

A Study Assessing the Feasibility of Michigan Malt Houses

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Date

August 2014

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I. Introduction

The craft or microbrew sector of the beer industry is growing. This has led to an increase in the demand for malt. Craft beers tend to use much more malt than larger breweries that use corn or rice in addition to barley or wheat in their beers. Craft brewers are also interested in malts with a different taste and chemical profile than traditional malts used by large breweries. These factors indicate that there may be the potential to build a malt house in Michigan.

Michigan has several desirable attributes as a location for a malt house. Traditionally the state has been a producer of barley for the beer industry. The underlying ability to produce barley in Michigan still exists. Also, the state is a leader in the craft beer industry creating a local demand for malt.

This study assesses the feasibility of a malt house in Northern Michigan. However, much of the analysis is applicable to a malt house located anywhere in the state.

The feasibility assessment will focus on economic feasibility, market feasibility, technical feasibility, financial feasibility and management feasibility. To the greatest extent possible, this analysis follows the outline in RD 4279-B Appendix A *Guide for the Completion of Feasibility Studies* from the U.S. Department of Agricultural Rural Development. By following this format it is hoped that potential malt houses will be well positioned to use the feasibility assessment to successfully obtain grants and loans.

Economic feasibility focuses on potential locations of malt houses as well as access to factors of production, transportation and the economic impact of increased malt production. Market feasibility focuses on potential marketing strategies as well as the size of the market, extent of competition and what factors drive brewer demand. Technical feasibility focuses on the technology used to produce malt. Financial feasibility will analyze model enterprise budgets and balance sheets for a malt house. Management feasibility focuses on the ability of key staff members within a malt house to carry out the firm's operations and goals.

While wheat and barley as well as other grains, can be malted and used for beer, the primary focus of this study will be on barley. This is due to the fact that barley based beers are more common than wheat based beers, and that barley is a very efficient converter of grain to beer (Fishbeck, p.5). Barley also malts more evenly than wheat. The hulls also aid in filtering the mash which is an intermediate product in the brewing process (Savin and Molina-Cano, p.523). Nonetheless wheat beers are popular especially in the summer and there is more wheat available than barley. A malt house should consider malting both barley and wheat.

Distilling is another industry that uses malted grains. In 2012, 15 percent of the malt produced in the U.S. was sold to distillers; the remaining 85 percent was sold to brewers (Tang, p.3). Distilling has definite promise, but currently and for the near future, brewing will be the primary market for malt and will be the primary focus of this analysis.

Overall a malt house is feasible with a relatively high chance of success. There is clearly a market for locally produced malt, and the craft beer and distilling industry in the state continues to grow. There is

likely sufficient grain available to convert into malt, and a malt house should be able to encourage additional grain production, especially barley. There are no technological barriers to producing malt, although malt production does exhibit economies of scale. Choosing the proper capacity of the firm will be important.

Both a large malt house and a small malt house are profitable, although the owners of a small malt house may need a second job to obtain a quality standard of living. Malting is not a labor intensive industry so the amount of labor needed is relatively small. However, finding someone with experience or someone willing and able to learn the process will be important for success. There are several possible business structures that a malt house could use. Single proprietor would be the simplest business structure but raising sufficient capital may be a constraint. Some type of joint venture with existing breweries could make raising capital easier while assuring a market for the malt.

II. Economic Feasibility

One issue facing a potential malt house is access to malt quality barley. While feed grade barley has several substitutes (corn, soybeans, etc.), malt grade barley has specific quality characteristics that are of only interest to the brewing industry (Fishbeck, p.11). Malted barley is also used in the whiskey industry, particularly in the production of scotch. Malt barley is really a specialty crop. Barley used for malt has a different enzyme and protein profile than barley used for feed. Yields of malt quality barley are also lower than feed barley varieties.

Another issue is the decline of barley acreage over time. This is true of both Michigan and the U.S. Finding farmers willing to produce barley may be a challenge. Maltsters may need to work with both brewers and farmers to secure a supply of barley. Also, given the specialized nature of barley used for malt, farmers will likely need a contract or some type of price guarantee before producing the crop.

While barley production has declined dramatically over time, malt barley production has been fairly constant. However, thanks to the growth of the craft beer industry demand has increased and production has not kept up the pace. High corn and soybean prices have also increased the demand for acres, and in the past barley has lost out as more farmers convert to corn and soybeans.

Michigan is not a major producer of barley. According to the 2012 Census of Agriculture, there were 321 farms that harvested 9,571 acres of barley in Michigan in 2012. Total output was 422,456 bushels. The yield was 44.1 bushels per acre. The Upper Peninsula is the major producing region. The five largest counties in terms of production in 2012 were Delta, Menominee, Tuscola, Baraga and Chippewa. It is unlikely that the Western Upper Peninsula counties will service a malt house in Michigan. Barley produced in these counties will likely be processed at existing malt houses in Wisconsin.

Despite these drawbacks it appears that Michigan's climates and soils are well suited to barley production. This crop appears to be able to compete against corn and soybeans in Northern Michigan. However, when starting, a malt house will need to use both barley and wheat as the raw ingredient. This project is feasible from an economic perspective.

IMPLAN, a standard economic impact software package, was used to generate an estimate of the economic impact of a small scale malt house. Assuming sales of \$200,000 a year generates an economic impact of \$370,000 for the state of Michigan.

III. Market Feasibility

The overall demand for beer is flat or declining slightly. However, the demand for craft beer is increasing (Mintel Beer-U.S., p.17). It is estimated that craft beer sales will be \$20 billion nationwide in 2014; a 100 percent increase from 2009 (Mintel Craft Beer, p.9). Mintel estimates the value of craft beer sales to be between \$34.4 billion and \$39.2 billion in 2019 (Mintel Craft Beer p.23); this represents a minimum increase of 72 percent over the next five years. In 2013, there were 2,347 craft breweries in the U.S. with another 1,254 in some level of development (Mintel Craft Beer, p.21). Some of these developing breweries may not ever reach the production stage. Nevertheless, these figures probably understate the true size of the industry as the larger brewers develop their own craft brewing brands and divisions. Almost 25 percent of people surveyed drink craft beer (Mintel Craft Beer, p.13). The growth of the demand for high quality beers will increase the demand for malt.

Another potential source of demand is the distilled spirits industry. The same demand drivers affecting the beer industry are beginning to impact the distilled spirits industry: craft products, locally produced, etc. While the craft distilled spirits industry lags the craft beer industry it will grow in the future.

One estimate expects the malting industry to grow 3.9 percent per year over the next decade, well above the 1.9 percent per year for the economy as a whole (Tang, p.11). Interest in craft brewing has supported the growth of the malt industry and appears to be continuing to do so in the near future.

Among craft beer drinkers style tends to be the most important attribute (Mintel Craft Beer, p.14). This makes high quality malt particularly important for craft brewers. The taste profile of the malt and hops are very important for the taste profile of the beer itself.

Craft beer consumers have several desirable attributes. They tend to be willing to try new beers, and have a strong interest in beer. Perhaps most importantly of all, they tend to have higher than average incomes. Fully one third of households that earn \$150,000 or more drink craft beer (Mintel Craft Beer, p.14). These consumers are willing to pay more for a high quality product which allows craft brewers to sell their products at a premium. They also tend to be somewhat young; consumption is highest among people between the ages of 25 and 34 (Mintel, Craft Beer, p.51).

Michigan is a hub of craft brewing activity. According to the *Michigan Beer Guide* there were 150 breweries and brewpubs in the state with more on the way. Policies have recently been implemented that double the amount of beer that microbreweries can produce and sell directly from 30,000 barrels (930,000 gallons) to 60,000 barrels (1.86 million gallons) (Mintel Craft Beer, p.25). Founders, Arcadia and Bell's among others are expanding their distribution beyond the state's borders. Midwesterners appear to be somewhat more loyal to beers produced in the region and are somewhat less interested in beers that appeal to their image (Mintel Craft Beer, p.60). Michigan residents may be particularly loyal to Michigan beers.

Craft brewers may be willing to pay a somewhat higher premium for malt but the quality of the malt has to justify the higher price. One advantage a small maltster may have over a large one is by offering limited runs of custom malt to meet the specific needs of a brewer interested in producing a unique or limited run of beer. One example of this is Bell's Brewery Planet Series of beers that will start in August 2014. Each of the seven beers will be based on a planet. The idea is derived from Holst's *The Planets* (Mintel, Craft Beer, p.31). Nonetheless, despite being able to obtain a higher price for its beer a brewer will still be somewhat price sensitive to its input costs. The price point at which a brewer will buy malt is still important.

Despite the fact that craft beer share of the total beer market is relatively small, it consumes a disproportionate share of the inputs used in beer. Craft brewers account for somewhere between 25 percent and one third of all malt consumed. Craft brewers often produce 100 percent malt beers. Large brewers tend to use corn and rice in addition to malt. Craft brewers also import malt from Europe. Specialty malts tend to be imported from England and Germany (Halloran).

The U.S. is both a major importer and exporter of malt (Tang, p.16). The primary export markets are Mexico and Canada. Canada is the major foreign source of malt to the U.S. although the U.S. also imports malt from the United Kingdom and Germany (Tang, p.16). These last two countries are growing in importance as craft brewers import specialty malts. Overall, the U.S. imports 24.8 percent of the malt it uses (Tang, p.31).

Competition from large maltsters needs to be considered. In 2102 the malt industry generated sales of \$1.1 billion and generated profits of \$45.6 million (Tang, p.3). Profit margin was 4.1 percent of sales which shows that malting is similar to other food processing activities in that it is an industry with narrow profits margins.

The three biggest malting states are Wisconsin, Idaho and Minnesota (Tang, p.18). These states either have large barley production, a history of brewing or both. Traditionally, malting has been a relatively concentrated industry. The two largest firms are Malteurop and Cargill (Tang, p.20); both of these firms are large multinational corporations. Cargill has facilities for specialty malts and has a pilot brewery for testing (Tang, p.26). In the past major brewers operated their own malt house. It appears that InBev, owners of Anheuser-Busch, is the only major brewer that does its own malting.

There is a clear potential for increased specialty malting capacity in the U.S. The increased interest in craft beer is coupled with an interest in locally produced food. Right now there are very few maltsters in Michigan which means that locally produced beer is not using locally sourced barley and malt. This creates an opportunity for local maltsters. Another question facing the industry is the concept of *terroir*, the idea that the taste profile of beer is a function of the land and the agricultural commodities produced on that land. The concept of *terroir* is an accepted fact in wine production but is a source of debate in beer circles. Some brewers do believe in *terroir* and this attribute could be used to market locally produced malt from locally produced barley.

While there is a great deal of opportunity for a small scale maltster competition does appear to be increasing. There is one small scale firm in Grand Rapids and another in Shepard. The firm in Grand

Rapids produces about 2,000 pounds of malt every week to ten days, and is currently soliciting and additional \$250,000 to increase production. This would allow the firm to produce between 50,000 and 75,000 pounds a week (MITECHNEWS.COM) There are at least 16 small operations nationwide with another seven under construction as of early 2014 (Brewers Association). Also the large scale maltsters may become more aggressive in pursuing market share by meeting the needs of craft brewers. Entering into contracts with brewers will ensure that there is a market for the malt produced by the firm. Brewers benefit by being able to have a steady and sure supply of malt and may be able to contract for specific attributes of the malt.

A malt house is feasible from a market perspective. The demand for specialty malts is growing as is the interest in locally produced products. Michigan is one of the centers of the craft beer movement and the interest in locally produced specialty malts will continue to grow. Despite the level of competition, from a marketing perspective a malt house has a strong potential for success.

IV. Technical Feasibility

While the malting process is well understood handling the variation in barley quality from year to year or from farm to farm is important (Savin and Molina-Cano, p.523). Brewers will demand a consistent high quality product. Among the major desirable traits for malting are variety, kernel size, soundness, color, brightness and a germinating capacity of 96 percent or more, a protein content of no more than 12 percent and no insect, microbial, heat and weather damage (Newman and Newman, p.111).

Malt is used as a source of fermentable sugars for fermentation (Newman and Newman, p.113). The flavor characteristics of barley contribute to the taste of beer and whiskey.

Malting is a three step process. The first step, steeping, involves placing sorted and cleaned barley (or wheat) into stainless steel tanks with sufficient clean water to wet the grains thoroughly. Water temperatures are maintained at 14 to 18 degrees Celsius (57 to 64 degrees Fahrenheit). Steeping lasts 48 to 52 hours during which time the grain is subject to repeating wetting and draining until the grain reaches a moisture content of 42 to 46 percent. Steeping exposes the starch and allows the development of hormones that initiate the growth of the sprouts (Newman and Newman, p.114).

The second stage is germination which begins when the barley (wheat) is removed from the water. The grain is turned every 8 to 12 hours to aerate and prevent compaction and intertwining of the rootlets. Temperature and humidity is controlled to control the rate of germination. The germination process takes four to ten days. Dark malts (used for stouts and other dark beers) require a longer germination period than pale malts (Schuster, p.283). Generally speaking floor germination takes longer than Mechanical germination. Floor germination temperatures are generally 13 to 16 degrees Celsius (55 to 60 degrees Fahrenheit) range. Mechanical germination temperatures are generally in the 16 to 20 degree Celsius (60 to 68 degrees Fahrenheit) range (Newman and Newman, p.114-115).

The final stage is the kilning. Kilning stops the germination of the grain by drying down the barley (wheat) which causes the withering and stabilization of the kernel. Kilning dries the grains down to a moisture level of two the three percent. Progressively hotter air is introduced to the grain to dry it

down to the desired moisture level (Newman and Newman, p.115). Pale malts tend to be dried faster than dark malts and at lower temperatures than dark malts (Schuster, p.287-288). After kilning the roots are removed and the finished malt is allowed to cool to room temperature (Schuster, p.293).

The final product among other things is composed of sugar, starch and the enzyme diastase. The malt is added to hot water at the brewery where the diastase converts the starch into sugars. Once the sugars are dissolved the final product is called wort and the brewer is ready to make beer.

As is the case with most agricultural enterprises malting exhibits economies of scale, and most maltsters are located in or near major barley producing regions (So). However, rising transportation costs may offset the production costs advantage large scale maltsters possess (Brewers Association). To overcome this obstacle a Michigan based maltster needs to be flexible, emphasize the locally produced nature of the malt, and offer unique products to brewers.

One technical aspect of malting that can work to the advantage of a smaller firm is the ability to run a bagging line. Some large scale malt houses may not bag their malt; and smaller brewers may not have the ability to handle bulk deliveries of malt. Generally speaking it appears that breweries that produced less than 8,000 barrels (248,000 gallons) of beer do not use silos to store their malt; brewers above this amount do generally store their malt in bulk in silos (Brewers Association). Selling a bagged product presents a possible competitive advantage for a small maltster.

Operating a malt house is a capital intensive industry and employs relatively few workers. It is estimated that the U.S. malt industry only employs about 1,100 workers (Tang, p.8). The major cost is the grain. Raw materials account for more than 70 percent of the cost of production for commercial sized malt houses (Tang, p.21).

A malt house is feasible from a technical perspective. The technology is established and the process is well understood. Quality standards are also well established. There are no barriers to malting from a technical perspective, although finding someone qualified to malt grain may be difficult. This will be discussed in the management feasibility section of the study.

V. Financial Feasibility

Perhaps the major barrier to success is financial feasibility. While the number of small malt houses continues to increase, finding capital for these firms and generating enough income for the owners to be able to work full-time at the malt house is currently difficult. Pilot Malt House in Grand Rapids has turned to social media to raise \$250,000 in capital of expansion. One reason finding capital is difficult is that the profit margins for large commercial malt houses are relatively narrow.

Table 1: Income Statement for an Average Sized Commercial Malt House.

Income Statement		
Item		Amount
Total Revenue		\$34,375,000
Cost of Raw Material		24,268,750
Income Before Expenses		\$10,106,250
Expenses		
Wages		1,993,750
Depreciation		584,375
Marketing		68,750
Rent and Utilities		1,031,250
Other Costs		4,950,000
Total Costs		8,628,125
Net Income		\$1,478,125

Source: Tang

The income statement shown in Table 1 highlights a number of important points. The first is that malting is not labor intensive. The typical commercial malt house only employs about 35 people. Secondly, like many food processing industries raw material costs are high and are the dominant cost of production. Finally, in a mature industry such as malting interest expenses are low. This industry does not depend on credit.

Some of largest firms engage in a wide range of food processing activities in addition to malting. As a result, their balance sheets reflect all of their activities of which malting may be a small part of their total business and portfolio of their activity.

Since this study is an analysis of a prospective venture, the figures that follow should be considered estimates. Actual performance will be different. The type of equipment used will play a particularly important role.

Table 2 shows the income statement for a small malt house that processes 200 tons a year or 8,000 fifty pound bags. The results are roughly based on a small malt house that sells to craft brewers. These figures are designed to give a general idea of what a small malt house can expect. Actual figures will be different.

Table 2: Income Statement Small Commercial Scale Malt House

Income Statement					
Item	Year 1	Year 2	Year 3	Year 4	Year 5
Sales	\$200,000	200,000	200,000	200,000	200,000
Cost of Grain	45,000	45,000	45,000	45,000	45,000
Net Sales	\$155,000	155,000	155,000	155,000	155,000
Other Expenses					
Depreciation	18,000	18,000	18,000	18,000	18,000
Interest	7,000	5,600	4,200	2,800	1,400
Wages and benefits	66,500	68,495	70,550	72,666	74,846
Marketing	10,000	8,000	6,000	4,000	2,000
Rent	24,000	24,480	24,967	25,469	25,978
Bags	4,000	4,080	4,161	4,244	4,330
Utilities	6,000	6,120	6,242	6,367	6,495
Maintenance	1,000	1,020	1,040	1,061	1,082
Office Expenses	500	510	520	531	541
Insurance	500	510	520	531	541
Total Expenses	137,500	136,815	136,200	135,669	135,213
Net Profit	\$17,500	18,185	18,800	19,331	19,787

It is assumed that the price of barley is \$6.00 a bushel (48 pounds to a bushel) as is the price of wheat (60 pounds a bushel) and that half the grain used is barley and the other half wheat. Obtaining 4,167 bushels of barley may be difficult at first but the state has supported that level of production in the past and there is increased interest in crop production throughout Northern Michigan.

The price of the malt is \$25 a bag which is a conservative estimate. It is estimated that the firm borrows \$100,000 for equipment for five years at 7 percent interest. The firm also hires two employees. It should be noted that malt houses this size often do not have full-time employees, that the owner does much of the work. Marketing expenses decline over time as craft brewers become more aware of the firm. There is a 3 percent annual increase in wages and benefits and a 2 percent adjustment for inflation for rent, utilities, and insurance. These figures are estimates, actual figures will be different. The rent figure may be somewhat high. If the firm owns its own building there will be no rent expense but there will be a smaller expense for property taxes. The firm will incur some initial raw material and equipment installation costs before generating any income. Having a strong cash reserve will be important for the success of a start-up malt house.

In this case the firm is profitable, with a profitability of about 10 percent of sales which is more than double the industry average. Profitability also increases slightly over time. However, the low level of output makes it difficult for a firm to pay its owners unless they are also workers.

Table 3 shows a simple balance sheet for the firm over the first five years of operation. The firm only has two assets, equipment and cash and only one liability, the loan for the equipment. It is assumed that the owner puts up 50 percent of the cost of equipment and borrows the other 50 percent. This is fairly typical for a new venture.

Table 3: Balance Sheet, Small Commercial Scale Malt House

Balance Sheet					
	Year 1	Year 2	Year 3	Year 4	Year 5
Assets					
Cash	\$15,500	31,685	48,485	65,816	83,603
Equipment	200,000	200,000	200,000	200,000	200,000
Less Accumulated Depreciation	(18,000)	(36,000)	(54,000)	(72,000)	(90,000)
Net Equipment	182,000	164,000	146,000	128,000	110,000
Total Assets	\$197,500	195,685	194,485	193,816	193,603
Liabilities					
Equipment Loan	80,000	60,000	40,000	20,000	0
Owner's Equity	\$117,500	135,685	154,485	173,816	193,603

The firm's owner's equity increases slightly from \$117,500 after the first year to \$193,603 after the fifth year. It is assumed that the equipment has a lifespan of ten years and has a salvage value of \$20,000. Straight line depreciation is used.

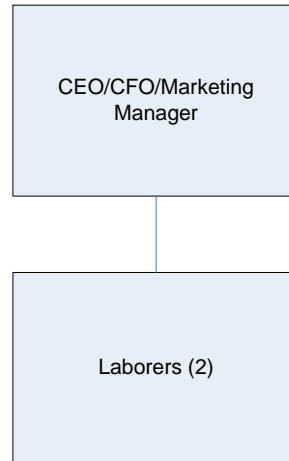
As is the case with the income statements these figures are estimates actual results may be different. One source of concern is cash flow. The cash position of the firm is relatively weak in the first two years of operation. After the second year the cash position improves. In this case the firm can service it's debts and is debt free after the fifth year. Nonetheless, it is important for the owner to have sufficient cash reserves from the beginning of operations to cover costs and unforeseen expenses.

In this case the firm is feasible from a financial perspective. However, unless the owner is willing to do most of the work himself or herself, the owner will need another source of income to support a family. This is common for small scale malt houses. A larger firm would be able to generate enough income to support a family and hire workers, however obtaining enough barley may be difficult in the short run. If the owner has access to an unused building, the firm would not have to pay rent which would improve the financial performance of the venture. Discussing the potential demand with brewers or even better obtaining contracts would be helpful in determining the proper size of the malt house.

VI. Management Feasibility

The actual structure of a malt house is relatively straightforward. Figure 1 shows a prospective organizational chart for a malt house.

Figure 1: Prospective Organization Chart for a Small Malt House



In this case the CEO is also the chief financial officer and the marketing manager. If the CEO decides to focus on production, then the CEO should probably hire someone to take on the financial and marketing activities. It is strongly suggested that the financial and marketing arms of the firm are not directly involved in the production of the malt. The human resources of the firm would be stretched too thin.

The ability to be able to produce malt that meets the quality requirements of the customers is also important. Whoever is in charge of production needs to have experience. Since the equipment needed to produce malt at a micro scale is relatively easy and inexpensive to obtain some learning by trial and error is possible. Learning from others in the malting and beer industry is another way to obtain the experience to manufacture malt.

The example shown in Figure 1 is for a simple sole proprietor firm. Organizationally, it is the simplest structure. However, such a structure may not have the resources at its disposal to raise sufficient capital. In that case working with a brewer or other partner could be successful in obtaining the necessary capital to effectively operate the business.

A malt house is feasible from a management perspective provided a person who can effectively produce malt that meets the customer's standards can be found or trained. The process is relatively simple and the organization of the firm is straightforward. However, some type of joint venture or partnership may be required to insure the firm has enough capital to operate successfully.

VII. Summary

This study analyzed the potential feasibility of a malt house in Michigan. It looked at five aspects of feasibility: economic, marketing, technical, financial and management. A malt house is feasible and has a relatively good chance of success if it has sufficient capital and has someone with experience in producing malt.

The primary economic issue is access to barley. Overall there is enough barley available to produce malt, but contracting with farmers in the area to produce barley would improve the likelihood of

success. Northern Michigan appears to be well suited to barley production. There is enough wheat produced to meet the needs of those brewers who produce wheat beers. The total economic impact of a malt house with sales of \$200,000 on the economy of Michigan is estimated to be \$370,000.

The project is clearly feasible from a marketing perspective. The growth of the craft breweries that produce beers with a high malt content has increased the demand for malt. Also, some craft brewers are interested in producing beers with locally sourced inputs such as malt from locally produced wheat and barley. Large maltsters and malts from Europe may be a source of competition but this can be alleviated by working closely with local brewers to meet their needs. Offering quality malts in bags is something that would be appealing to brewers. While still in its infancy, there is a growing demand for malt from distillers as well.

Technical feasibility is not a major concern. The technology is simple and not overly complicated; and the three stages of malting: steeping, germination, and kilning are well understood. The biggest obstacle is making sure that quality is maintained throughout the process.

While the project is feasible from a financial perspective, profit margins are likely to be narrow. In order to be successful the firm will need adequate capital and be of sufficient size to meet the needs of brewers and other customers. Initially, the owner of the malt house may need another source of income to maintain the owner's standard of living.

The project is also feasible from a management perspective. It is important to separate the production functions of the firm from the operations (accounting, marketing, etc.) in order to be successful. While a sole proprietorship is the simplest structure, finding a partner or entering into a joint venture with a brewery or other firm may make it easier to obtain sufficient capital to ensure success.

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