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## **A Feasibility Study of a Georgia Micro-Malting Operation**

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## **ABSTRACT**

Malting is the process of turning raw grains into a product that can be used in brewing, distilling, and baking, to name a few end products. Currently, a small number of large companies supply malts at a large scale, particularly to brewers. As the craft beer industry has continued to expand over the past 20 years in the US, however, micro-malters have emerged providing smaller batches of specialized malts, primarily for regional craft brewers. The purpose of this study is to assess the feasibility of such a venture given market conditions in the state of Georgia. The feasibility of a micro-malting facility in northeast Georgia is dependent on a number of factors. In this study we examine the current micro-malting industry, potential demand for commercial malts in Georgia and consumer demand for specialty malts.

**Keywords:** Malts, micro-malting, maltster, malting feasibility study, craft beer

**JEL Codes:** Q13, Q18

## **Introduction**

The purpose of this report is to assess the demand for malts from craft breweries within the state, and in turn, estimating the feasibility of opening the malting house. The report looks at many different attributes of the malting industry in order to provide a synopsis of feasibility. We begin the feasibility study by providing an in-depth overview of the malting market, which includes general information about competitors. Next, we delve deeper into the micro-malting marketing area of interest. In this section we focus on product information, including malt specifications, pricing of the malts, promotional tactics, and potential business locations. We then estimate transportation costs, followed by our PESTLE analysis of the malting industry. Next, we perform a malt demand analysis for the craft beer industry within the state of Georgia, based upon information received from multiple breweries. Then, we estimate break-even points by calculating the percentage of market share needed if break even required 2 tons, 50 tons, 100 tons, or 200 tons of sales a year. Finally, we perform hedonic price analysis and logit regression analysis based upon data that we have found.

We found that there is significant estimated demand for malts from craft breweries within the state of Georgia. The estimated total of 16,697,696 pounds, can potentially increase or decrease as craft breweries enter and exit the market. There is opportunity for a micro-malting firm to enter the Georgia market and capture some of the industry share. Of particular interest is the fact that there are currently no micro-malting houses in the Georgia market and that there is a growing movement by consumers to purchase products that are produced locally. Local craft breweries could be interested in purchasing locally produced malts in order to create beers that are aimed at locavores.

## **Market Overview**

Malting is the process of turning raw grains into a product that can be used in brewing, distilling, baking, etc. With regards to beer production, the maltster comes in between the farmer, who grows the grain, and the brewer, who makes the beer. In the U.S., micro-malting was once as expansive as the growing craft beer industry is now. Before prohibition, there were “mom and pop” malt houses across the country, sourcing locally grown barley and selling to local breweries. After prohibition, the small malt houses were either bought out or failed, making way for a small number of large companies such as Cargill and Malteurop Group to take over.

Since that time, breweries typically buy their malt from such large-scale, mechanized facilities that combine enormous volumes of grains grown across the United States, Canada, and Europe. At the same time, the beer market in the United States has largely been dominated by American Adjunct Lager which is characterized as light bodied and pale, relying on “thin” malts with less flavor and which produce lower alcohol content. Larger breweries also dictate to farmers which kinds of grains they should grow. This decision is based on characteristics such as yield and protein content which affect both the quality and consistency of the beer that is produced. Consequently, many heirloom varieties of barley have essentially disappeared (Anderson, 2013).

The two main malt producers in the country are Malteurop Group and Cargill Inc. Malteurop currently controls 25.1% of the United States malt market (Tang, 2012). This company purchased Archer Daniels Midland’s malting division in 2008 and now operates in North American under the name of Malteurop North America Inc. That acquisition made the company the largest malt producer in the world and gave it a presence in all major malt markets. The second largest malting company in the United States is Cargill, with control of an estimated

19.3% of the United States market. Other large industry players include Rahr Malting and Briess Industries, as well as, large scale breweries such as ABInbev (ABI) that produce their own malts.

The current malting industry can thus be characterized as one with significant economies of scale. That is, large volume production allows maltsters<sup>1</sup> and brewers to achieve lower costs. Further, larger firms take advantage of technology to improve operational efficiency. In addition to more efficient production, larger firms have greater bargaining power. This allows them not only to negotiate better prices but to develop supply contracts to ensure consistent inputs in production. Larger maltsters also have the ability to access available inputs by locating facilities in favorable growing regions. Given these conditions, there are relevant barriers to entry at a large scale.

Since 1993, there has been an explosion of the craft brewery industry growing from 446 to an estimated 2,822 breweries in 2013<sup>2</sup>. Importantly, the United States craft beer industry has been characterized by greater product differentiation resulting in a wide variety of ales, lagers, porters, and stouts, to name a few. Also, such differentiation requires a greater variety of malts. This has led to a resurgence of the micro-malting industry. Although, most micro-malting houses produce yearly what a typical large scale malting house produces in a day, their focus is often on quality over quantity. As a result, micro-malt houses contribute to the craft brewing industry and are helping to bring back heirloom crops. As malting becomes more specialized and more adventurous, specialized malt varieties are likely to be developed. Like wines, some grains are setting themselves apart by emphasizing their terroir, i.e. geographic specific characteristics that

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<sup>1</sup> We use the terms malters and maltsters interchangeably throughout the study.

<sup>2</sup> <http://www.brewersassociation.org/statistics/number-of-breweries/>

provide unique agricultural products. By promoting malt terroir, small maltsters can distinguish themselves from larger malting houses with whom they cannot compete on price. While craft brewers are the main importers of the high-end malts from Europe they are also the group of people that are most likely to appease locavore's<sup>3</sup> by producing "all local" beers (Anderson, 2013).

Currently, we are able to identify 26 micro-malting houses within the United States (Table 1) with the largest number in the Northeast, Midwest, and West Coast regions (Figure 1). This largely mirrors the expansion of craft breweries in the U.S. as well. For example, of the roughly three thousand craft breweries in the United States, California, Oregon, and Washington have around 26% and the New England States have almost 7%.

Presently, only three micro-malting houses are located in the Southeast states. Those three southeast micro-malting houses are Riverbend Malt House in Asheville, North Carolina, Farm Boy Farms in Pittsboro, North Carolina, and Corsair Distillery in Bowling Green, Kentucky. At this point, in time there are no malting houses located in Alabama, Florida, Georgia, Louisiana, Mississippi, or South Carolina. According to the Brewer's Association, there are 142 craft breweries (micro, regional, and contract brewers) in this six state area (Table 2) which is almost 5 percent of all breweries in the United States and this number is expected to continue to grow. Given this growth in demand for craft beer, there could be potential opportunity for micro-malting operations in the Southeast region to collaborate and partner with regional craft brewers.

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<sup>3</sup> A locavore is a person who is interested in eating food that is produced locally.

**Table 1 Micro-malting houses in the United States, 2014**

<b>Name</b>	<b>Location</b>
Riverbend Malt House	Asheville, North Carolina
Valley Malt	Hadley, Massachusetts
Rebel Malting	Reno, Nevada
Michigan Malt	Shepherd, Michigan
Colorado Malting Company	Alamosa, Colorado
Skagit Valley Malting Company	Burlington, Washington
Rogue Brewery	Newport, Oregon
Grouse Malting and Roasting Company	Wellington, Colorado
Christensen Farms Malting Company	McMinnville, Oregon
Peterson Quality Malt	Monkton, Vermont
Deer Creek Malt	Glen Mills, Pennsylvania
New York Craft Malt	Batavia, New York
Blacklands Malt	Leander, Texas
Gold Rush malt	Baker City, Oregon
Niagara Malt	Cambria Center, New York
Blue Ox Malthouse	Maine
Eckert Malting and Brewing	Chico, California
Mammoth Malt	Thawville, Illinois
Pilot Malt House	Jenison, Michigan
Farmhouse Malt	Newark Valley, New York
Abbott's Mill House	Milford, Delaware
Academy Malt	Indianapolis, Indiana
California Malting	Santa Barbara, California
Hillrock Estate Distillery	Ancram, New York
Our Mutual Friend Malt and Brew	Denver, Colorado
Farm Boy Farms	Pittsboro, North Carolina

Sources: Craft Malting Guild, <http://www.craftmalting.com/about/members/>, 07/20/2014





**Figure 1 Map of Micro-Malt Houses in the United States, 2014**

**Table 2 Number of Southeast Breweries**

<b>State</b>	<b>Number of Breweries</b>
Alabama	13
Florida	66
Georgia	28
Louisiana	11
Mississippi	4
South Carolina	20

Source: Brewers Association, <http://www.brewersassociation.org/statistics/by-state/>, 07/20/2014

**Micro Malting Marketing**

*Product*

The malting process is commonly known as “controlled germination” because the process harnesses the basic germination of the barley acrospires. Malting begins the process of reducing the size and complexity of the carbohydrates and proteins found within the barley. The first step of the process, known as steeping, consists of soaking the barley in water for 2-3 days to encourage growth. The moisture content of the barley is allowed to increase from roughly 12 percent to over 40 percent. The second step of the malting process, known as germination, is when the grains are removed from the soaking tanks and laid on the floor of the malting house. Germination requires a constant supply of oxygen, so the grains are occasionally turned over for roughly four to six days. During this step, the internal structure of the grains is altered, sugar is produced from the grain’s starch and enzymes begin to break down the protein and starch molecules. The third step of the malting process, known as kilning, begins once sufficient growth has occurred. During this step, the malt is dried using warm air in a kiln to stop the modification process. The moisture content is reduced to usually less than 5 percent. The temperature is usually kept low at first to prevent the destruction of the enzymes within the malt; it is then increased as the grain becomes increasingly drier. The kilning state imparts color and flavor compounds within the malt and takes around 18 to 24 hours. The entire malting process generally takes about seven days. It is estimated that the weight of the barley grain, from the time it is harvested to the end malt product, will be reduced in weight by 8-10% due to conversion. This implies that the business will need to purchase roughly between 100,000 to 110,000 pounds a year in order to produce 50 tons of malt annually and roughly between 216,000 to 220,000 pounds a year in order to produce 100 tons annually.

A good definition of a quality beer is “a beer that consistently meets specification.” Quality control is extremely important to the brewing process as it ensures that a beer is

consistent. To reach that consistency, the process and ingredients used to make the beer must be the same every time. This means that a brewery needs malt that is of high quality and consistently has the same characteristics. This responsibility falls on the maltsters to acquire high quality grains and then transform them into a consistent quality finished malt product. To that point, there are several important considerations regarding malting.

Malts that are sold to brewers are estimated to account for roughly 85 percent of the industry's revenue (Tang, 2012). The two main types of malts used in brewing are base and specialty malts. Base malts are the majority of the total grain bill while specialty malts usually account for about 10 to 25 percent of the grain bill. Base malts must be mashed in order to fully convert their starch into fermentable sugars and dextrin, and to continue the enzymatic breakdown that started during the malting process. Base malts have higher enzyme levels than specialty malts and provide a majority of the diastatic<sup>4</sup> power for all-grain recipes. Most modern base malts have enough enzymatic power to mash themselves and a certain portion of adjuncts or non-enzymatic grains.

There are different kinds of base malts offered but the most common categories include: lager malts, pale ale malts, wheat malts, and rye malts. Lager malts can be used to produce ales as well as lagers. Pale lagers are the most common style of beer and this type of malt is most commonly used to produce it. The Pale Ale Malt is kilned at higher temperatures than lager malt, which gives it a slightly toastier malt flavor. Wheat malt can be used for roughly 5 to 70 percent of the mash depending on the beer style. The diverse range of craft beers has contributed to innovations in malt varieties, particularly for specialty malts used to give craft beers unique

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<sup>4</sup> Diastatic power refers to the chemical process of converting starch into sugar.

flavors. Specialty malts give beer character and can be classified into many different groups including but not limited to: kilned malts, caramel malts, and roasted malts.

According to the questions filled out for the study, the business plans to offer three different products. Those products include 6-row barley malt, malted rye, and malted wheat. The 6-row barley malt variety has a much higher protein content and enzymatic power than that of the 2-row barley malt variety. Therefore, it can be advantageous to use 6-row barley malt in recipes that use higher proportions of specialty malts, wheat malts, or other adjuncts, due to the little enzymatic power held by these other malts (Grain List). This type of malt is typically used to produce adjunct-based American lager and wheat beers but can be used as the base malt for essentially all other styles of beer. Rye malt is another popular but sometimes overlooked malt variety that is very similar to barley and wheat. It provides a unique spicy flavor for the production of rye beers. Rye malt can also help build flavor and complexity in many beer styles, including lagers and dark ales. A popular form of rye beers, Rye Pale Ales, typically uses only 5% rye in the grain bill. (Rye Product Information & Typical Analysis, 2013) Finally, the wheat malt variety can be broken down into two subcategories: red and white. Both varieties can be used as all or part of the base malts in wheat beers. The red variety has slightly higher protein content than the white variety and is commonly used in Hefeweizen<sup>5</sup> and other wheat styles of beer. This malt also helps to improve head and foam retention in any beer style. (Product Overview)

The business is planning to acquire all of their grains from Georgia unless breweries and distilleries express an interest in them malting 2-row barely, even if it is from out of state. The

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<sup>5</sup> A Hefeweizen is a German style of wheat beer.

business plans to purchase the needed grains if they're able to acquire them as needed. They also have the hopes of contracting with the farmers if they need to arrange for certain growing conditions, this will also allow them to lock in prices per bushel as long as the grain meets certain specifications. According to the beginning survey, the potential business owners are currently talking to two-three farmers within the state to be their suppliers. Additionally, one farmer is potentially interested in storing the grain as well.

Another interesting topic involving malts is what happens to spent grain once the breweries have used them to produce their beer. Spent grain can constitute as much as 85 percent of a brewery's total by-product. Breweries using their by-products for agricultural purposes are dominant, but there are a few other options that are gathering attention. Some breweries give their spent grain to farmers for animal feed, while some use it as fertilizer for future grain growth. In addition, other breweries may use their old grain to produce baked goods in their kitchens. According to CraftBeer.com, spent grain's greatest capability lies in its power to provide food for an entire community. "Composted, spent grain fertilizes fields, gardens, and urban greenhouses across the country, thus providing people with nutritious, natural foods." The waste from a brewery can turn into wealth for a larger community. One brewery, Alaskan Brewing Company, has developed a broiler system that uses their spent grain. "It will completely eliminate the brewery's use of fuel oil in the grain drying process, and displace more than half of the fuel needed to create process steam for the brewing process." That system is ingenious in the fact that as their brewery grows, they will have a fuel source that grows along with it. It could be of great benefit to Great Southern Malting if the company could team with breweries and develop a way of using the spent grains to create value for their communities. "From farm to foam. From foam to plate." (Witkiewicz, 2013)

### *Price*

The economics of grain supplies vary among grain varieties depending on protein content, plumpness, and moisture content. Changes in the price of inputs affect malt producer's production levels and pricing. Currency exchange rate fluctuations impact import prices and in turn affect the demand for industry malts against competing imports. Barley tends to be oversupplied, which causes food-grade barley prices to be lower than livestock-grade barley prices.

Micro-malting houses typically cannot compete with the larger malting companies. Those companies have economies of scale and production down to a science. Therefore, the micro-malting house will need to compete on terms of quality and not price. The malts will be consistently high in quality, embody "local", and will be able to adapt to consumer needs, but all of this will come at a higher cost to the breweries.

### *Promotion*

Initially, the best promotion tactic is going to be building relationships with the local breweries. By building these relationships, you are informing them of what your business plans to produce. This will be very beneficial since they will undoubtedly have some input about what they are looking for in a product or a certain product that they wish was accessible. The second promotion tactic is to create a website. Websites are now cheap to design and maintain and it allows the consumers an opportunity to learn about your business, as well as, to shop from home. Other websites, such as the Georgia Craft Brewers Guild and the Brewers Association, offer

additional opportunities to advertise the business. There is also a Craft Maltsters Guild<sup>6</sup> in the United States; this could potentially be a great opportunity to get the name of the company out there. The Craft Maltsters Guild has recently been established with the goal of promoting and educating the public about the tradition of craft malting in the United States. Their website indicates that there are two different levels of membership: the associate level which costs \$160 and the regular level which costs \$350. Other forms of advertising, such as T.V. or radio, could be used but might be less effective.

Search engine optimization could be a cheap and effective tactic as well. The earlier that a website is displayed in the search results, the more traffic that website gets. (Search Engine Optimization) This tactic involves formatting the company's website in order to be considered one of the relevant search results by the search engine. Public relations could be another very interesting and effective way of promoting the business. This method does not necessarily involve paying for the promotion like advertising does. One idea in this category is to take advantage of free social media. Social media is a huge marketing tool and it seems that every company is using it these days in some form or another. Some ideas of how to use social media include: using Facebook to keep fans and customers up to date on what is going on, using Instagram to share pictures of the process or beers that use the company's malts, and use Twitter to inform followers of new product offerings or contests.

Another idea for public relations promotion is, once the malt house is up and running, you could provide a few local breweries with some of the malts (possibly specialty malts, such as pecan wood smoked malts) and have them create different types of session beers based around

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<sup>6</sup> Craft Maltsters Guild (<http://www.craftmalting.com/>)

those malts. It could potentially be turned into a taste test competition or something along those lines. Word of mouth is more than likely going to be the best bet at first for the public relations sector. I have received nothing but great interest from the breweries that I have talked to regarding this study. Since there is a growing movement towards buying local, i.e. locavore, it should not be difficult to find breweries that are willing to purchase your products in order to attach that label to their beers. There are many events going on within the Georgia area and it seems that there is some form of a beer festival almost every weekend. All of those events provide great opportunities to meet potential customers and to promote the business.

It is also advisable to join groups related to the craft beer industry or local agriculture. Georgia Grown is one example of an organization that can help to increase exposure. There are multiple levels of Georgia Grown membership. The first level of membership is the silver level, which includes the use of the Georgia Grown logo for one year, discounts on events, customized profile on the Georgia Grown website, and free publicity via articles about Georgia Grown and Georgia agriculture, all for \$100 per year. The second level of membership is the gold level and costs \$500 per year. This level includes all silver benefits plus access to select Georgia Grown marketing materials and tools, discounts on Georgia Grown merchandise, and discounts on financial transactions through WorldPay. The third level of membership is the platinum level and it costs \$2,500 per year. This level includes all gold benefits, feature story in the Market Bulletin and the Georgia Grown E-Newsletter, full suite of customizable marketing materials, preferred source for news stories, and ad placement opportunities on the Georgia Grown website. The next level of Georgia Grown membership is the diamond level and it costs \$10,000 or more per year. It includes all platinum benefits, statewide press releases, features in Georgia Grown and other publications, custom public relations as necessary, premium ad placement on the Georgia Grown



site, and event opportunities. The final level of membership is the Founders' Circle and is priced on a case by case basis. This level of membership includes all diamond benefits, custom marketing programs that maximize the company's role in Georgia grown, customer ad/sponsor opportunities at Georgia Grown events, premium sponsorship recognition and other benefits at the Georgia Grown Symposium, and other opportunities that meet the company's marketing needs as negotiated.

There is another component to the marketing of malts, ingredient branding. Above, we covered ideas of how to market the malts as a finished product and now we will cover ideas of how to market the malts as an ingredient, specifically for breweries. Ingredient branding can be defined as creating a brand for an ingredient or component of a product, to project the high quality of the product. The consumer (beer drinker), is the end user of the ingredient but is not involved in the buying decision for the component, which is done by the producer (brewery). Overall, companies attempt to attract and retain customers by creating and promoting the value of their products. Promoting value is essential to the malting firm since the finished products for Great Southern Malting will have a higher price than many other competitors due to their lack of economies of scale. If a customer knows and understands the added values, features, and benefits of the ingredient, he or she will be willing to pay more attention and thus money, for the product. This can potentially lead to loyal and profitable customer connections. Great Southern Malting will want to make sure their products are not at risk of being interchangeable with competitors by developing, strengthening, and extending their market share.

This form of marketing is sometimes referred to as InBranding. One definition of InBranding is "pars pro toto," which means a part represents the whole. Sometimes, a relatively unknown component of a product becomes more well-known than the product itself. Essentially,

the ingredient becomes the buying decision trigger for the consumer. Customers trust established brands. Since there are cheaper options for the breweries to acquire the necessary malts for their beers, promoting the added value of using Great Southern Malting's products will be key. One of the most widely known cases of ingredient branding is Intel's marketing of "Intel Inside." Their campaign taught consumers that they should look for the "Intel Inside" logo as an indicator that the product was of high quality. Over time, consumers began to believe that "Intel Inside" was a standard and would wonder why products didn't have that ingredient inside of it. The ingredient must be highly differentiated in order to add value to the overall brand. This becomes very important in a market like malts, where any product can be easily replaced by another without any significant change in the final product. The gas industry is a good example of this. To most consumers gas is gas, and as such, the buying decision is based mostly on price. Bigger companies like Shell, Citgo, and Chevron, want you to be concerned about the quality of the gas you use. If they can convince you that their gas is of higher quality than their competitors, they do not need to compete on price. In a marketing document on Citgo's website, they claim that "recent efforts to tout our quality gas have reaped promising results in perceived quality among consumers per our research. Our research shows that quality gasoline is one of the top four reasons for purchase among many consumers."<sup>7</sup> This model can be applied to the malting industry as well. Convince the breweries and the end consumers that Great Southern Malting's malts are better than the cheaper brands and price becomes less of a factor. "Ingredient branding can be a successful strategy when it creates a new check box in the consumers' mind, a new field of evaluation the customer now must consider."

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<sup>7</sup> <https://www.citgo.com/WebOther/TriClean/TricleanMarketerFAQ.pdf>

## *Place*

The business plans to begin with a single location within Georgia. The clients currently believe that the business will be located near the cities of Suwanee or Dacula, which are both in Gwinnett County. According to the study questionnaire, other potential locations are in Walton or Barrow Counties. The single location that is selected can serve multiple businesses through a distribution plan that covers a specified delivery area. Anything outside of that area can be shipped to via traditional parcel services. The clients are looking for a location that is available for lease or rent, has sloped floors, that is within a \$5 to \$6 per square foot price range, and is five to seven thousand square feet, all of which signify a vacant warehouse of some sort. Additional requirements can be either purchased or built to accommodate the needs of the business. The business has indicated that they will be willing to sell to customers that arrive at the business, but will not have a dedicated store front. They will also attempt to sell their products to homebrew shops that have available shelf space.

Our research focuses on the four distinct categories of breweries within the state of Georgia: micro-breweries, regional breweries, brewpub, and in-planning breweries. We intentionally exclude larger breweries<sup>8</sup>, the Miller-Coors brewery in Albany for example. The first category, micro-breweries, is defined as a brewery that produces less than 15,000 barrels of beer<sup>9</sup> (Bbl) a year with 75 percent or more of its beer sold off-site. The second category, regional

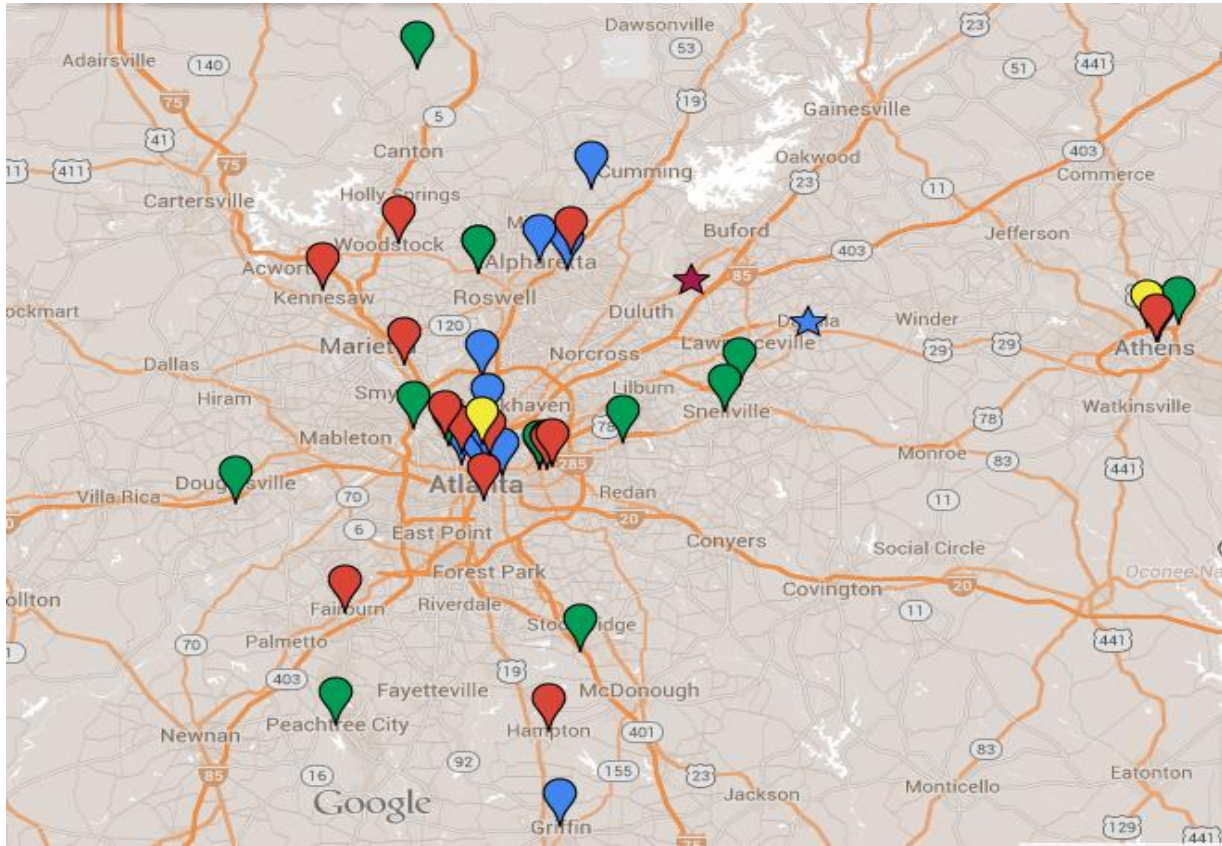
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<sup>8</sup> We intentionally exclude the large breweries because they consistently require very large amounts of malts throughout the year, amounts of which will exceed the capacity of a micro-malt house. These large breweries also either already have malt contracts or produce them internally.

<sup>9</sup> Barrel of beer (Bbl) = 31 U.S. gallons

breweries, is defined as an independent brewery with an annual beer production of between 15,000 and 6,000,000 barrels of beer annually. According to the Brewers Association, the regional craft brewery produces the majority of its volume as either “traditional” or “innovative” beers. The third category, brewpubs, is defined as a restaurant-brewery that sells 25 percent or more of its beer on site. The beer is brewed primarily for sale in the restaurant and bar. The beer is often dispensed directly from the brewery’s storage tanks. The final category, in-planning breweries, is defined as those breweries that are in the planning stage and have not been opened to the public. These breweries can either become micro-breweries or brewpubs. (Craft Beer Industry Market Segments, 2014)

Below is a map of the location of the breweries within the greater Atlanta area (Figure 2). The different categories of breweries are color coded for easier reference: micro-breweries are red, regional breweries are yellow, brewpubs are blue, and in-planning breweries are green. The red star is the potential Suwanee location, while the blue star is the potential Dacula location. Both locations have access to major interstates and both locations have their own perks. The Suwanee location has immediate access to Interstate 85 which feeds directly into Atlanta, as well as the perimeter which can expedite the time required to travel to other brewery locations. It is also the closer of the two locations to Atlanta, which can be considered as the epicenter of craft breweries in Georgia. The Dacula location also has access to major interstates that feed into Atlanta, but it is also closer to a growing brewery scene in Athens and is already located on the main road that leads into the city from Atlanta.



**Figure 2 Greater Atlanta Area Breweries, 2014**

**Transportation Cost Estimation**

Transportation costs can be a significant factor when deciding where to locate the business. In order to estimate the transportation costs for the malting business, we broke the different breweries down into four separate categories: Micro-breweries, Regional Breweries, Brewpubs, and In-Planning Breweries. Next, we used Google Maps to find the mileage from both of the proposed Suwanee and Dacula locations to each brewery in the list using their addresses. If the addresses were not available, the cities were used instead. Google uses the downtown area of the city as one point of the direction locations. We then assumed that the proposed business will

produce and transport 100 tons a year, with each shipment being 2 tons each, giving us a total of 50 trips per year. Using the mileages computed we then found the maximum mileage and average mileage for each group from both proposed locations. These were then used to compute the estimated transportation costs by multiplying the average or maximum mileage by 50 trips by \$0.56 (2014 Standard Mileage Rates, 2013). According to the Internal Revenue Service, the standard mileage rate of \$0.56 for business is based on an annual study of the fixed and variable costs of operating an automobile. Note: These estimates do not account for the decreased fuel economy that will result from transporting the trailer holding the 2 tons to the different locations. That information would be contingent on the type of vehicle used, type of trailer, modifications, etc.

Table 3 shows the mileages and estimated transportation costs for the micro-brewery category. According to the results, the company will spend at most an estimated \$7,728 on transportation costs from the Suwanee location and an estimated \$7,840 on transportation from the Dacula location. They will also spend an average of \$2,216.82 from the Suwanee location and \$2,259.91 from the Dacula location. These estimates assume a one way trip. In order to account for the fuel costs on the return trip, just multiply the costs by two.

**Table 3 Micro-Brewery Estimated Transportation Cost**

	Suwanee Mileage	Dacula Mileage
<b>Max Distance (miles)</b>	276	280
<b>Max Distance Cost</b>	\$ 7,728.00	\$ 7,840.00
<b>Average Distance (miles)</b>	79.17	80.71
<b>Average Distance Cost</b>	\$ 2,216.82	\$ 2,259.91

Table 4 shows the mileages and estimated transportation costs for the regional brewery category. According to the results, the company will spend at most an estimated \$1,386 on

transportation costs from the Suwanee location and an estimated \$929.60 on transportation from the Dacula location. They will also spend an average of \$1,093.40 from the Suwanee location and \$921.20 from the Dacula location. These estimates assume a one way trip. In order to account for the fuel costs on the return trip, just multiply the costs by two.

**Table 4 Regional Brewery Estimated Transportation Cost**

	Suwanee Mileage	Dacula Mileage
<b>Max Distance</b>	49.50	33.20
<b>Max Distance Cost</b>	\$ 1,386.00	\$ 929.60
<b>Average Distance</b>	39.05	32.9
<b>Average Distance Cost</b>	\$ 1,093.40	\$ 921.20

Table 5 shows the mileages and estimated transportation costs for the brewpub category. According to the results, the company will spend at most an estimated \$7,728 on transportation costs from the Suwanee location and an estimated \$7,840 on transportation from the Dacula location. They will also spend an average of \$1,567.01 from the Suwanee location and \$1,769.44 from the Dacula location. These estimates assume a one way trip. In order to account for the fuel costs on the return trip, just multiply the costs by two.

**Table 5 Brewpub Estimated Transportation Cost**

	Suwanee Mileage	Dacula Mileage
<b>Max Distance</b>	276.00	280.00
<b>Max Distance Cost</b>	\$ 7,728.00	\$ 7,840.00
<b>Average Distance</b>	55.96	63.19
<b>Average Distance Cost</b>	\$ 1,567.01	\$ 1,769.44

Table 6 shows the mileages and estimated transportation costs for the in-planning brewery category. According to the results, the company will spend at worst an estimated \$7,728 on transportation costs from the Suwanee location and an estimated \$7,840 on transportation

from the Dacula location. They will also spend an average of \$2,268.24 from the Suwanee location and \$2,308.13 from the Dacula location. These estimates assume a one way trip. In order to account for the fuel costs on the return trip, just multiply the costs by two.

**Table 6 In-Planning Brewery Estimated Transportation Cost**

	Suwanee Mileage	Dacula Mileage
<b>Max Distance</b>	276.00	280.00
<b>Max Distance Cost</b>	\$ 7,728.00	\$ 7,840.00
<b>Average Distance</b>	81.04	82.43
<b>Average Distance Cost</b>	\$ 2,269.24	\$ 2,308.13

These results show that there is not a significant difference between the mileage and costs associated with each proposed location. This is meant to be a general idea of what the transportation costs could be using the IRS’s mileage cost method. The mileages are also associated with the quickest routes determined by Google Maps. There are many other factors that can change the actual costs of transporting the malts to the breweries including but not limited to: fuel costs, traffic, weather, maintenance, insurance, driving habits, etc. These estimates also assume a one way trip. In order to account for the fuel costs on the return trip, just multiply the costs by two.

**PESTLE Analysis**

*Political and Legal*

Malting is not regulated at the industry level, although malt producers must adhere to various environmental, food and health regulations. These regulations are mainly aimed at maintaining a high level of quality and to protect the downstream consumers. Failure to comply with the regulations can result in monetary and civil damages, as well as, negative publicity and reduced



sales and earnings. Malting is mainly regulated by the Food and Drug Administration (FDA). One of the main responsibilities of the FDA is to enforce the Federal Food, Drug, and Cosmetic Act. Under this act, malt producers are required to comply with labeling regulations. This includes the ingredients used, the presence of genetically modified raw materials, country of origin, and the product description on the packaging.

Another regulating body is the Environmental Protection Agency. This agency is responsible for enacting multiple laws including the Clean Water Act, the Clean Air Act, the Pollution Prevention Act, and the Resource Conservation and Recovery Act. These laws affect the methods used to manufacture malts, including raw material handling and waste disposal. Finally, state and local governments regulate the production of malts in some way. These governmental bodies are responsible for overseeing food safety standards within their jurisdictions. These governmental bodies work with federal agencies to create beverage production safety standards within their respective areas. They also carry out inspections of malting facilities to establish the level of food hygiene present in processing (Tang, 2012)

### *Economic*

Rising disposable income from the recovering economy should allow consumers to increase their demand and consumption, or alcoholic beverages in general. Increasing demand for beer will signal to breweries to increase production, which will in turn, increase demand for malts. Craft beer is forecasted to perform very well in the coming years and will help increase the demand for malts even more. As for inputs, the supply for barley is forecasted to increase as a result of growing farming acreage and shifting growing strategies. The acreage is expected to increase in order to continue maintaining the crop's competitiveness against substitutes. Farmers may also

increase their use of genetically modified crops to make malting barley less sensitive to the temperatures used in the malting process. This shift could potentially be very beneficial if the barley crop does not have enough of the natural enzymes that make it ideal for malting. The slowing increase of input prices should allow industry producers to anticipate cost fluctuations and adjust production and product prices as needed. Finally, the dollar is expected to increase in value, making foreign goods relatively cheaper and more attractive to buy. This could mean that malting houses are acquiring their supply of raw grains from foreign farmers and then malting them within the United States (Tang, 2012).

### *Social*

According to a Bloomberg BusinessWeek article, households that earn more money tend to drink more craft beer. Correspondingly, breweries tend to thrive in wealthy areas. According to Census data, counties in the United States with breweries had a median household income of \$52,000 in 2012, and the median household income for counties without a brewery was \$43,700 (Ellis & Kessenides, 2014). The median household income for the state of Georgia was \$49,604, while the median household income for the counties within the state that had breweries was \$52,904 (United States Census Bureau, 2014). In Table 7, we break down the counties with breweries, how many breweries are in each county, as well as, their respective median household incomes.

**Table 7 Median Household Income of Counties with Breweries**

<b>County</b>	<b># of Breweries</b>	<b>Median Household Income</b>
Bibb	2	\$37,920
Bulloch	1	\$34,403
Chatham	5	\$45,653
Cherokee	2	\$67,928
Clarke	4	\$33,846
Cobb	3	\$65,180
Columbia	1	\$67,295
Dekalb	6	\$51,252
Douglas	1	\$54,526
Fayette	1	\$81,242
Floyd	1	\$41,442
Forsyth	1	\$87,585
Fulton	18	\$57,664
Gwinnett	2	\$61,944
Henry	2	\$62,377
Lumpkin	1	\$44,595
Muscogee	1	\$41,443
Spalding	1	\$40,655
Stewart	1	\$28,222

The growing trend of “buy local” will potentially have a strong impact on the malting industry and could reduce imports. Additionally, health trends will continue to grow in popularity and this could negatively impact the beer industry and as a result, the malting industry. Most beers are high in calories and carbohydrates which are considered by most to be unhealthy in large quantities. The sustainability trend is a growing concern for consumers and they are looking for products that are produced with those concerns in mind.

*Technological*

Within the malting industry, technological change has mainly come through the automation of the malting process, in order to ensure consistency of the finished product and to reduce costs. Firms are buying equipment that allows them to develop new malt varieties that cater to the craft beer industry. Product innovation is a major strategy for gaining a market advantage within the malting industry. Most firms focus on research and development which allows them to identify the quality of raw materials and develop new malt varieties by experimenting with new grains outside of barley. Another technological change within the malting industry is updated computer systems. Firms are turning towards e-commerce, which allows them to improve customer and supplier preparations. This then leads to cost savings through better management of inventory and production planning (Tang, 2012).

### *Environmental*

Environmental impacts play a significant role in the yields and prices of grains. This in turn can have a significant impact on the malting business. Warmer temperatures can make many crops grow more quickly, but the warmer temperatures can also have a negative impact. For grains, the faster growth rate reduces the amount of time that seeds have to grow and mature, which results in reduced yields. Temperatures are not the only variable that can have impacts on the grains market. Increased CO<sub>2</sub> can also increase yields. It is estimated that some crops, including wheat and soybeans, could increase yields by 30% or more if the current atmospheric concentrations of CO<sub>2</sub> are doubled. More extreme temperatures and precipitation levels can have adverse effects on the growth of crops. Specifically, floods and droughts, can negatively impact crop yields. For example, a 2008 flood of the Mississippi River, prior to the harvesting of numerous crops, caused an estimated loss of \$8 million for farmers. Weeds, pests, and fungi all flourish under

conditions of increased temperature, wetter weather, and increased CO<sub>2</sub> levels. This means that farmers will have to spend more money to counteract these increased problems. The increased use of pesticides and fungicides could potentially have a negative impact on human health as well. While there are favorable aspects of the climate for the farming industry, there are also negative aspects. These work in conjunction with other factors and as a result help to set the price that the malting firm must pay for raw grains. (Environmental Protection Agency, 2014)

### **Product Marketing and External Factors**

To obtain market share as an emerging company in the malting business, the micro-malting firm must consider how it will market their product line using the 4 Ps (price, product, place, promotion) as well as other external factors that can affect the firm.

Quality control is extremely important to the brewing process as it ensures that a beer is consistent. To reach that consistency, the process and ingredients used to make the beer must be the same every time. The brewery needs malt that is of high quality and consistently has the same characteristics. To that point, there are several important considerations regarding malting.

#### *Consistent Inputs*

While water is not necessarily a limiting impact for micro-maltsters in the state of Georgia, as production increases, firms must be aware of both the quantity and quality of water available. The former will likely be dictated by regional water districts, while the latter will be a function of in-house quality control. To maintain consistent water standards, the micro-maltster needs to consider how to maintain consistent water quality.

Perhaps a more important consideration is the quantity and quality grains used in production. Farmers in the state are pulled by market forces and will supply to the highest prices. This could put pressure on the micro-maltsters to obtain consistent supply. Further, the quality of the input grain is essential for providing consistent malt. Craft brew masters require specific malt quality to produce a consistent and high-level of quality beer. It is important that micro-maltsters meet this standard. As such, it is important to identify farmers that can and will supply consistent quality grains to the micro-maltster. Additionally, contingency plans should be developed, in case crop shortages in the state of Georgia occur. Such contingency plans should also consider the effect on bottom line pricing and break even.

### *Labor*

The malting firm must plan for sufficient labor inputs. Malting requires not only physical labor, but technical skills as well. This includes, among other things, the ability to analyze malt samples to ensure malt quality. If the quality of malt is below brewer standards, this will hurt the malting company's reputation. Since sales are direct to consumer, reputation is key in this industry. Sufficient planning is required to meet malt demand as well. If the malting-company is not prepared to supply malt, this creates opportunities for other firms to obtain their market share. With small margins in this industry, this could be catastrophic.

### *Environmental Control*

The malting company must ensure safe and consistent product. This is not only a function of labor inputs but environmental control. In particular, temperature control and sanitation efforts should be put in place to ensure costly inputs (grains, labor, and time) do not turn into

unmarketable end products. Given cyclical and potentially irregular demand, the malting operation needs to be cognizant of ways to store and maintain inventory.

## **Demand Analysis**

First, some background on quality assurance. Two quality measures are important in the malting process: grain quality parameters and malt quality parameters. The three most important malt quality parameters are: malt extract, diastatic power, and wort viscosity. The malt extract measures the amount of fermentable sugars, which determines the amount of alcohol that can be produced from the grain. Essentially, the higher the malt extract, the more alcohol that can be made. This level is measured by malting the grains and then measuring the amount of soluble sugars in the wort. The percentage of extract is critical to the brewer and is related to the quality of the malting grain and how it is malted. The extract adds to the body, foam, and flavor of the final product. Each grain in a batch needs to be converted to the same extent. If they are modified unevenly, it can result in processing problems in the brewery including malt milling, poor wort and beer filtration, hazes, poor yeast growth, and off flavors. (Malting Barley Quality Requirements) Diastatic power measures the amount of diastatic enzymes, which convert the starch of the grain into soluble sugars. The levels of the various diastatic enzymes are important in achieving the quality standards required by the downstream customer. Wort viscosity measures the thickness of wort relative to water, and is basically measuring the amount of stress a plant has undergone during grain filling. Wort viscosity is determined by measuring the amount of B-glucan (cell wall material) in the wort. Barley with low viscosity germinates more evenly than barley with high cell wall material. The cell wall material can restrict the conversion of starch into malt extract. Malts with high viscosity slow down the separation of the wort from

the husks during the brewing process. Therefore, it slows down the amount of beer processed in a brewery each day and can potentially increase production costs. (Malt quality parameters for malting barley, 2013)

Brewers specify which malting barley varieties that they will use based on their manufacturing process and product lines. Malting barley varieties must be delivered in segregated lots, which are kept separate based on season and growing region, since growing conditions can impact how they must be malted. In order to meet brewers' specifications, malting barley varieties must be germinated uniformly and quickly. Kernels that don't germinate correctly can contribute to mold growth during malting or lead to problems with uneven germination and malt modification. Plump barley kernels contain higher levels of starch and smaller amounts of husk which results in higher extract yields. While thin barley kernels exhibit higher protein levels and also increase grading losses. Overall, plump kernels must be equal to or greater than 75% of the batch while thin kernels should not be greater than 5%. A moderate level of protein is needed for good yeast nutrition, the development of desired enzyme levels, foam stability, and other end product characteristics. If the protein level is too high, the amount of extract available to convert to beer will be reduced and beer hazes could form. Protein content should not be higher than 5% of the grain. Blending malting barley lots to meet protein or other quality specifications can impact processing. The barley with lower protein contents will absorb water faster than those with higher protein levels and result in malt that is unevenly modified. Also, the loss of the portions of the barley husk has a profound impact on the malting process. Husks help to regulate the uptake of water into the kernel. Therefore, the loss of some of the husk can result in faster water uptake which can lead to uneven modification. Finally, malting barley should be stored at 13% moisture or less with good air circulation. Storage conditions that



are inadequate can lead to hot spots that cause heat damage and mold problems. (Malting Barley Quality Requirements) Also, the test weight for each lot must be no less than 48 pounds per bushel.

Given the recent growth of craft brewers in the United States, a relevant question is what is the *total demand* for malts by craft brewers? More specifically, our interest lies in the total demand of craft brewers in the state of Georgia. Importantly, this total demand only represents the potential market for a micro-maltster. That is, a micro-maltster is likely to only obtain a small market share of total demand. This share would be their penetrated market.

Based on the Brewer's Association and the Georgia Craft Brewers Guild, we identify all of the breweries in the state of Georgia within driving distance from Northeast, Georgia (approximately Gwinnett County). These breweries can be broken down by brewery type, including: micro-breweries, regional, brewpubs, and in-planning breweries. We intentionally exclude larger breweries from the list. We collected information on each brewery including: addresses, websites, and contact information. Then we contacted each brewery to attempt to identify their total annual malt usage, expected annual malt usage, total annual barrels of beer produced, and/or how many barrels of beer they expected to produce. A number of breweries responded with exact production numbers while others responded with estimations<sup>10</sup>. For those that did not respond, we took the average of the reported demand to fill in the blanks of the non-reporting breweries.

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<sup>10</sup> The exact information that they provided is kept confidential.

We assume that a brewery, regardless of size, will use roughly 70 pounds of malt for every barrel of beer produced. This assumes that the beer being produced will be around 7% alcohol by volume. Accordingly, a 1,000 bbl. brewery will use 70,000 pounds of malt a year. (We also consider a more modest assumption of 35 pounds, which we discuss later).

We identified 18 functioning micro-breweries (Table 8) which is expected to grow as the numerous in-planning breweries become operational. Based on our production assumption, the estimated annual demand for malts from the micro-breweries in Georgia alone is 3,189,056 pounds (1,594.53 tons) per year. Table 9 shows the different types of malts that the micro-breweries currently use in some capacity for their year-round and seasonal beers. This information is based on either their websites or information provided by the breweries. Yet, this data does not provide information about the timing of usage nor does it provide information on where they acquire their malts from or when they acquire them.

**Table 8 Micro-Breweries in Georgia, 2014**

Name	Address	City	State	Zip Code
Blue Tarp Brewing Co.	731 East College Avenue	Decatur	Ga	30030
Burnt Hickory Brewery	2260 Moon Station Court NW Suite 210	Kennesaw	Ga	30144
Coastal Empire Beer Co.	75 Ross Road	Savannah	Ga	31405
Creature Comforts Brewery	297 West Hancock Avenue	Athens	Ga	30601
Eagle Creek Brewing Company	106 Savannah Avenue Suite B	Statesboro	Ga	30458
Eventide Brewing	1015 Grant Street NE	Atlanta	Ga	30315
Jailhouse Brewing Co.	14 Cherry Street	Hampton	Ga	30228
Jekyll Brewing	2855 Marconi Drive Suite 350	Alpharetta	Ga	30005
Macon Beer Company	345 Oglethorpe Street	Macon	Ga	31210
Monday Night Brewing	670 Trabert Avenue NW	Atlanta	Ga	30318
Orpheus Brewing	1440 Dutch Valley Place	Atlanta	Ga	30324
Red Brick Brewing Co.	2323 Defoor Hills Road NW	Atlanta	Ga	30318
Red Hare Brewing Co.	1998 Delk Industrial SE	Marietta	Ga	30067
Reformation Brewery	500 Arnold Mill Road	Woodstock	Ga	30188
Southbound Brewing Co.	107 East Lathrop Avenue	Savannah	Ga	31415
Strawn Brewing Co.	27 Word Street	Fairburn	Ga	30213
Three Taverns Craft Brewery	121 New Street	Decatur	Ga	30030
Wild Heaven Craft Beers	135 Maple Street	Avondale Estates	Ga	30002

**Table 9 Micro-Brewery Malt List**

American 2-row	Chocolate	Flaked Wheat	Pilsen	Wheat
Biscuit	Crystal 60L	Golden Promise	Pilsner	White Wheat
Caramel	English Morris Otter	Munich	Roasted Barley	
Caramel-15	Extra Dark Crystal	Pale Ale	Special Roast Malt	
Carapils	Flaked Barley	Pale Chocolate	Victory	
Cherrywood-smoked Malt	Flaked Oats	Pale Wheat	Vienna	

The list of regional breweries in Georgia is short and only includes Terrapin and Sweetwater (Table 10). Sweetwater is the older of the two and is located in Atlanta. They are by far the largest craft brewery in the state and as such consume a large amount of malts. Terrapin is newer and smaller, but is currently expanding their production out of Athens. These two breweries combined have an estimated annual malt demand of 12,624,000 pounds (6,312 tons) of malts. There are two important differences between the micro and regional brewers. First, these regional brewers are currently distributed beyond the state of Georgia and therefore have greater final demand for their product. Alternatively, micro brewers have smaller distribution and may be more susceptible to changes in demand. Second, regional brewers are more likely to have contracts in place to obtain malts more consistently and at a lower price. Having said that, both the Sweetwater and Terrapin breweries are known to experiment with different styles of seasonal beer. Table 11 shows the different types of malts that the two regional breweries currently use in some capacity for their year-round and seasonal beers. This information is based on either their websites or information provided by the breweries. Yet, this data does not provide information about the timing of usage nor does it provide information on where they acquire their malts from or when they acquire them.

**Table 10 Regional Breweries in Georgia, 2014**

Name	Address	City	State	Zip Code
Sweetwater Brewing Co.	195 Ottley Drive NE	Atlanta	Ga	30324
Terrapin Beer Co.	265 Newton Bridge Road	Athens	Ga	30607

**Table 11 Regional Brewery Malt List**

2-row Pale	Carastan 13/17	Crystal 70/80	Malted Rye	Vienna
Acidulated	Chocolate	Crystal 85	Malted Wheat	Wheat
Black	Chocolate Wheat	Crystal 86	Melanoiden	
Black Malts	Crystal 120	DH Carafa III	Munich I	
Black Pilsner	Crystal 24L	Flaked Barley	Munich II	
Cara Pilsner	Crystal 40L	Flaked Oat	Pilsner	
Caramalt	Crystal 45	Flaked Oats	Roasted Barley	
CaraMunich II	Crystal 65	Honey Malt	Victory Malt	

Brewpubs provide a unique experience by offering their beer directly to consumers in a restaurant environment. As such, they are less reliant on distribution and more reliant on local demand. We followed the same procedures as above and used the average of all data to fill in data for three brewpubs with missing information. According to the data, the estimated annual demand for malts from the brewpubs within Georgia is 695,640 pounds or 347.82 tons (Table 12).

**Table 12 Brewpubs in Georgia, 2014**

<b>Name</b>	<b>Address</b>	<b>City</b>	<b>State</b>	<b>Zip Code</b>
5 Seasons Brewing Co.	3655 Old Milton Parkway	Alpharetta	Ga	30005
5 Seasons Brewing Co.	5600 Roswell Road	Sandy Springs	Ga	30342
5 Seasons Brewing Co.	1000 Marietta Street NW Suite 204	Atlanta	Ga	30318
Brother Huff's Microbrewery	2901 Shorter Avenue	Rome	Ga	30165
Cannon Brewpub	1041 Broadway	Columbus	Ga	31901
Copper Creek Brewing Co.	140 East Washington Street	Athens	Ga	30601
Dahlonga Brewing Co.	19 East main Street Suite B	Dahlonga	Ga	30533
Gordon Biersch Brewery - Atlanta	3242 Peachtree Road NE	Atlanta	Ga	30305
Gordon Biersch Brewery - Midtown	848 Peachtree Street NE	Atlanta	Ga	30308
Hop Alley Brew Pub	25 South Main Street	Alpharetta	Ga	30009
Max Lager's Wood Fired Grill & Brewery	320 Peachtree Street NE	Atlanta	Ga	30308
Moon River Brewing Co.	21 West Bay Street	Savannah	Ga	31401
Park Tavern Brewery	500 10th Street NE	Atlanta	Ga	30309
Cherry Street Brewing Cooperative	5810 Bond Street #E-2	Cumming	Ga	30040
The Wrecking Bar Brewpub	292 Moreland Avenue NE	Atlanta	Ga	30307
Twain's Billiards and Tap	211 East Trinity Place	Decatur	Ga	30030
Yes Face		Griffin	Ga	30224

Finally, we created a list of breweries in-planning and estimated their demand. The Brewers Association provides a forum for breweries in-planning to interact before they enter the market. Such breweries spend a considerable amount of time and effort before offering their product to the market. To get a rough estimate of this group's demand, we used the lowest response from the micro-breweries list and assumed that this was the average annual malt demand for these breweries that are still in planning. These future businesses can potentially be either micro-breweries or brewpubs. Some information is still missing from the table due to the fact that these are not established businesses yet. According to the data, the estimated annual demand for malts from the in-planning breweries within Georgia is 189,900 pounds or 94.95 tons (Table 13).

**Table 13 In-planning breweries in Georgia, 2014**

Name	Address	City	State	Zip Code
Abbey of the Holy Goats		Roswell	Ga	30075
BattleGreen Beer Co.	1418 Wheeler Drive	Lawrenceville	Ga	30045
Dockside Brewery	201 West river Street	Savannah	Ga	31401
EuroBevs	2445 Church Road SE Suite 210	Smyrna	Ga	30080
Gate City Brewing Company		Roswell	Ga	30075
Ironwood Creek		Evans	Ga	30809
Magic Rooster Brews		Peachtree City	Ga	30269
Monkey Wrench Brewing Company, LLC		Snellville	Ga	30078
Omaha Brewing Company	1 Ford Road	Omaha	Ga	31821
Piedmont Brewery and Kitchen	382 Cherry Street	Macon	Ga	31201
Red Clay Brewing Company	8617 Wood Springs Court	Douglasville	Ga	30135
Reformation Brewery	750 Henry Turner Trail	Ball Ground	Ga	30107
Rex Mill Brewing Co.	740 Hudson Bridge Road	Stockbridge	Ga	30281
Second Self Brewing	1311 Logan Circle NW	Atlanta	Ga	30318
Service Brewing Company	574 Indian Street	Savannah	Ga	31401
Southern Brewing Company	231 Collins Industrial Blvd	Athens	Ga	30601
Southern Sky Brewing Co.		Decatur	Ga	30030
The Village Corner	6655 James B Rivers Drive	Stone Mountain	Ga	30083

In total, the estimated annual malt demand for craft breweries (micro, regional, brewpubs, and breweries in-planning) within the state of Georgia is 16,697,696 pounds per year. Again, this is built on the assumption that a brewer will use 70 pounds of malt per barrel of beer produced. A more conservative estimate (35 pounds of malt per barrel of beer) would indicate 8,348,848 pounds per year. Given the variability in recipes among brewers, this provides a range of total demand.

### **Break Even Analysis**

To be profitable, the malting firm will need to obtain some level of market share of sales to the craft beer industry within the state of Georgia. In Table 14, we calculate the percentage of market

share that the company would need if break even required 2 tons, 50 tons, 100 tons, or 200 tons a year. We break this down by brewer type as well as show the total for all types<sup>11</sup>.

According to the results, the malting company would need the smallest market share if it sold malts solely to regional breweries. For example, the malting company would only need to provide 1.58% of total malt demand by regional breweries to sell 100 tons of malt in a year. It is likely to be difficult to begin selling to the regional breweries, however, since those firms already have contracts to satisfy their malt requirements. In particular, price competition may be restrictive. If the break even requirement is larger (say 200 tons), this objective will be even more difficult since the malting company will have to meet 3.17 % of demand. At the same time, there may be opportunities to offer specialty grains to regional brewers, particularly for experimental brews or brews that are produced to promote Georgia by using Georgia malts.

Micro-breweries offer the next potential opportunity for obtaining market share. According to our estimates, the malting company only needs to provide 6.27% of micro-brewery malt demand to sell 100 tons of malt in a year. Given the micro-breweries need to differentiate and gain local market share; this could be a practical opportunity. Still, micro-breweries need to maintain profits to stay viable, so price competition could be prohibitive in this market. Similar considerations go for brewpubs.

The growth of in-planning breweries is promising and could provide an important opportunity to create relationships with brewers that are still looking to source their inputs. Since

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<sup>11</sup> The numbers in Table 14 are based on the assumption of 70 pounds of malt per barrel of beer. If we use the conservative estimate of 35 pounds per barrel, the numbers in Table 14 will double.

we do not know for certain what their malt demand would be, however, the malting company may need to be cautious in relying on such demand.

Any new business needs to be aware of potential demand for their product. Given the current size and growth of breweries in the state of Georgia, there does appear to be adequate potential demand to make profits given the assumption of 100 tons of malt to break even. The challenge for the micro-malting company is to develop ways to penetrate the market. The data in Table 14 show the extent of market penetration that is required. To this point, it will be important to form relationships with the growing craft beer industry in the state. In addition, it is important to identify what types of malts might be most relevant for the market. We consider this next.

**Table 14 Break Even Requirements Assuming 70 pounds of Malt per Barrel**

<b>Break Even Market Share per Category</b>	<b>2 Tons</b>	<b>50 Tons</b>	<b>100 Tons</b>	<b>200 Tons</b>
<b>Micro-Brewery</b>	0.13%	3.14%	6.27%	12.54%
<b>Regional Brewery</b>	0.03%	0.79%	1.58%	3.17%
<b>Brewpub</b>	0.55%	13.83%	27.67%	55.34%
<b>In-Planning Brewery</b>	2.12%	52.91%	105.82%	211.64%
<b>Total Break Even for all Categories</b>	0.02%	0.60%	1.20%	2.39%

This table shows the percentages of market share that the company would need to sell in order to break even if it sold 2 tons, 50 tons, 100 tons, or 200 tons a year, assuming that the company only sold to each category. According to the results, the micro-brewery category appears to be the best bet for acquiring market share. Again, it may be difficult to begin selling to the regional breweries since those firms already have contracts to satisfy their malt requirements. Brewpubs and in-planning could be potential consumers but they may be difficult to predict or depend on.

### **Hedonic Price Analysis**



A hedonic price analysis examines the marginal price that consumers pay for specific product characteristics. Commonly applied to the housing market, analysts often examine how characteristics such as square footage, hard wood floors or proximity to parks affect the closing price of homes. Applying this same analytical technique to beer, we can evaluate what characteristics of beer consumers will pay more for. This includes what type or style of beer consumers pay more for. Since certain styles of beer utilize certain types of malts, we can use hedonic price analysis to get a sense of what malts might be more popular based on retail sales prices of beer.

We use retail beer sales data in the Atlanta market for 2012 to estimate which styles of beer have the highest price and command the highest per ounce price. Since Atlanta is the largest retail market in the Southeast, this provides some insight into the styles of beers that are most popular in Georgia. Craft brewers that are attempting to satisfy market demand may be more likely to produce similar styles of beer. As such, there may be a greater demand for malts used to make those more “popular” styles of beer. For consistency, we rely on characterizing our beer based on the Brewers Association beer style guidelines.

We have many different variables that are used in the hedonic price analysis. The first variable is alcohol by volume or ABV. Alcohol by volume is a standard measure of how much alcohol is contained in an alcoholic beverage and is expressed as a percentage of the total volume. The next variable used is the Brewer’s Advocate Score. Officially known as the Beer Advocate Overall Score (BOS), it is a weighted point system that represents the final overall score for a beer or place. The purpose of the score is to provide consumers with a quick reference when comparing one beer or one place to another. A beer or place must have 10 or more reviews in order to receive a BOS. There are many different variables that go into each beer advocate

score but beers that score 95-100 are classified as “world-class,” those that score 90-94 are known as “outstanding,” those beers that score 85-89 are known as “very good,” the beers that score 80-84 are referred to as “good,” and those that score 70-79 are known as “okay.” The next variable, container size refers to the different sizes that the beer can come in. For example, 12 ounce cans, 40 ounce bottles, kegs, etc. The variables can, keg, glass bottle, and aluminum bottle are all dummy variables. We also created a dummy variable for flavor, fruit. Some beers will add fruit adjuncts, with this dummy variable; we are able to differentiate those types of beers from the rest. We create another dummy variable, imported, in order to differentiate between the beers that are produced domestically and those that are imported into the country. Additionally, we created dummy variables for each season (winter, spring, fall, and summer) by breaking down when the products were sold into their respective weeks. For example, the summer season are those weeks that fall between Cinco de Mayo and Labor Day.

The equation for the hedonic pricing model is as follows:

$$\begin{aligned} \text{Log Price} = & -2.341(\text{Constant}) - [4.332 \times \text{Alcohol by volume}] + [.003 \times \\ & \text{Beer Advocate Score}] - [.0004 \times \text{Container Size}] - [.487 \times \text{Can}] + [.045 \times \text{Keg}] + \\ & [.098 \times \text{Fruit}] + [.358 \times \text{Imported Beer}] - [.004 \times \text{Summer Season}] \dots + [1.57 \times \\ & \text{American India Pale Ale}] \dots + [1.043 \times \text{Belgian Strong Pale Ale}] + [1.134 \times \\ & \text{Biere de Garde}] \dots + [.999 \times \text{English Bitter}] \end{aligned}$$

Based on our analysis, the beer styles with the highest price premium include: American India Pale Ale (Type 6), Belgian Strong Pale Ale (Type 12), Biere de Garde (Type 13), and English Bitter (Type 21). This does not mean that these types of beer have the highest sales volume (the type with highest sales volume is American Adjunct Lager). Rather, these beer

styles have the highest premium, while holding all other beer characteristics constant. The output for the hedonic price analysis can be found in the appendix.<sup>12</sup> The regression results for this model's independent variables estimates their impact on the dependent variable, price, given a one unit increase in each variable. For variable, alcohol by volume (abv), we can say that for a one-unit increase in abv, we expect to see about a 4.33% decrease in price. For variable, type 6 (American IPA), we can say that for a one-unit increase in this variable, we expect to see about a 157% increase in the dependent variable price. For variable, Belgian Strong Pale Ale (type 12), we expect to see a 104% increase in price per one-unit increase in this independent variable. As for Biere de Garde (type 13), we can say that we expect to see a 113% increase in price per one-unit increase of this variable. Finally, we can say that for a one-unit increase in English Bitter (type 21), we expect to see about a 99.9% increase in the dependent variable.

The base malt used in the American Indian Pale Ale is usually the domestic 2-row pale malt and the most commonly used specialty malt is crystal malt in the 30-40°L range. (Colby, 2013) The Belgian Strong Pale Ale generally uses mostly pilsner malts while some recipes use pale malts for the base malt grain bill. The malts used in the Biere de Garde style of beer vary depending on color but usually include pale, Vienna, and Munich types. The types of malts used in the English Bitter style of beer include pale ale, amber, and/or crystal malts. (BJCP Style

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<sup>12</sup> After running the regression through STATA software, we used the VIF (variance inflation factor) function to measure the multicollinearity of our variables. As a rule of thumb, variables with a VIF greater than 10 may merit further investigation. In our case there was one variable that has VIF value above the cutoff: type 12 (American IPA). This means that this variable could be considered as a linear combination of other independent variables. Essentially, this variable could potentially be redundant.

Guidelines) Given that we observe a higher price premium for these styles of beer, there may be an opportunity to provide corresponding types of malts.

Although the craft beer industry is growing in the United States, it is still relatively small. American Adjunct Lagers sold by the largest firms are still the most popular styles of beer, and have been for many decades. These results also show that consumers in the Atlanta area pay a premium for higher quality beer. The malting firm may therefore benefit from having a more “educated” consumer base in the region.

### **Logit Regression Model**

We further used the Census data to form different logit regression models that help to predict the potential for a county to have a brewery. We use the ordered logit regression model (also known as the ordered logistic regression model) because the dependent variable (in this case, # of breweries) has more than two categories and the values of each category have a meaningful sequential order where a value is indeed ‘higher’ than the previous one. These models predict the likelihood of a certain county having one brewery, two breweries, three breweries, etc. based on the characteristics of the model. We begin by breaking down the counties into their respective twelve economic regions within the state of Georgia. The first model takes into account the median household income of the counties within the state. The equation for this model is:

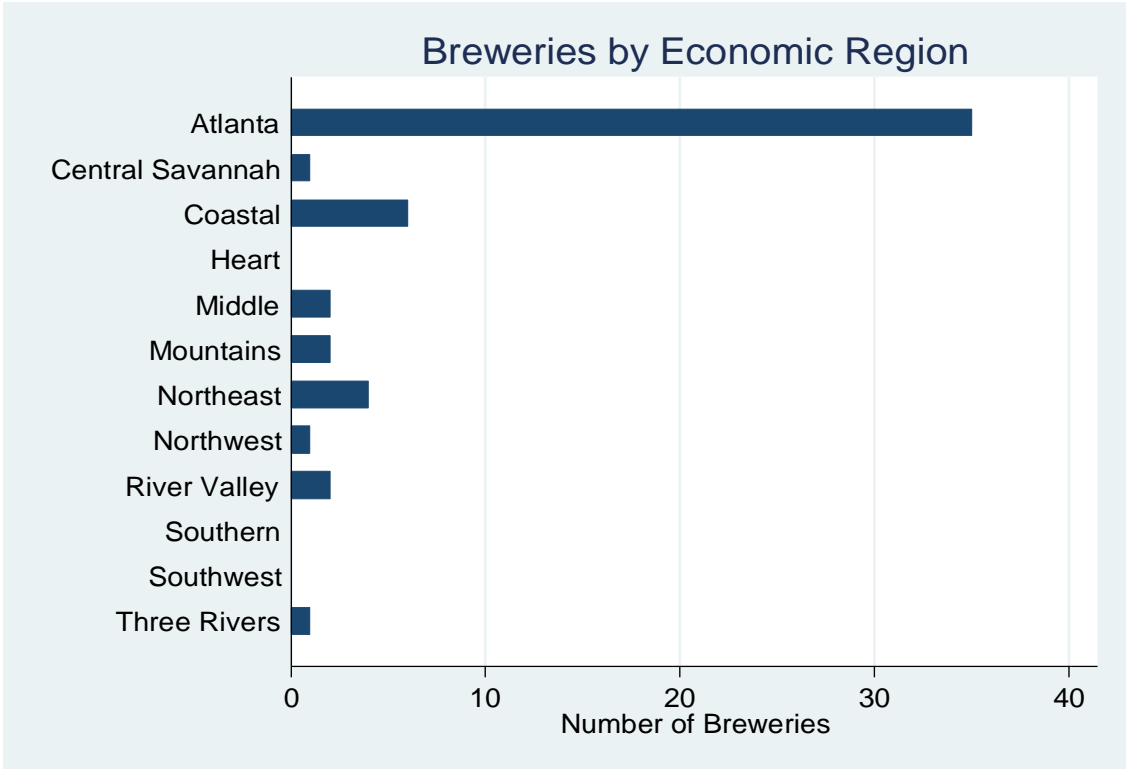
(equation 1)  $\# \text{ of breweries} = \alpha + \beta_1 * \text{median income}$ . In this model the number of breweries is the dependent variable and median household income is the independent variable.

The median household income is divided by 1,000. The output for this model can be found in the appendix. In order to break down the output we will look at a few different parts. First, we look at the z value for the median income variable in order to test the hypothesis that each coefficient

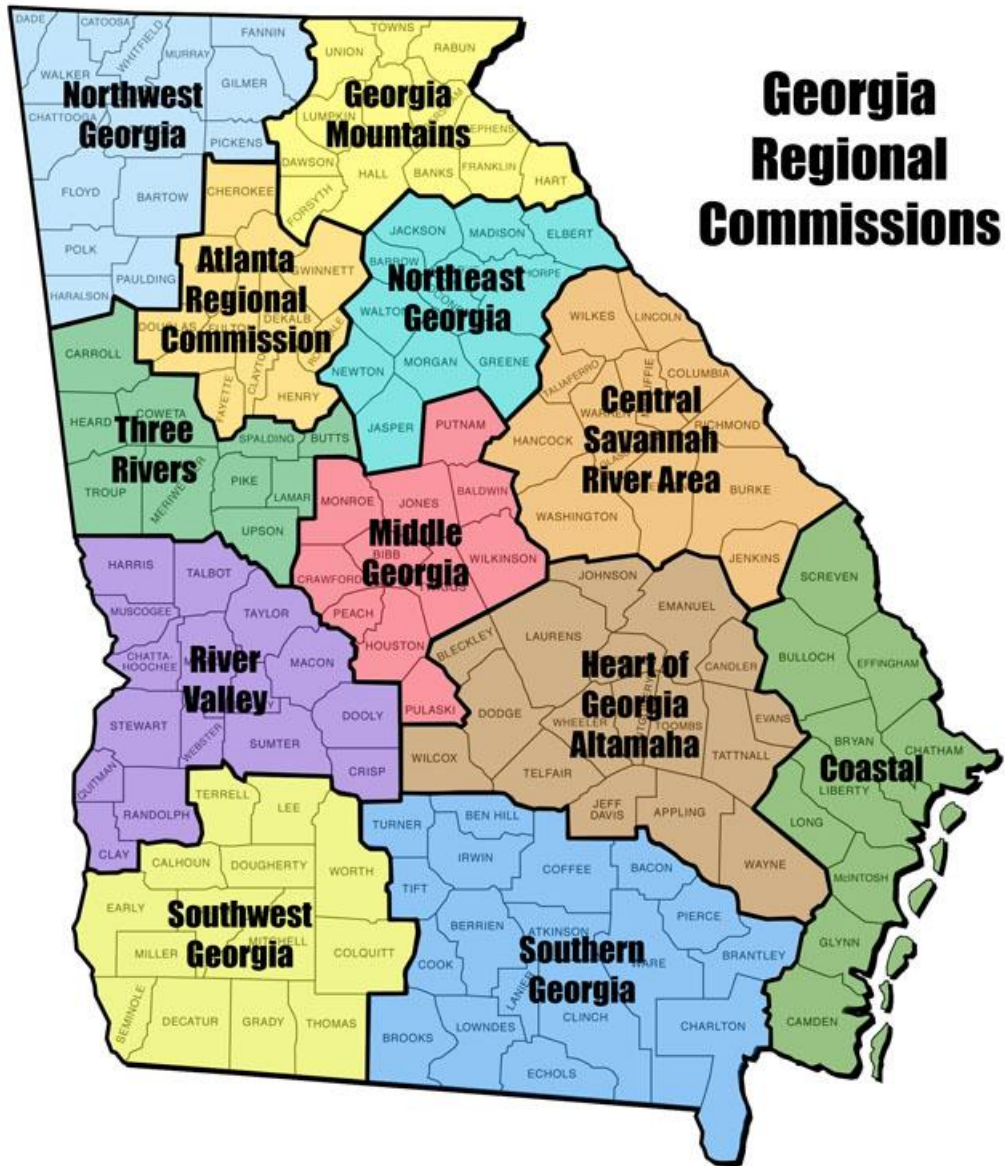
is different than 1. The z value must be greater than 1.96 for a 95% confidence interval. In this model, the z value is 2.99, so we conclude that this variable has a significant influence on the dependent variable, # of breweries. The higher the z value, the higher the relevance of the variable. Next we look at the p-value. Using the two tail p-values test, the p-value needs to be less than 0.05 at a 95% confidence interval in order to reject the hypothesis that each coefficient is different from 0. 0.003 is less than 0.05; therefore we can say that the variable has a significant influence on the dependent variable. There is another factor that we need to evaluate for this model, the  $R^2$ . R-squared is a statistical measure of how close the data are to the fitted regression line. It can also be defined as the percentage of the response variable variation that is explained by a linear model. In general, the higher the R-squared the better, but that is not always true. It should always be taken into consideration with other parts of the output. In this model, the R-squared value is 0.1078, which is pretty low. Yet, the median income variable is significant and we can still draw conclusions from the model. The results of the model show us that the median household income of the counties has predictive power when it comes to a brewery establishing within the county. This means that the higher the median household income is in a county, the more likely it is for a brewery to open there.

The second model looks at additional factors including: population size, persons over the age of 21, sex (female), median age, the presence of beer and ale merchant wholesalers, beer and liquor stores (package stores), restaurants, and drinking places (bars, nightclubs, etc.). The equation for the second model is: (equation 2)  $\# \text{ of breweries} = \alpha + (\beta_1 * \text{median income}) - (\beta_2 * \text{population}) + (\beta_3 * \text{persons over 21}) - (\beta_4 * \text{female}) - (\beta_5 * \text{median age}) + (\beta_6 * \text{beer wholesalers}) + (\beta_7 * \text{liquor stores}) + (\beta_8 * \text{restaurants}) + (\beta_9 * \text{drinking places})$ . In this model we find that many of the variables are significant while some are not. The median

income variable is still significant but so are the following variables: population size, persons over the age of 21, the presence of beer and ale merchant wholesalers, beer and liquor stores, and restaurants. All of the variables listed above had z-values that were either greater than 1.96 or less than -1.96, as well as p-values that were greater than 0.05 at the 95% confidence level. Also, the R-squared value for this model is 0.5219, which is better than the previous model. As such, we can conclude that this model is a better fit than the previous model since more of the response variable is explained. Counties with these additional businesses and locations are more likely to have a brewery open up. The chart below (Figure 3) breaks down the number of breweries within each economic region, which are shown in the following map. (Figure 4)



**Figure 3 Breweries by Economic Region**



**Figure 4 Map of Georgia Economic Regions**

According to a Bloomberg Businessweek article, households that earn more money, drink more craft beer. Breweries tend to thrive in wealthy areas. Counties with breweries had a median household income of \$52,000 in 2012, according to Census data, and the median for counties without was \$43,700. (Ellis & Kessenides, 2014) The median household income for the state of Georgia was \$49,604, while the median household income for the counties within the state that had breweries was \$52,904. (United States Census Bureau, 2014) Table 15 below, breaks down



the counties with breweries, how many breweries are in each county, and their respective median household incomes. The counties that have 2 or fewer breweries and a median household income above 52,000 are believed to have the potential for more breweries to open. Of particular interest are: Columbia, Fayette, and Forsyth counties. These counties currently only have one brewery and median household incomes that are substantially higher than the estimated \$52,000 threshold. These counties have potential for significant further growth.

**Table 15 Counties in Georgia with Breweries**

<b>County</b>	<b># of Breweries</b>	<b>Median Household Income</b>
Bibb	2	\$37,920
Bulloch	1	\$34,403
Chatham	5	\$45,653
Cherokee	2	\$67,928
Clarke	4	\$33,846
Cobb	3	\$65,180
Columbia	1	\$67,295
Dekalb	6	\$51,252
Douglas	1	\$54,526
Fayette	1	\$81,242
Floyd	1	\$41,442
Forsyth	1	\$87,585
Fulton	18	\$57,664
Gwinnett	2	\$61,944
Henry	2	\$62,377
Lumpkin	1	\$44,595
Muscogee	1	\$41,443
Spalding	1	\$40,655
Stewart	1	\$28,222

**Conclusion**

This feasibility study has provided and congregated a lot of relevant information that can be of importance to someone that is considering opening a micro-malting house in the state of Georgia. As our demand analysis has acknowledged, we estimate that total malt demand from

craft breweries within the state to be between 8 million and 16 million pounds annually. This is a large amount of malts that can either increase or decrease as breweries enter and exit the market. There is sufficient potential demand for malt produced by a small micro-malt house in the state of Georgia producing 50-100 tons of malt per year. This, however, does not guarantee sales. We also acknowledge that there are currently only 26 micro-malting houses in the U.S. and only 3 of those micro-malters are in the Southeast states.

According to our first ordered logit regression model results, it is believed that median household income of a county has predictive power when it comes to a brewery being established within the county. Therefore, the higher the median household income is in a county, the more likely it is for a brewery to open up there. The second model included additional factors including: population size, persons over the age of 21, sex, median age, the presence of beer and ale merchant wholesalers, beer and liquor stores (package stores), restaurants, and drinking establishments. The results suggest that counties with those additional businesses and locations are more likely to have a brewery open up. The business has expressed their desire to open the business in either Suwanee or Dacula. Both locations are suitable and provide easy access to the greater Atlanta area and Athens, which we expect will have growing craft brewery presences in years to come. These locations also provide the needed interstate access that will benefit the transportation of malts to other areas of the state.

In order for the micro-malting house to be profitable, it will need to obtain some level of the market share of sales to the craft breweries within the state. This can be accomplished by producing consistently superior products at attractive prices. The prices charged for the products will potentially be the largest obstacle to overcome. The larger, more established, malting companies can charge low prices due to their economies of scale. As a result, the micro-maltsters

must focus on quality and their ability to provide products as specified by their customers. According to our hedonic price analysis of Atlanta market beer data, there are three types (styles) of beer that have a high price premium: American India Pale Ale, Belgian Strong Pale Ale, Biere de Garde, and English Bitter. The malting company could potentially take advantage of this information by producing malts that are used in the brewing of these styles of beer. Also, the craft beer industry in the United States, it is still relatively small. American Adjunct Lagers sold by the largest brewing firms are still the most popular, and have been for many decades. The hedonic model results show that consumers in the Atlanta area pay a premium for higher quality beer. The malting firm may therefore benefit from having a more “educated” consumer base in the region.

In order for the end products to be consistent, the maltsters must use consistent inputs; the grains used must meet stringent specifications and the firm must decide how to maintain consistent water quality. Environmental conditions can have significant impacts on the quality levels and prices of the inputs used in the manufacturing process and as such, the firm must decide how to mitigate those risks. The environmental conditions within Georgia are of great importance since the purposed business owners have expressed their desire to only purchase their grains from Georgia farmers. Another major concern is the necessity of developing long-term relationships and long-term contracts with local breweries in order to secure future revenue for the company. Additionally, water usage and subsequent disposal of water and by products could be a concern for the firm. Overall, there are many different competing factors that one must consider before deciding to open a micro-malting firm.

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## Logit Regression Outputs

```

Ordered logistic regression           Number of obs   =       159
                                     Wald chi2(0)    =         .
                                     Prob > chi2     =         .
Log pseudolikelihood = -76.329016    Pseudo R2      =       0.1078
    
```

(Std. Err. adjusted for 12 clusters in region)

breweries	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
med_income	73.72732	24.67031	2.99	0.003	25.37439	122.0802
/cut1	5.285799	1.031647			3.263807	7.307791
/cut2	6.237527	1.0637			4.152714	8.322341
/cut3	6.885992	1.199399			4.535213	9.236771
/cut4	7.118247	1.300979			4.568376	9.668119
/cut5	7.412341	1.153839			5.150858	9.673824
/cut6	7.826457	.9039819			6.054685	9.598229
/cut7	8.530902	.9049082			6.757315	10.30449

Ordered logistic regression

Number of obs = 159

Wald chi2(5) = .

Prob > chi2 = .

Log pseudolikelihood = -40.900052

Pseudo R2 = 0.5219

(Std. Err. adjusted for 12 clusters in region)

breweries	Robust		z	P> z	[95% Conf. Interval]	
	Coef.	Std. Err.				
med_income	107.4913	22.04321	4.88	0.000	64.28736	150.6952
population	-37.33588	18.74453	-1.99	0.046	-74.07448	-.5972834
per21	28.29061	12.4948	2.26	0.024	3.801256	52.77996
female	-.0130919	.1486657	-0.09	0.930	-.3044715	.2782876
med_age	-.3320865	.1799026	-1.85	0.065	-.6846891	.0205162
beerwholesalers	1.150491	.5227075	2.20	0.028	.1260027	2.174979
liquorstores	.0882592	.0324174	2.72	0.006	.0247223	.1517962
restaurants	.0489588	.0230791	2.12	0.034	.0037245	.094193
drinkingplaces	.0055751	.0569895	0.10	0.922	-.1061222	.1172725
/cut1	14.81287	9.214938			-3.248078	32.87381
/cut2	16.88972	9.119652			-.9844672	34.76391
/cut3	19.98928	9.146471			2.06253	37.91604
/cut4	21.15005	9.428609			2.670314	39.62978
/cut5	22.36401	9.206162			4.320263	40.40775
/cut6	24.21501	9.213446			6.156986	42.27303
/cut7	35.79862	8.008074			20.10308	51.49416