into a commonly accepted financial term that allows emphasis on value to the stockholders of the company. Investments are best defined when NPV is maximized as this brings the most value to the company and ultimately to the shareholder.

The solution process uses net cash flow analysis to determine timelines and Net Present Values defined in years for length of time based on annualized returns. The determination of when annualized Net Present Value for the old plant is less than the annualized Net Present Value of a new facility (2 new plant scenarios – refurbished new and 'greenfield' new) answers the issue from a financial timeline and decision analysis perspective. The important information for Net Present Value will include the estimated facility service life for both the 'old' facility scenario and the 'new' facility scenarios to provide an accurate net cash flow determination for the three facility scenarios. The Net Present Value criterion with the annualized returns will answer the question of 'when' does General Mills close the old facility to maximize financial results if it is the best solution. Furthermore, the objective of this theory is to determine whether driving the salvage value of the older facility to zero before the facility is closed maximizes the return to the company.

4.2 PBED and mapping tool

A tool that is used for competitive advantage in a continuous improvement process is called “Planning, Brief, Execute, Debrief” (PBED) tool. Strategic advantage is gained with this tool in a manner that allows for constant planning, constant updates and improvements in a time continuum process. The classic statement ‘Plan, Do, Check’ also describes this type of process thinking. The strategic advantage for the PBED tool is ‘how the use of the map is conducted in a more strategic approach’. The PBED tool describes the mapping tool potential and how to use the tool for planning. The mapping tool is used for the briefing and execution of the solution process. The PBED tool is then used to allow the mapping tool to go through a ‘debrief’ where the discussion includes what was good about the map tool variables and what are the learnings (or changes that need to be made in the net cash analysis) from the mapping process and debrief discussion. The learnings would include changes to internal variables, external variables and management variables.

The strategic concept is to establish a more competitive model in the beginning (planning stage) and then update the model to maintain competitive advantage in the selection of ‘when’ the best time (in years) is to look at a new oat product facility. The tool also allows all stakeholders in the process to have input – this allows strategic value for a team not just an individual influence in the decision making process.

4.3 Logistics – New Plant Locale

The map has been developed and the information gathered using the PBED process of continuous improvement. The information must be translated into a language that can be easily understood for all key stakeholders.

The development of the new plant scenarios allows the analysis of the important question of 'where' to locate a new facility. The scenario driven analysis requires cost estimates from the new facility refurbished and the new facility Greenfield. To obtain that data, the location of the facility must be determined to obtain accurate costing analysis.

The question is answered by obtaining cost information based on the input side of the equation (grain logistics) and the output side of the equation (finished product customers) and the use of plant costs based on the locale. The three areas of financial analysis described are obtained via key stakeholders within General Mills and on external data gathered to ensure a higher degree of accuracy. The information gathered from the three sources is used to determine the locale of new plant sites. A spreadsheet model is used with transportation nodes to setup a constraint spreadsheet model to determine least cost scenarios for location of new plant based on existing customer base and existing input grain base. The process described here is also used within the confines of what locations, land and possibilities exist in the geographic regions. Table 4.1 shows these costs set up based on existing oat flour plant customers and the three plant scenarios used for Existing, Refurbished and Greenfield plant locations. Canada represents the possible Greenfield plant location, Nebraska represents possible Refurbished plant location and Minneapolis represents Existing plant location. Costs change if locations are changed on final destinations and/or locations for the three plant scenarios are changed.

Table 4.1 Distribution Cost Analysis
Distribution Costs

Finished Product-Flour Logistics Cost
Rail

	Albuquerque, NM	Buffalo, NY	Cedar Rapids, IA	Covington, GA	Lodi, CA	Other
Canada	$0.03	$0.03	$0.02	$0.03	$0.02	
Minneapolis	$0.02	$0.02	$0.01	$0.02	$0.03	
Nebraska	$0.02	$0.02	$0.01	$0.02	$0.02	
Percent of Flour Volume	3.50%	25.00%	33.20%	18.00%	14.70%	5.60%

Note: Truck costs not analyzed here as they are not ever the least cost shipping alternative from freight cost/lb perspective. Include these if trucks are the only option for

	Aggregate rail cost in cents per lb based on business percentage to each location	Total cost with desired flour
Canada	$0.023	$4,596,400.00
Minneapolis	$0.013	$2,619,800.00
Nebraska	$0.013	$2,589,200.00

This project used information gathered from a company project that ran scenarios and determined locations that would be feasible and those that were available at the time. The specific information won't be discussed as it is proprietary. The least cost scenario drives the determination of location of the new facility regardless of refurbished or Greenfield. The determination of the least cost scenario is based on locations that are available to be purchased as other ideal locations may exist but if the current ownership is not willing to sell than the availability for other locations no longer exists. This is an

important consideration in the location choice as there may be hurdles that a company cannot solve. The differentiation in the refurbished plant or the Greenfield plant site is based solely on cost inputs of land, buildings, capital, availability, etc. to allow for analysis of cost. The locale allows the gathering of financial data on the two new plant scenarios and allows the use of this financial data into balance sheet and income statement that drives the next step of the process – net cash flow analysis.

Figure 4.1 shows the flow of input source (oats) through the existing elevator network and the existing plant locations. The map also shows the flow of finished oat flour product to the finished product plants within the General Mills system (cereal and snack production). The Red dots show the approximate locales of the proposed Greenfield and Refurbished sites identified in this project for analysis.

Figure 4.1: Product Flow Map

Table 4.2 below shows the calculations and information used in the analysis for the incoming grain costs and transportation cost of moving the grain to various locations. The byproduct credit is waste from the processing operation that produces a byproduct that has income recovery for plant locales based on current or potential customer availability. The information was obtained from General Mills Grain group based on analysis of current cost and recovery and estimated cost and recovery with the two new locations analyzed. Grain costs are based on information from existing sourcing of oats to all the plant locations as the existing source would be maintained as desired for the finished product design required by General Mills.

Canada is representative of the Greenfield site analysis, Nebraska is representative of the Refurbished site analysis and Minneapolis represents the Existing plant locale. If the company determines an analysis of plant sites are desired in other locations then an analysis would need to be completed again with cost changes inputted into the analysis spreadsheet as listed above. Plant location changes would change transportation costs based on distance to locations.

Table 4.2 Grain and Byproduct Analysis

Grain Costs

Incoming product- Grain logistics costs versus Mpls

	Oat Grain Cost vs. Mpls & per bushel	Total Cost
Canada	-0.25	$26,675,000.00
Minneapolis	0	$29,100,000.00
Nebraska	0.1	$30,070,000.00

Oat Price	$3.00	
Oat Flour Yield	4.85	bu/cwt
	100	lbs/cwt
Annual oat flour production desired		
	200,000,000	lbs of flour

Byproduct Credit/$ recovered from waste stream

	Oat hulls/ton	Oat screenings/ton	Hulls credit	Sags Credit	Total Byproduct
Canada	$20.00	$20.00	$1,216,380.00	$110,580.00	$1,326,960.00
Minneapolis	$25.00	$25.00	$1,520,475.00	$138,225.00	$1,658,700.00
Nebraska	$10.00	$20.00	$608,190.00	$110,580.00	$718,770.00

Storage and Transfer Costs

	Transportation transfer	Storage and Futures costs	Total Storage and transfer (per Cwt flour needed)	Total cost
Canada	$0.20	$1.50	$1.70	$3,400,000.00
Minneapolis	$0.14	$0.00	$0.14	$280,000.00
Nebraska	$0.26	$0.00	$0.26	$520,000.00

4.4 NPV and net cash flow analysis

The model is setup to analyze the net cash flow for three plant scenarios. All three plant scenarios look similar except that the costing/income information collected differs (i.e. existing plant, new plant refurbished and new plant Greenfield). The scenarios allow the collection of data on all three plant options in an organized manner.

The data gathered are financial information, plant management information, grain department analysis and logistics and planning analysis to develop an income statement, capital investment, salvage value, grain inputs, finished product inputs, etc. The format

consists of data input into an income statement format under the three plant options. The data are used to calculate annual net cash flow. The number of years used are determined by expected life cycles of the three plant options. Data needed for development of the net cash flows include opportunity costs of capital, tax rates, etc. The existing plant scenario considers driving the salvage value to zero to maximize the financial opportunity of the remaining valuation of the existing facility for the company.

The net cash flows for all three plant options were used to conduct the NPV calculations. A determination can be made based on these NPV calculations on which plant scenario maximizes profit to the shareholders and 'when' it is financially advantageous to switch to one of the scenarios on a given timeline.

The solution process used a net cash flow and Net Present Value calculations. The determination for the length of time to analyze for each facility scenario was determined by expected length of life based on capital investment needed at this time.

Existing Facility

The existing facility would need capital investment to existing assets to improve building life, expand processes, purchase of land and buildings, etc. The investment would be expected to allow for a 10 year lifetime with limited growth.

Table 4.3: Existing Facility analysis

	Year 0	Year 1	Year 10
Sales		$40,000,000	$47,803,703
Grain cost		$27,721,300	$28,994,001
Manufacturing costs		$3,600,000	$6,393,041
Distribution cost		$2,619,800	$3,130,904
Depreciation costs		$1,000,000	$1,000,000
Pretax profit		$5,058,900	$10,376,465
Taxes at 35%		$1,770,615	$3,631,763
Profit after tax amount		$3,288,285	$17,519,480
Cash flow (add in deprec)		$4,288,285	$18,519,480
Opportunity investment(land/building sell)	$-1,531,039		
Investment	$-10,000,000		$1,531,039
Working capital required	$-306,968	$1,693,033	$2,576,728
WC difference		$-306,968	$-1,892,903
WC needed (account for these in negative terms)		$1,386,065	$38,805
Net cash flow	-$11,838,006	$2,902,220	$2,986,624

NPV	$16,996,457
IRR	37.7%
Discount Rate	12.0%

We would invest in this project as the NPV is positive and the IRR is higher than the opportunity cost of capital.

Existing plant location analysis shows that the NPV is positive and is nearly $17 million. The IRR is higher than the opportunity cost of capital. This shows that investment in the existing plant location is a good investment.

The refurbished plant site would have existing assets but would need capital investment to purchase, to update the processing system to General Mills desired needs, and to invest in buildings that would be expected to have a lifetime of 20 years as the assets are newer versus the existing locale and would have growth potential.

Table 4.4: Refurbished Facility analysis

	Year 0	Year 1	Year 20
Sales		$40,000,000	$58,272,447
Grain cost		$29,871,230	$32,840,388
Manufacturing costs		$4,000,000	$7,103,379
Distribution cost		$2,589,200	$3,771,976
Depreciation cost		$2,500,000	
Pretax profit		$1,039,570	$15,832,839
Taxes at 35%		$363,850	$5,541,494
Profit after tax amount		$675,721	$16,128,152
Cash flow (add in deprec)		$3,175,721	$16,128,152
Opportunity investment	$-3,250,000		
Investment	$-25,000,000		$3,250,000
Working capital required	$-253,219	$1,746,781	$2,638,841
WC difference		$-253,219	$-2,245,171
WC needed (account for these in negative terms)		$1,493,562	$39,114
Net cash flow	$-28,503,219	$1,682,159	$3,808,696

NPV	$8,482,862
IRR	15.53%
Discount Rate	12.0%

We would invest in this project as the NPV is positive and the IRR is higher than the opportunity cost of capital. However, it is not as opportunistic as the existing.

The Refurbished plant location analysis shows that the NPV is positive and is more than $8 million dollars. The IRR is higher than the opportunity cost of capital. This shows that investment in the Refurbished plant location is a good investment. However, the investment would not have as high a return on investment as the Existing plant location.

The Greenfield plant site would have new assets built on property purchased and would require more initial capital investment to purchase. The processing system that General Mills requires and the ability to store grain as an input source are all cost inputs for this scenario. The expected lifetime of these newer assets is 30 years and a main influence

on capital investment is the need for grain storage. Grain storage capability has a large influence on the capability of the grain department to leverage assets to maximize earnings to the corporation. The Greenfield plant would have growth potential.

Table 4.5: Greenfield Facility analysis

	Year 0	Year 1	Year 30
Sales		$40,000,000	$71,033,788
Grain cost		$28,748,040	$33,221,867
Manufacturing costs		$4,400,000	$7,813,717
Distribution cost		$4,596,400	$8,162,493
Depreciation costs		$3,800,000	
Pretax profit		-$1,544,440	$21,835,712
Taxes at 35%		$-540,554	$7,642,500
Profit after tax amount		$-1,003,886	$14,193,2123
Cash flow (add in deprec)		$2,796,114	$14,193,213
Opportunity investment(land/building sell)	$-3,250,000		
Investment	$-38,000,000		$3,250,000
Working capital required	$-281,299	$1,718,701	$2,606,391
WC difference		$-281,299	$-2,567,439
WC needed (account for these in negative terms)		$1,437,402	$8,288,953
Net cash flow	$-41,531,299	$1,358,712	$5,904,260

NPV	($2,619,297)
IRR	11.37%
Discount Rate	12.0%

We would not invest in this project as the NPV is negative and the IRR is less than the opportunity cost of capital. Less attractive vs. other existing option and requires more upfront investment

The Greenfield plant location analysis shows that the NPV is negative. The IRR is lower than the opportunity cost of capital. This shows that investment in the Greenfield plant location isn't a good investment. The company would lose money on its investment compared to the other two plant location possibilities. The Greenfield plant location would not be recommended in this scenario based on our analysis.

The analysis found important relationships between the variables that can influence net cash flow and ultimately NPV. However, given the information for this analysis, a determination is made that the existing facility would be the best investment at this time. NPV and IRR results show that based on General Mills investment, the Existing plant location offers the greater return on investment for the next decade. Future analysis and process following the same analysis can be considered so that the company continues to maintain its competitive advantage.

Analysis accuracy can be affected by many variables. Grain cost and distribution costs can be greatly affected if finished product locations are changed or if the plant locations analyzed change from the current scenarios that were analyzed. Distance from grain or to finished product locations greatly influence transportation costs. The costs can be influenced by rail cost changes from railroads or customer changes in availability or capability to sell byproducts for credits. Customers and changes based on geographic location are critical to understand to avoid pitfalls in the analysis.

CHAPTER V: SENSITIVITY ANALYSIS

The sensitivity analysis shows that there are many variables and factors that could influence the decision making for input costs and output costs. Factors such as length of time for expected life of facility, capital investment needed for the scenario and site selection, availability of property and assets, willingness of current ownership to sell, etc. influence the location of a refurbished site and a Greenfield site for analysis.

External influences and understanding is a key to ensuring accurate analysis. Local influences, neighbors, etc. are all variables that may change rapidly so understanding and planning properly is a key.

Management variables have influences from individuals that can influence the costs for the analysis. Decisions on new locations that become personal, capacity needs today and in the future, types and numbers of each product to be produced are all variables that need clear vision, alignment and understanding to provide an accurate analysis.

Internal influences can be the most concrete in the model. They become the foundation for the building block of the analysis and tend to be the variables best understood. However, understanding geographical differences and logistics are a key and can influence cost structure in many ways.

Grain and logistics costs are large influences on the overall model. These are key variables in the analysis that can influence NPV and costs. Scenario planning should be a part of these processes. Grain is a commodity that has influences from weather risk so if there is a year with poor quality crop conditions what is the plan? Do you increase elevator storage capacity? Purchasing from international regions may be considered? Logistics can

be influenced by availability of rail cars or trucks, weather and all can have considerable cost influences on the final analysis due to locations chosen for Refurbished and/or Greenfield sites.

Initial investment amounts play a key role in the analysis and the costs expected for the initial investment need to be well understood. Costing errors due to issues not considered may incorrectly influence the investment amounts and the final analysis conclusions in the financial model.

Variable analysis with well thought out costing analysis is a key to correctly answering the question for scenario analysis and have an accurate financial model based on sound supply management decision making.

Opportunity cost of capital may vary. The rate used for this project was 12% based on General Mills guideline recommendation at the time of this project. It is important to understand what the existing rate is and what the financial analysis should include. The interest rate may vary by company as this is a variable rate.

Ensuring you have well understood numbers is a key to the analysis. Information that isn't well understood and accurate when completing this analysis can have an effect that may lead to conclusions with inaccuracy and increased cost to shareholders.

CHAPTER VI: CONCLUSION

The purpose of this project was to analyze three supply chain scenarios to determine where future investments should be made in the oat network for General Mills. The analysis looked at an existing location, a refurbished location and a Greenfield site. The analysis gathered information with important considerations for the accuracy and thoroughness of the data gathered for the projected income statements and net cash flows to determine a solution based on sound financial analysis using Net Present Value. The question answered is should the company continue to invest in the existing supply chain or should it look to different alternatives in the form of a Refurbished or Greenfield plant site for production of oat flour? The answer was determined through the use of Net Present Value and determination of which scenario drives the most value – in the form of the highest return of Net Present Value.

The tool analysis with the mapping tool, Plan, Brief, Execute, Debrief continuous improvement tool, use of all external and internal variables of influence on net cash flow and the Net Present Value calculations allowed a complete and thorough analysis to drive more accuracy to the solution. Ensuring an accurate analysis and understanding of all the variables is a key driver to the solution process.

External variables have many influences and can be some of the most difficult to understand and accurately define. Government regulations, neighbors and many local influences are included in this group. The difficulty understanding these variables are due to the rapid possibility of their change. Local influences can change rapidly so a thorough understanding of what those possibilities can be are important to ensure you have an

accurate, well understood financial analysis with all costs included. External influences were proved to be the most difficult for analysis so many assumptions become part of this portion of the analysis.

Management variables should be well understood. Many times personal influences can become a portion of this analysis. Plans that are well defined and goals that are understood by all team members can be a key part of ensuring accurate financial data is obtained for the analysis. Many questions and educated guesses become part of the process and slow down the analysis when a clear vision isn't yet achieved. Products produced, capacities, location influence or preference (disagreement) by some supply chain management personnel can have large influence over these factors.

Internal variables include standard data collected in many analyses, these play an influential role and need to be well understood. These include many items that can be difficult to obtain data to ensure a good solution process. New locations may need to have average or approximate data applied since actual costs may be difficult to obtain. Geographical influences also include logistical considerations. Incoming materials and outgoing materials costs all change depending on distance from location. These may be well understood for an existing facility but a new facility analysis has many considerations that influence these and accuracy of this data is important. Inclusion of all material incoming and outgoing is a key. The budget costing included in this portion is the 'backbone' of the analysis.

The scenario analysis allows for the tool use in a straightforward common language approach that helps define the solution with a clear and financially sound approach. The

use of the strategic tools outlined allows a redesign of supply chain management strategies to provide the company with advantages that allow for approaches to 'when' General Mills should stop utilizing an older facility and start processing its oat products in a newer facility or continue utilizing the existing supply chain network. The designed strategic approach allows for a competitive model that provides a clear picture of the 'future' in the oat products market. Financial tools and alignment of the variables that influence the dollars involved are all important contributions when well understood.

Sensitivity analysis is an important part of the financial analysis and must be a part of a sound financial analysis process. There are inevitably variables or items that will be left out of the financial analysis due to various reasons such as, lack of knowledge of future technology for new products, other financial observations that could affect interest rate levels, government regulations not yet understood, customer use of byproducts, future company initiatives for sustainability and others. Oat products have variables that weren't included in this analysis due to current knowledge. The items not included in this analysis were: future use of oat hulls with new Canadian customers if a Canadian location were chosen for the Greenfield site, General Mills supply chain policy on sustainability that could influence sourcing of oats and use of oat hulls, oat hull use as a sustainable product for energy production or food fiber products and possible new products included utilizing rolled oat production capabilities at the Nebraska Refurbished plant site. All excluded items can influence the net cash flow possibilities for the financial analysis completed for this project. If information is updated and becomes available for any of the excluded items, then

a new financial analysis would need to be completed with updated net cash flows for a new NPV analysis.

The use of financial tools provides a strategic vision and current approaches and helps to properly define sound supply chain management. The language of business can be defined and clearly communicated by use of proper financial models. In this project, the use of NPV provides a well understood language and allows sound business decision making on the Oat products business. The Refurbished site analyzed is a good investment for General Mills based on the NPV analysis. The Greenfield site is not a good investment for General Mills based on the NPV analysis. The Existing plant site is the best investment for General Mills based on the financial analysis provided in this project. The Refurbished plant site would be an alternative choice for General Mills if new information becomes available that changes the supply chain financial analysis. The Greenfield site is not recommended at this time. The company should plan to run this analysis again in the five to ten year timeframe to determine if any net cash flow change has occurred that would influence the NPV calculations for sound financial analysis.

REFERENCES

Agriview. (n.d.). Retrieved from www.agriview.com/articles/2008/01/17/crop_news/crops01.txt

Beckmann, M. J. (1976, Autumn). Spatial Price Policies Revisited. *The Bell Journal of Economics, 7*(2), 619-630.

Brealey, R. A., Myers, S. C., & Allen, F. (2006). *Principles of Corporate Finance* (Eighth ed.). McGraw-Hill Irwin.

Canada Agriculture and Agri-Food Canada, Market Analysis Division. (2006, 10 3). Biweekly Bulletin. *Publications, 19*(14).

Canada's National Statistics Agency. (n.d.). Retrieved from Statistics Canada: www.statcan.ca/101/cst01/prim11b.htm

Chopra, S., & Meindl, P. (2004). *Supply Chain Management: Strategy, Planning and Operation* (Second ed.).

Food and Agriculture Organization of the United Nations. (2016, April 1). *FAOSTAT*. Retrieved from http://faostat.fao.org/site567/DesktopDefault.aspx?PageID=567

Futures Buzz. (2006). Retrieved from Futures Buzz: www.futuresbuzz.com/oatslt.html

General Mills. (2003). *Project Bobby.*

Greenhut, M. (1956). *Plant Location in Theory and in Practice: The Economics of Space.* Chapel Hill: The University of North Carolina Press.

Henderson, J. R., & McNamara, K. T. (2000). The Location of Food Manufacturing Plant Investments in Corn Belt Counties. *Journal of Agriculture Resource Economics, 25*(2), 680-697.

Kim, W. C., & Mauborgne, R. (2005). *Blue Ocean Strategy: How to Create Uncontested Market Space and Make the Competition Irrelevant.* Boston: Harvard Business School Press.

Mauney, D. A. (n.d.). *Using Financial/Decision Analysis Risk Optimization to Prioritize Maintenance Expenditures, Justify Maintenance Spending and Maximize the NPV Savings of the Maintenance Function.*

Mundi, I. (n.d.). Retrieved from http://www.indexmundi.com/agriculture/?country=us&commodity=oats&graph=production

North American Millers Association. (2007). *2007 Annual Report.* Retrieved from NAMA: www.namamillers.org

Shieh, Y.-N. (1990). FOB Mill Pricing and Plant Location when Demand is Linar but Non-uniform. *Urban Studies, 27*(5), 719-723.

USDA. (n.d.). *Foreign Agriculture Service*. Retrieved from http://www.fas.usda.gov/psdonline/psdgetreport.aspx?hidReportRetrievalName=BVS&hidReportRetrievalID=446&hidReportRetrievalTemplateID=7

Wisner, J. D., & Stanley, L. L. (2008). Texts and Cases. In *Process Management: Creating Value Along the Supply Chain.* Thomas and Southwestern.