Malt Preferences of the Craft Brewing Industry

By

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Executive Summary

Several economic forces motivate this research. The first is the need for cash generating crops that fit into crop rotation systems in Wyoming and the Rocky Mountain region. Malt barley is an important cash producing crop in the West which fits well into irrigated cropping systems. The second force motivating this research focuses on the growing number of craft brewers in the United States, and more specifically in the West. The unique and highly differentiated products produced by craft brewers require distinctive attributes in the ingredients of the beers, specifically barley and other grain malts, as well as specific malting processes. Finally, brewer interest in specific malt qualities (i.e., regionally grown, physical, chemical and service characteristics; etc.) may affect purchasing decisions and demand for malt.

The objective of this research is to assess attitudes and the importance of specific malt characteristics affecting craft brewers' malt purchases and their propensity to switch maltsters. Little research has been done on the craft brewing industry, and this information is intended to be useful in determining if niche marketing opportunities for Wyoming or Rocky Mountain region produced malt exist.

Secondary research was reviewed to gather information to be used throughout the project, as well as to develop questions to be used in two focus groups comprised of craft brewers. During these focus sessions, brewers' general attitudes and concerns were recorded, as were demographic characteristics of their individual businesses. Generally, participants in the focus groups preferred two-row and whole kernel malts, and none of the participants were completely satisfied with the product and/or services associated with the malt they received.

This information combined with secondary research was used to develop questions for the survey instrument. A modified Dillman design was used to achieve the highest possible response rate for the survey. The mailing list of brewers was comprised of the entire population of craft brewers in the United States listed in the North American Brewers Resource Directory as of January 1997.

Descriptive statistics, cross-tabulation and chi-square analyses indicate craft brewers consider individual malt characteristics to be more important when purchasing specialty malts than when purchasing base malts. The three characteristics of base malt that were pivotal in craft brewers' decisions to switch maltsters were malt containing a minimum amount of foreign matter, a minimum amount of broken and damaged kernels, and the amount of extract yielded from the malt. Ten characteristics were significant in explaining craft brewers' decision to switch specialty malt suppliers. Those ten characteristics were the absence of foreign matter, a minimum number of broken and damaged kernels, consistent kernel size, uniform grind, low moisture content, unique malt color, availability of technical support, an accurate malt analysis, a recourse for poor malt, and malts unique to the craft brewing industry. The greater number of specialty characteristics that were significant indicates respondents are more concerned with the attributes of the input that gives the unique properties to their final product than they are with the input that is more standardized. Results also indicate craft brewers prefer two-row malt varieties as opposed to six-row malt varieties. These results indicate that possible niche marketing opportunities may exist for Wyoming or Rocky Mountain malt.

Introduction

Malt barley is an important economic crop to agricultural producers in Wyoming and the West. Malt barley is an attractive alternative for Wyoming growers because of its compatability with sugar beets in a crop rotation system, as well as the cash flow provided in late August or early September (Bastian et al., 1994). Historically, the brewing industry has been the major purchaser of this commodity. However, the growth in demand for beer has been relatively stagnant since the 1980's. The market for malt barley has become less profitable for producers in recent years, given the flat demand for beer and the increased use of barley malt substitutes such as corn and rice by macro-breweries. The investigation of alternative markets for this crop is important to malt barley producers.

While the demand for beer has been relatively flat, the craft brewing industry has enjoyed growth in market share in recent years. During the mid-1980's approximately 90% of all U.S. manufactured beer was produced by six major companies. Annual combined production of these megabreweries exceeded 171 million gallons in 1986 (Beverage Industry Supplement, 1995). Large processors are characterized by efficiency, uniformity, and mass marketing. The product they produce is rather homogeneous, and differentiation occurs primarily through advertising and promotion.

Craft brewers hold a minute share of the market as compared to megabreweries, but their market share is growing rapidly. In 1994, craft brewing comprised 1.3 % of the beer market. By 1995, the market share had increased to 2 %. In 1996, 108 new microbreweries and 209 new brewpubs began selling beer in the United States. Overall, the total number of domestic specialty brewing companies exhibited a growth rate of

28.2% (Edgar, 1997). Industry expectations now foresee craft brewers holding as much as 10% of the market by 2000.

What are craft brewers?

Three categories of brewers generally typify the craft brewing industry: regional brewers, microbreweries, and brewpubs. Brewpubs are a combination of a restaurant and brewery, which sell the majority of all beer produced on-site. Microbreweries are characterized by primarily off-site sales and production of less than 15,000 barrels[1] annually. Regional breweries have yearly production between 15,000 and 500,000 barrels. In comparison, megabreweries produce more than 500,000 barrels of beer annually (North American Brewers Resource Directory, 1997). Mass production by megabreweries provides craft brewers with opportunities for niche marketing of differentiated beers.

Craft brewing businesses are generally small in nature and focus on creating unique flavors or styles of beer. Their emphasis focuses on offering diverse products to local communities and surrounding vicinities. As tastes and preferences changed, and disposable incomes increased, craft brewers have enjoyed wide popularity. Craft brewing provides consumers with specialized beers. As a result, consumers have become increasingly interested in the types of craft beer available. Domestic malt beverage per capita consumption has declined from 24.0 gallons per person in 1990 to 23.0 gallons in 1992, (Beverage Marketing Corporation, 1995) while 1995 sales of specialty brews increased over 1994 by more than 51% (Steele).

[1] A barrel is 31 gallons.

Objectives of this study

Little research has been conducted on the demands and needs of craft brewers regarding inputs into their brewing process. Consequently, results of this study stand to provide market knowledge to the craft brewing industry, as well as identify possible market alternatives for Wyoming and Rocky Mountain region malt barley producers. Specifically, this study was designed to achieve the following objectives:

1. To assess the importance of specific characteristics and attitudes affecting malt purchases by craft brewers.
2. To determine malt needs and preferences among craft brewers.
3. To determine the propensity of craft brewers to switch or not switch maltsters based on the physical, chemical and service characteristics associated with malt.

Achieving these objectives should provide the information necessary to identify any possible marketing opportunities which might be available for Wyoming or Rocky Mountain region produced malt barley and or malt.

Background information on the brewing process and malt characteristics

An understanding of the brewing process provides the basis for determining the right questions to ask craft brewers. Characteristics of the malt used in that process can affect the taste and characteristics of the beer. Among the factors that affect the acceptability and value of barley for malting purposes are variety, color, protein content, moisture level, kernel size and kernel condition (Wilson, 1983).

Besides water, malt is the principal ingredient in most beers. It is the major source of fermentable extract, color, and beer flavor. Barley traditionally has been the

source of malt for brewing purposes. Other grains, such as rice, corn, wheat and rye, also can be malted and used in beer production. Malt processors, or maltsters, provide a variety of malts suitable for different brewing techniques and beer styles. Malt is the main source of starch (broken down into sugars during the brewing process), proteins, amino acids and lipids. These attributes are influenced by barley variety, meteorological and soil conditions, and the malting process employed.

Water, hops and yeast are other ingredients in the brewing process. Water chemistry affects the final product significantly. Hops provide the "bitterness" to the beer. Yeast is the catalyst that changes the fermentable sugars in an anaerobic environment into carbon dioxide, ethanol and heat according to the Gay-Lussac Equation (Bates, 1993).

Brewers and maltsters make the distinction between base malt and specialty malt. Base malt, as its name indicates, is the foundation of the beer. Base malt generally makes up 60 to 100% of the "grain bill" or recipe. Base malt has the highest enzyme activity and provides the bulk of the fermentable sugars to the brew. Specialty malts are kilned at higher temperatures for longer periods of time. They add the unique color, flavor, aroma and body to the beer.

Another malt distinction important to brewers is between whole kernel malt and pre-ground malt. Whole kernel malt is shipped from the maltster in a whole, un-ground form. It is preferred by brewers who want to exert more control over their brewing process, as well as have the capital and square footage required to mill their own malted grain. Brewers who do not have the capital or space available for a grain mill, order their malt pre-ground from the maltster.

The type of malt barley, six-row or two-row, has an effect on the malt. The production of six-row barley varieties is better suited to areas of high rainfall. Six-row barley is a dryland crop grown primarily close to grain processing centers in the Midwestern portion of the United States. Two-row varieties perform better in cool, arid climates with plentiful irrigation. They flourish in the western states. Two-row malt has two major advantages over six-row malt for craft brewers. It has both a more consistent kernel size and a higher extract yield for the brewer than six-row malt. These characteristics alone suggest a possible preference by craft brewers for malt barley produced in Wyoming and the Rocky Mountain region. More information is needed, however, before malt barley producers and or maltsters can successfully capitalize on these characteristics.

Study design

Information to address study objectives was obtained through secondary research, focus group sessions, and a mail survey. Data collected from the mail survey were analyzed using simple descriptive statistics including frequencies, means, and cross-tabulations.

Secondary research

Secondary research provided necessary background information used throughout the project. Brewers' journals (*New Brewer*, *Malt Advocate*, etc.), previous studies, the Internet, government publications and other sources of literature were reviewed. Questions asked during the focus group sessions largely were developed from secondary research.

Focus groups

Focus groups were designed to help develop and formalize a more complete questionnaire for widespread use. The intent was to discuss brewers' concerns and attitudes. Questions targeted specifics relating to malt currently being received, the individual businesses and the craft brewing industry overall. Participants in both of the focus groups tended to be either head brewers or owner/operation managers. The two focus groups were conducted in Laramie, WY and in Fort Collins, CO during June 1997. During these focus sessions, brewers' general attitudes and concerns were recorded, as were the demographic characteristics of their individual businesses.

Overall, participants in the focus groups were interested in different malt characteristics for their base and specialty malts. They expressed preference for whole-kernel and two-row malt. None of the participants were completely satisfied with the product and/or services associated with the malt they received. Factors identified as important in brewers' purchasing decisions included price, cost of transportation and specific malting technique. The majority of participants had experienced large growth in recent years.

Mail survey

Questions for the survey instrument (presented in Appendix I) were developed using focus group findings and secondary research. Comments from the focus groups were summarized to identify key areas of concern regarding malt needs and demand. The overall purpose of the survey was to assess current satisfaction with their malt inputs and potential demand by craft brewers for Wyoming and Rocky Mountain Region

produced malt barley. The five sections included in the survey reflect this objective and are discussed below.

Section I: The brewer's individual business
Section II: The business' malt needs
Section III: The maltster from whom the brewer currently receives malt
Section IV: Specific characteristics of malt and maltsters
    Part A: Physical characteristics
    Part B: Chemical characteristics
    Part C: Service characteristics
    Part D: Switch or not switch
Section V: Business and industry demographics and trends

Section I was designed to gather general information from brewers about their businesses. Questions included number of years in business and in the industry, the previous year's production, job function of respondent, and the primary type of business.

Section II concentrated on the amount and form of malt used by the brewer, types of packaging utilized, frequency of orders and price of the malt.

Section III contained inquiries about the maltster from whom they received malt and how the respondent located the current maltster from which they purchased malt.

Section IV involved brewers determining the importance of certain physical, chemical and service characteristics of the malt product. Respondents were asked Likert scale questions about both base and specialty malt purchased with respect to the selected characteristics. An overall score was calculated from the scaled questions. Attitude scores were evaluated to determine brewers' opinions regarding the selected characteristics and whether or not those characteristics were important in the malt purchase decision. Section IV, also asked brewers whether or not they had ever switched maltsters for their base or specialty malts. If they had switched maltsters, a follow-up query determined if their price increased, decreased or stayed the same. Questions on

physical, chemical and service characteristics of the malt product were asked to determine what did (or would) affect the decision to switch maltsters.

Section V dealt with past and future production, business and industry growth, consumer sophistication, beer markets, malt supply and malts grown in the Rocky Mountain Region.

Sample

The sample size and subsequent mailing list of brewers was constructed from the North American Brewers Resource Directory. Every brewer operating in the United States as of June 1997, was surveyed. Using the modified Dillman survey design, a response rate of 37.6% was achieved. Results from selected survey questions were compared to published industry statistics to determine if a representative sample of the craft brewing industry was being analyzed.[2] Industry data from the North American Brewers' Resource Directory and Industry Revealed are indicated in Table 1. The percentages shown indicate the proportion of the craft brewing industry (excluding large breweries) for each category of businesses or craft brewing industry segment.

Table 1. Proportions of Brewers: Industry Publications vs. Survey

	Brewers Resource Directory (1995)	Industry Revealed (1996)	Survey Results (1997)
Brewpubs	62.5%	65.1%	57.7%
Microbreweries	34.3%	39.9%	33.7%
Regional Breweries	3.1%	3.9%	8.6%

Activity within the craft brewing industry has been constant. New breweries open and close their operations regularly. As breweries grow, they move into the category above which they are currently operating (e.g., brewpubs become microbreweries;

[2] Survey proportions are calculated on craft brewing respondents only. Proportions are not based on total sample.

microbreweries become regional breweries). These activities change the dynamics of the craft brewing industry. As a result, the proportions of businesses within the industry is continually changing. The Institute for Brewing Studies lists the average number of years in the industry for craft brewers as 5 years. The mean number of years in the industry for survey respondents was 5.4 years. Because these data and the segment proportions reported in Table 1 are similar, it is presumed the survey results are representative of the industry.

Data analysis

Basic descriptive statistics were calculated, including frequencies, means and cross-tabulations for the analysis. Results were first reviewed in terms of the full sample surveyed. The presence of megabreweries in the full sample tended to skew overall results because of the mass production of these breweries. Mean responses for selected questions, as a result, were questionable for the smaller categories of brewers due to the inflated data. Summary findings thus indicated that segmenting the data may provide a better understanding of both industry and individual needs. All statistical analyses were organized to reflect malt demand for the following categories: full survey sample, craft brewing industry (regional brewers, microbreweries, and brewpubs), regional brewers only, microbreweries only, and brewpubs only.

Results obtained from the statistical analysis are useful in demonstrating brewers' preferences throughout the industry. Additionally, this type of information contributes to general knowledge as little research has been done on craft brewers. Segmenting the data into categories reflected both similarities and differences in opinions and malt needs across industry categories.

Survey results

Information contained in this section represents the responses obtained from the Malt Demand Assessment Study Survey. All questions contained in the survey are discussed below. Survey findings indicate differences between types of craft brewers and provide a basic understanding their specific needs for both base and specialty malts.

Section I. General Questions about Individual Businesses

Brewers were first asked in which of five categories did their business belong. The majority of respondents were brewpubs with 52.9% of respondents, followed by microbreweries with 31.9%. Regional breweries captured 8.2% of respondents, while large breweries and the "other" category held 2.0% and 1.8% of the respondents, respectively.

A distinction was made between number of years the respondent's particular business had been operating and the number of years the respondent had worked in the industry (Table 2). Responses ranged from less than five years in production for the smaller brewery categories to over 30 years for the larger regional brewers. The same type of relationship is shown for the number of years respondents had been in business. Summary findings are typical of what was expected. Microbreweries and brewpubs are a more recent type of brewing business, whereas regional brewers have been in existence for a substantially longer period of time.

Table 2. Number of Years Business in Operation and Years Respondent in Business

Type of Brewery Category	Mean # of Years Business in Production	Mean # of Years Respondent in Business
Full Sample	7.78	5.38
Craft Brewing Industry	6.36	5.27
Regional Brewers Only	29.95	10.34
Microbreweries Only	4.12	4.96
Brewpubs Only	4.01	4.61

Responses to the questions regarding size of brewing system used and quantity of beer produced in 1996 demonstrate the necessity for data segmentation. Mean responses are summarized in Table 3. Respondents in the craft brewing industry and brewpub categories most frequently indicated using a 7 barrel brewing system followed by a 15 barrel system. The most common response for regional brewers was a 50 barrel system. Microbreweries tend to choose a 30 barrel and a 20 barrel as the two most frequently used systems. The numbers for the full sample surveyed are quite large due to the presence of megabrewers in the sample.

The mode or most frequently answered number of barrels produced annually was 1,000 barrels for the full sample, the craft brewing industry, and for brewpubs. Regional brewers regularly reported producing quantities of 16,000, 32,000 or 80,000 barrels. The median number of barrels produced for microbreweries was 1,700 barrels.

Table 3. Size of Brewing System Used as Compared to Amount of Beer Produced in 1996

Type of Brewery Category	Mean Size of Brewing System Used (barrels)	Mean Quantity of Beer Produced in 1996 (barrels)
Full Sample	24,512	261,216
Craft Brewing Industry	40	8,576
Regional Brewers	110	75,064
Microbreweries	72	2,996
Brewpubs	10	1,399

Table 4 summarizes the primary job function of survey respondents for each segmented category. The primary job function of the majority of respondents was head brewer followed by owner-operators. The only exception was for regional brewers who tended to be head brewers or in management-administration.

Table 4. Primary Job Function of Respondent

Primary Job Function	Type of Brewery Category % of sample				
	Full Sample	Craft Brewing	Regional Brewers	Microbreweries	Brewpubs
Owner/Operator	26.0%	26.3%	8.6%	43.5%	18.2%
Head Brewer	62.6%	64.4%	60.0%	44.3%	75.9%
Assistant Brewer	1.2%	1.2%	2.9%	1.7%	0.5%
Public Relations	0.0%	0.0%	0.0%	0.0%	0.0%
Management/ Administration	3.5%	3.1%	17.1%	3.5%	2.1%
Other	5.0%	5.0%	11.4%	7.0%	3.2%
Non - response	1.7%	0.0%	0.0%	0.0%	0.1%

The demographic trends in section I of the survey indicate the majority of the respondents were head brewers and owner-operators, and were characterized as having ample power over the decision making process in the business. As seen in the craft brewing industry, the largest proportion of respondents were brewpubs followed by microbreweries. The mean number of years in business and years in the industry varied

from few years to showing substantial experience. The relatively short duration of brewers in the industry compared to the number of years in business, suggests that the experience of brewers lags behind that of the business in general. However, overall answers to number of years in both the industry and in business were more closely matched, indicating that the experience of brewers increased correspondingly to the experience of the individual business. This indicates the craft brewing industry is a relatively young industry. There could be market potential in meeting the needs of these breweries as they grow and mature. Additionally, this suggests there may be opportunities to change the minds of the decision makers regarding malt purchases. The less time the decision makers have been in the business, the less likely brand loyalty for malt may be a factor in their decision to switch malt suppliers.

Section II. The Business's Malt Needs

Respondents almost entirely preferred two-row whole kernel malt (Table 5). This indicates that brewers prefer to exert more control over the brewing process by milling their own grain. Brewers tended to favor the consistent kernel size and higher extract yield of two-row malt as compared to six-row malt. The second most desired form of malt was two-row pre-ground malt, except for regional brewers who chose six-row whole kernel. The regional brewers' preference for six-row whole kernel may be related to brand loyalty and price issues, as decision makers in regional breweries have, on average, been in the business the longest. Results largely suggest brewers desire the higher extract yield of two-row malt varieties. The six-row malt both whole kernel and pre-ground were chosen less often, as was malt extract.

Table 5. Form of Malt Ordered

Type of Form Ordered	Type of Brewery Category % of Sample				
	Full Sample	Craft Brewing	Regional Brewers	Microbreweries	Brewpubs
2-row Whole Kernel	79.8%	81.2%	94.3%	86.1%	76.1%
2-row Pre-ground	16.4%	17.0%	5.7%	12.2%	22.9%
6-row Whole Kernel	14.3%	13.0%	28.6%	9.6%	11.2%
6-row Pre-ground	4.7%	4.6%	5.7%	0.0%	6.9%
Malt Extract	5.3%	4.9%	0.0%	3.5%	6.4%
Other	7.0%	6.5%	11.4%	7.0%	5.9%

Almost all brewers use whole kernel or pre-ground base malt to brew beer (Table 6). Less than 5 brewers per category use dry base malt extract. Slightly more brewers use syrup malt extract for their base malt. However, the total number of brewers per brewery category is still quite low at less than 15 in each segment. The amount of whole kernel or pre-ground malt used per batch varied widely between categories. Table 6 reports the mean, or average number recorded by respondents for amount of base malt used per brewing batch. The mode, or most frequent responses are somewhat different. Craft brewers as a whole frequently indicated using 315 pounds of malt per batch of beer. The common response for regional brewers was 1,500 pounds, while microbreweries use 1,000 pounds and brewpubs use 400 pounds of malt per batch of beer brewed.

Table 6. Average Amount of Base Malt Used Per Batch of Beer Brewed

Type of Malt Used	Type of Brewery Category Mean Number of Pounds/Gallons Used				
	Full Sample	Craft Brew	Regional Brewers	Microbreweries	Brewpubs
Whole Kernel or Pre-ground	1,619 lbs	1,147 lbs	5,144 lbs	989 lbs	521 lbs
Dry Malt Extract	48 lbs	71 lbs	N/A	22 lbs	120 lbs
Syrup Malt Extract	150 gal	172 gal	717 gal	156 gal	111 gal

The type of specialty malt used per batch of brewing also is predominately of the whole kernel or pre-ground form (Table 7). In the case of specialty malt, dry malt extract or syrup malt extract is either not used at all or by only a few brewers. The most common responses for amount of specialty malt used are more similar than those reported for base malt. Craft brewers as a whole and brewpubs most frequently selected 100 pounds of specialty malt used per batch. Regional brewers and microbreweries often chose 200 pounds as the amount of specialty malt used during the brewing process.

Table 7. Average Amount of Specialty Malt Used Per Batch of Beer Brewed

Type of Malt Used	Type of Brewery Category Mean Number of Pounds/Gallons Used				
	Full Sample	Craft Brew	Regional Brewers	Microbreweries	Brewpubs
Whole Kernel or Pre-ground	228 lbs	214 lbs	876 lbs	196 lbs	102 lbs
Dry Malt Extract	500 lbs	500 lbs	N/A	500	N/A
Syrup Malt Extract	N/A	N/A	N/A	N/A	N/A

Amounts of total malt used during the brewing process are primarily of the whole kernel or pre-ground form for both base and specialty malts (Table 8). Dry malt extract

and syrup malt extracts are simply not as popular as whole kernel or pre-ground malts. These results support brewers' preference for purchasing whole kernel or pre-ground malt. As evidenced from the tables, regional brewers have a capacity of malt used that far outweighs the other categories of craft brewers.

Table 8. Total Amount of Malt Used in 1996 (nearest 100 lbs)

Type of Malt Used	Type of Brewery Category Mean Number of Pounds/Gallons Used				
	Full Sample	Craft Brew	Regional Brewers	Microbreweries	Brewpubs
Whole Kernel or Pre-ground	3,247,569	418,522	2,696,780	196,872	74,223
Dry Malt Extract	5,000 lbs	5,000 lbs	N/A	5,000 lbs	N/A
Syrup Malt Extract	1,790gal	1,622gal	N/A	927 gal	1,970 gal

Tables 9 through 11 summarize the malt purchasing process from amount ordered, packaging type, and the frequency of when orders are placed. In a typical single order, respondents purchased primarily whole kernel or pre-ground malt. The amount of malt purchased varied widely between the three craft brewer segments. Regional brewers purchased on average 72,756 pounds, whereas microbreweries and brewpubs purchased 20,454 pounds and 7,840 pounds, respectively. These figures again point to the volume of beer being brewed in regional businesses.

The majority of respondents in smaller brewery categories ordered malt in 50-55 pound bags for both their base and specialty malt. Regional brewers preferred ordering base malt in bulk, but they ordered specialty malt in 50-55 pound bags. This indicates that smaller brewers do not generally have the ability to purchase malt in bulk shipments

because of capital requirements, space requirements or other business limitations. As a result, they do not receive the benefits of bulk buying.

Large differences exist among the craft brewing segments regarding how often brewers must purchase malt. Regional brewers order malt more frequently, usually either weekly or twice monthly. Typical orders from microbreweries occur monthly. Brewpubs generally only order malt quarterly.

Table 9. Total Quantity of Malt Purchased in Single Order

Type of Malt Purchased	Type of Brewery Category Mean Number of Pounds/Gallons Ordered				
	Full Sample	Craft Brew	Regional Brewers	Microbreweries	Brewpubs
Whole Kernel or Pre-ground	55,197 lbs	18,767 lbs	72,756 lbs	20,454 lbs	7,840 lbs
Dry Malt Extract	150 lbs	150 lbs	N/A	150 lbs	N/A
Syrup Malt Extract	197 gal	209 gal	N/A	333 gal	153 gal

Table 10. Package Type Used to Purchase Base Malt

Package Type Used to Purchase Base Malt	Type of Brewery Category % of Sample				
	Full Sample	Craft Brew	Regional Brewers	Microbreweries	Brewpubs
Bulk	26.6%	25.8%	91.4%	31.0%	14.9%
Bagged 50-55#	67.8%	69.8%	8.6%	63.8%	80.9%
Bagged 100-110#	1.2%	1.2%	0.0%	2.6%	0.5%
Malt Extract	2.9%	3.1%	0.0%	2.6%	3.7%
Other	0.0%	0.0%	0.0%	0.0%	0.0%
Non - response	1.5%	0.1%	0.0%	0.0%	0.0%

Table 11. Frequency of Ordering Malt

Frequency of Malt Ordered	Type of Brewery Category % of Sample				
	Full Sample	Craft Brew	Regional Brewers	Microbreweries	Brewpubs
Weekly	13.2%	13.3%	34.3%	6.1%	13.9%
Twice Monthly	20.8%	20.4%	34.3%	13.0%	20.9%
Monthly	32.5%	32.8%	20.0%	49.6%	24.6%
Quarterly	21.3%	22.6%	5.7%	22.6%	26.2%
Semi-Annually	2.6%	2.8%	2.9%	1.7%	4.3%
Annually	0.0%	0.0%	0.0%	0.0%	0.0%
Other	7.6%	8.0%	2.9%	7.0%	10.2%
Non-response	2.0%	0.1%	0.0%	0.0%	0.0%

Rarely is malt shipped to business locations in any form other than whole kernel or pre-ground. Table 12 indicates the cost of shipping malt in dry malt extract or in syrup malt extract is substantially more expensive. As expected, regional brewers pay the lowest price for shipping malt largely because of their ability to purchase bulk quantities. Microbreweries and especially brewpubs pay higher prices due to their inability to capture bulk rate savings.

Table 12. Estimated Average Cost of Malt Delivered to Business

Type of Malt Being Shipped	Type of Brewery Category Mean Cost of Shipping Malt Per Pound/Gallon				
	Full Sample	Craft Brew	Regional Brewers	Microbreweries	Brewpubs
Whole Kernel or Pre-ground	$0.529/lb.	$0.539/lb.	$0.209/lb.	$0.559/lb.	$0.567/lb.
Dry Malt Extract	$1.280/lb.	$1.280/lb.	$0.360/lb.	$1.480/lb.	$2.00/lb.
Syrup Malt Extract	$3.932/gal.	$3.568/gal.	N/A	$0.847/gal.	$4.589/gal.

Brewers were asked to identify the three most often used forms of specialty malt. Brewers were then asked to indicate the cost of the specialty malt including transportation. The three most popular types of malt chosen and their corresponding frequencies and mean prices are listed below (Table 13). All categories of brewers selected Munich malt and Wheat malt, the third most often chosen specialty malt varied between brewers. Regional and microbreweries also use chocolate malt, brewpubs use crystal malt. Once again, regional brewers are able to secure lower prices than the other types of craft brewers.

Table 13. Frequencies and Prices of Specialty Malt Used by Businesses

Type of Brewery Category	Type of Specialty Malt Selected % of Sample and Mean Price Per Pound							
	Chocolate Malt		Crystal Malt		Munich Malt		Wheat Malt	
	Mean	%	Mean	%	Mean	%	Mean	%
Full Sample	N/A	N/A	$0.433	11.0%	$0.422	21.6%	$0.423	25.9%
Craft Brew	N/A	N/A	$0.442	10.7%	$0.425	21.4%	$0.424	25.5%
Regional Brewers	$0.430	20.8%	N/A	N/A	$0.260	33.3%	$0.313	12.5%
Microbreweries	$0.480	11.3%	N/A	N/A	$0.456	26.8%	$0.417	26.8%
Brewpubs	N/A	N/A	$0.446	13.3%	$0.442	16.0%	$0.434	30.0%

Section II describes the malt needs of respondents. They generally prefer two-row whole kernel malt because of its associated benefits in the brewing process. More base malt is used per batch than specialty malt. Malt purchases are generally made in relatively small packages because of business limitations, with the exception of regional brewers. The price of base malt was lower than that of specialty malt and in all cases regional brewers were able to purchase malt for less expense.

Section III. Maltsters

Brewers were asked to provide information regarding the maltster from whom they currently receive both base and specialty malt (Table 14). The majority of respondents received base malt directly from the maltster. Specialty malt is more likely to be received through a distributor or warehouse. Regional breweries almost exclusively use maltsters directly in both scenarios.

Table 14. Manner In Which Base and Specialty Malt Were Received

Type of Brewery Category	How Malt Is Received % of Sample					
	Direct from Maltster		Distributor/Warehouse		Other	
	Base	Special	Base	Special	Base	Special
Full Sample	60.5%	42.4%	31.9%	51.2%	3.2%	2.3%
Craft Brewing Industry	63.1%	43.5%	33.4%	54.0%	3.5%	2.5%
Regional Brewers	97.1%	81.8%	2.9%	18.2%	0.0%	0.0%
Microbreweries	78.6%	49.6%	21.4%	50.4%	0.0%	0.0%
Brewpubs	49.4%	33.1%	44.4%	62.4%	6.1%	4.4%

Brewers were asked to list the maltster from which they purchased base malt and specialty malt (Table 15). Answers to these questions were predominately Briess Malting Company and Great Western Malting Company for both selections of base and specialty malt. Base malt tends to be purchased from Great Western, while specialty malt is ordered from Briess.

Schreier Malting Company was the third most popular maltster selected for base malt with the exception of regional brewers. Regional brewers reported using either Froedtert Malt Corportation, Minnesota Malting Company, or Gambrinus Malting Company. In terms of specialty malt ordered, Hugh Baird was the third most popular

maltster listed. Again, regional brewers reported using a different maltster. Schreier Malting Company was chosen by regional brewers as the third alternative for ordering specialty malt.

Table 15. Maltsters Used to Receive Base and Specialty Malt

Type of Brewery Category	Name of Maltster Selected for Base and Specialty Malt % of Sample			
	Briess Malting Co.		Great Western Malting Co.	
	Base	Special	Base	Special
Full Sample	32.5%	44.4%	35.4%	22.5%
Craft Brewing Industry	37.1%	50.5%	40.5%	26.7%
Regional Brewers	22.6%	64.3%	51.6%	32.1%
Microbreweries	33.0%	43.9%	47.2%	31.8%
Brewpubs	42.2%	50.6%	37.3%	23.1%

According to survey respondents, their current malt supplier was most often located through personal contact with another brewer (Table 16). Regional brewers were split between personal contact with another brewer and being contacted by a malt supplier for how the malt supplier was located.

Table 16. Method of Locating Current Malt Supplier

How Malt Supplier Located	Type of Brewery Category % of Sample				
	Full Sample	Craft Brew	Regional Brewers	Microbreweries	Brewpubs
Personal Contact w/ Other Brewer	47.7%	51.3%	33.3%	50.5%	53.9%
Contacted by Malt Supplier	13.7%	14.5%	33.3%	14.4%	12.4%
Trade Journal	11.4%	12.3%	12.1%	14.4%	11.2%
Other	21.1%	21.9%	21.2%	20.7%	22.5%
Non – response	6.1%	0.0%	0.1%	0.0%	0.0%

Section IV. Specific Characteristics of Malt and Maltsters

In evaluating the specific characteristics and attitudes of brewers regarding malt and maltsters, individual physical, chemical and service characteristics were identified. It was hypothesized that these characteristics might be significant in the purchasing decisions of brewers.

Respondents were asked a series of Likert scale questions on these characteristics with respect to both base and specialty malt. Likert scales spanned a range of one to seven designed to allow respondents variety in assessing their opinion for the selected questions. A Likert score of one indicated a respondent strongly agreed with the question being asked. A Likert score of seven indicated respondents strongly disagreed with the question.

The top three most important characteristics are summarized in each category. An overall mean statistic is also reported for general satisfaction of brewers with respect to the physical, chemical and service characteristics. In a range of one to seven, a lower score indicates a more "positive" attitude about the given set of characteristics, meaning this group of characteristics is important to brewers' purchasing decisions. Also reported is a tabulated frequency demonstrating how many respondents answered one or two on the Likert scale. This frequency score shows the relative importance to the selected characteristic to respondents.

A second component asked brewers if they had switched maltsters. If they answered in the affirmative, they were asked if price had increased, decreased or remained constant for both the base and specialty malts they purchase. Moreover, if the respondent indicated they had switched, they were asked to identify the reasons, or

specific characteristics associated with the malt, that encouraged them to switch. If they had not switched, they were asked to identify the characteristics that could cause them to switch maltsters.

Part A. Physical Characteristics

Typically the same physical characteristics were important to brewers for both base and specialty malt (Table 17). Foreign matter, kernel size, and uniform grind were critical factors for microbreweries and brewpubs. Regional brewers also thought foreign matter and kernel size were important. Additionally, regional brewers were more inclined to chose minimal broken kernels over kernel size as a key physical component.

Average scores for the Likert scale questions are calculated based on the following criteria: 1 = positive response, 4 = neutral opinion, 7 = negative response. Respondents were asked to reveal their overall satisfaction level in conjunction with the physical characteristics of malt they receive. Craft brewers reported mean scores of 2.088 (regional brewers), 2.014 (microbreweries) and 1.944 (brewpubs) for the overall satisfaction with the physical properties of base malt. Specialty malt had overall satisfaction mean scores of 2.121, 1.924 and 1.902 for regional brewers, microbreweries, and brewpubs respectively. Results confirm that craft brewers collectively are very satisfied with the physical characteristics of the malt they receive. Regional brewers are less satisfied than other brewers. Brewpubs appear to be the most satisfied.

Table 17. Important Physical Characteristics of Base and Specialty Malt

Type of Brewery Category	Top Three Most Important Physical Characteristics of Malt Characteristic and % of Sample					
	Base Malt			Specialty Malt		
Full Sample	Foreign matter	Minimal broken kernels	Uniform grind	Foreign matter	Kernel size	Uniform grind
% of sample	91%	67.9%	64.6%	89.5%	72.8%	62.3%
Craft Brewing Industry	Foreign matter	Kernel size	Uniform grind	Foreign matter	Kernel size	Uniform grind
% of sample	94.3%	83.4%	84.9%	93.3%	78.2%	81.7%
Regional Brewers	Foreign matter	Minimal broken kernels	Kernel size	Foreign matter	Minimal broken kernels	Uniform grind
% of sample	97%	91.1%	91.2%	96.9%	90.9%	82.6%
Microbreweries	Foreign matter	Kernel size	Uniform grind	Foreign matter	Kernel size	Uniform grind
% of sample	93.8%	91.2%	83.9%	93.8%	78.2%	80.5%
Brewpubs	Foreign matter	Kernel size	Uniform grind	Foreign matter	Kernel size	Uniform grind
% of sample	94.4%	82.4%	87.8%	92.7%	75.5%	83.2%

Part B. Chemical Characteristics.

Brewers again demonstrated similarities in opinions with respect to important chemical characteristics of both base and specialty malt (Table 18). All brewers found extract yield, consistent color, and protein levels to be the critical chemical characteristics for base malt. Low moisture content, extract yield and consistent color were cited as the important chemical characteristics for specialty malt. Since unanimous selection of these characteristics occurred across all brewers, frequencies are reported for each category. Reported frequencies are the summation of individuals who responded to the question with one or two on the Likert scale.

Likert scale ranges for this question are identical to those used previously. Low responses in a range of one to seven demonstrate strong approval, high mean scores

reflect disapproval. Overall mean satisfaction scores for the chemical properties of base malt are as follows: 2.029 for regional brewers, 1.983 for microbreweries and 1.914 for brewpubs. The chemical characteristics of specialty malt had mean general satisfaction levels of 2.132 for regional brewers, 2.034 for microbreweries and 1.906 for brewpubs. In agreement with the physical properties of malt, brewpubs tend to be the most satisfied.

Table 18. Important Chemical Characteristics of Base and Specialty Malt

Type of Brewery Category	Top Three Most Important Chemical Characteristics of Malt Characteristic and % of Sample					
	Base Malt			Specialty Malt		
	Extract yield	Consistent color	Protein level	Low moisture	Extract yield	Consistent color
Full Sample	88.3%	85.6%	79.5%	66.1%	67.5%	89.2%
Craft Brewing Industry	89.8%	87%	81.1%	70.7%	69%	90.4%
Regional Brewers	88.9%	85.7%	77.8%	72.7%	62.9%	94.1%
Microbreweries	91.4%	93.1%	83.6%	73.8%	67.3%	93.1%
Brewpubs	89.8%	83.5%	79.7%	69.3%	68.4%	87.7%

Part C. Service Characteristics.

All categories of brewers reported the same service characteristics as being the most important for both base and specialty malts (Table 19). Accurate malt analysis, recourse for poor malt, and timeliness of delivery were unanimously chosen as imperative service characteristics. Again, the frequencies reported were tabulated from individuals who responded to the question with one or two on the Likert scale. The same Likert scale with range one to seven was used to analyze service characteristics as was used for the physical and chemical characteristics. Overall satisfaction scores are similar to the two previous categories.

Mean responses for base malt were 1.750 for regional brewers, 1.728 for microbreweries and 1.947 for brewpubs. Specialty malt overall satisfaction scores were

2.086 for regional brewers, 1.841 for microbreweries and 1.973 for brewpubs. Scores less than three on the Likert scale show respondents are quite favorable towards the malt service characteristics they currently receive. Unlike the satisfaction reported for physical and chemical characteristics, brewpubs were not the most satisfied brewery category. Regional brewers were the most pleased for base malt service characteristics while microbreweries indicated content for specialty malt.

Table 19. Important Service Characteristics of Base and Specialty Malt

Type of Brewery Category	**Top Three Most Important Service Characteristics of Malt Characteristic and % of Sample**					
	Base Malt			**Specialty Malt**		
	Accurate analysis	Recourse poor malt	Timely delivery	Accurate analysis	Recourse poor malt	Timely delivery
Full Sample	87.4%	71.4%	92.1%	85.9%	71.4%	91.2%
Craft Brewing Industry	89.4%	73.3%	94.1%	88.5%	72.9%	93.8%
Regional Brewers	97.1%	80%	100%	91.1%	82.4%	100%
Microbreweries	87.1%	75.6%	97.5%	85.4%	74.8%	97.4%
Brewpubs	90.3%	72.9%	91.4%	88.7%	72.3%	93%

Part D. Switch or Not Switch.

For base malt, under 40% of most respondents indicated they had switched maltsters (Table 20). Almost 39% of the craft brewing industry as a whole reported having changed base maltsters. Percentages for microbreweries and brewpubs were near this average. Regional brewers were far more likely to have switched base maltsters than the other categories. Over half of the regional brewers responding to the survey had changed base maltsters. Regional brewers did not experience a change in prices due to switching maltsters, however. Results for the rest of the respondents were different than the regional brewers. Roughly 42% of all respondents who had switched experienced a

price decrease. General findings suggest that price is an important factor in base malt purchasing decisions.

Reported decisions to switch or not switch specialty maltsters closely reflects those reported for base malt. Approximately 40% of the craft brewing industry had switched specialty maltsters. Microbreweries were slightly more inclined to have changed specialty maltsters, whereas regional brewers switched specialty maltsters less frequently. Brewpubs tended to make similar decisions for both types of maltsters. Individuals who had switched specialty maltsters generally did not experience any price change. This indicates that price is a less important factor in the buying decision of respondents for specialty malt than base malt.

Table 20. Decision to Switch or Not Switch Both Base and Specialty Maltsters

Type of Brewery Category	Decision to Switch Maltsters % of Sample			
	Base Malt		Specialty Malt	
	YES	NO	YES	NO
Full Sample	38.9%	59.6%	37.4%	58.8%
Craft Brewing Industry	38.6%	61.4%	38.9%	61.1%
Regional Brewers	52.8%	47.2%	47.1%	52.9%
Microbreweries	37.1%	62.9%	40.7%	59.3%
Brewpubs	38.8%	61.2%	37.3%	62.7%

Individual physical, chemical and service characteristics were compared with the respondents' decision to switch or not switch maltsters. A crosstabulation and chi-square analysis were conducted on the various characteristics identified by respondents. Tables 21 and 22 report the statistically significant characteristics influencing the decisions to switch maltsters per category. Statistically significant characteristics were those with $\alpha<0.05$.

The crosstabulation and chi-square analysis for base malt showed malt containing a minimum amount of foreign matter was significant to the decision to switch or not switch maltsters. Further, a minimum of broken and damaged kernels was important in this decision, as was the amount of extract yielded from the malt. Other characteristics were important per brewery category such as an accurate malt analysis and a guarantee policy for poor malt. Physical, chemical, and service characteristics were most important to brewpubs. The small sample size for regional brewers did not allow statistically sound chi-square estimates for the question.

Table 21. Chi-Square Analysis: Decision to Switch Base Maltsters

Characteristics Influencing the Decision to Switch Base Maltsters By Brewery Category				
Full Sample	**Craft Brewing Industry**	**Regional Brewers***	**Microbreweries**	**Brewpubs**
Foreign matter Kernel condition Moisture content Extract yield Mealiness Malt analysis Recourse- poor malt Delivery time	Foreign matter Kernel condition Extract yield Malt analysis Recourse-poor malt	N/A	Foreign matter Kernel condition Extract yield Malt analysis	Foreign matter Kernel condition Kernel size Extract yield Recourse- poor malt

*An accurate chi-square analysis could not be performed on regional brewers due to a small sample size.

The crosstabulation and chi-square analysis found substantially more characteristics for specialty malt were statistically significant in explaining the decision to switch malt suppliers. Physical characteristics of general importance are the absence of foreign matter, a minimum number of broken kernels, and uniform grind. Chemical characteristics affecting the decision to switch or not switch maltsters depend on type of

brewery category in consideration. Beyond having a recourse policy for poor malt, service characteristics vary between types of breweries.

Table 22. Chi-Square Analysis: Decision to Switch Specialty Maltsters

Characteristics Influencing the Decision to Switch Specialty Maltsters By Brewery Category				
Full Sample	**Craft Brewing Industry**	**Regional Brewers***	**Microbreweries**	**Brewpubs**
Foreign matter	Foreign matter	N/A	Foreign matter	Foreign matter
Kernel condition	Kernel condition		Kernel condition	Kernel condition
Uniform grind	Uniform grind		Conversion time	Uniform grind
Moisture content	Moisture content		Recourse- poor malt	Moisture content
Color	Conversion time		Delivery time	Technical support
Conversion time	Wort properties			Malt analysis
Wort properties	Technical support			Recourse- poor malt
Technical support	Malt analysis			Unique malts
Malt analysis	Recourse- poor malt			
Recourse- poor malt	Unique malts			
Unique malts				

*An accurate chi-square analysis could not be performed on regional brewers due to a small sample size.

Responses to the questions in part D of the survey indicated price of malt was more important in the decision to switch maltsters for the base malt purchased than for the specialty malt purchased. Base malt makes up 60 to 100% of the "grain bill" for each brew, as a result price becomes an important factor. For specialty malt, however, price is a less important factor in purchasing decisions, primarily because it makes up a smaller portion of the brew.

Also in part D, specific characteristics were identified that did (or would) cause a brewer to switch maltsters. For base malt, absence of foreign matter, kernel condition

and amount of extract yield were important to respondents. Once again, because base malt provides the largest amount of extract to the brew, these factors were expected to be significant. The base malt should be free of foreign matter (bugs, husks, etc.), and the condition of the kernels should be whole, plump and undamaged. Additionally, extract yield is important for base malt because the bulk of the fermentable sugars is extracted from the base malt during the brewing process.

Numerous characteristics were important for specialty malt decisions. The greater number of specialty characteristics that were significant indicates respondents are more concerned with the attributes of that input which gives the unique properties to their final product than with the input that is more standardized.

Section V. Business and Industry Demographics and Trends.

Brewers answering the survey expressed their views regarding business and industry demographics as well as trends within the craft brewing industry. Questions spanned past and future production, growth of the industry, malt supplies, and the appeal of Rocky Mountain Region grown malt.

Tables 23 and 24 discuss 1996 production as compared to respondent's projected production for 1997. In 1996 over half of all respondents experienced an increase in production. Regional brewers and microbreweries had over 70% of their respective respondents experience increased production. Almost 70% of brewers projected an increase in production for 1997. Such a high figure demonstrates that individuals tend to project the industry will perform strongly in the future. In concordance with these findings, well over 80% of brewers responding to the survey believed the craft brewing industry will continue to grow (Table 25).

Table 23. Change in Barrels Produced for 1996

Type of Brewery Category	1996 Change in Barrels Produced % of Sample and Mean # of Barrels Changed				
	Increase		Decrease		Same
	%	Barrels	%	Barrels	Same
Full Sample	54.1%	7,373.46	9.9%	19,076.56	26.9%
Craft Brewing Industry	60.3%	2,431.38	10.7%	3,562.90	29.0%
Regional Brewers	71.4%	14,016.48	8.6%	34,833.33	20.0%
Microbreweries	70.9%	1,092.93	4.9%	346.00	24.3%
Brewpubs	50.6%	242.37	13.6%	193.48	35.8%

Table 24. Change in Barrels Projected for 1997

Type of Brewery Category	1997 Change in Barrels Projection % of Sample and Mean # of Barrels Changed				
	Increase		Decrease		Same
Full Sample	72.2%	7,629.83	7.0%	19,484.05	17.3%
Craft Brewing Industry	74.8%	1,854.08	7.2%	6,126.14	17.9%
Regional Brewers	72.2%	10,260.00	11.1%	31,250.00	16.7%
Microbreweries	84.1%	1,962.05	2.7%	1,950.00	13.3%
Brewpubs	68.6%	743.92	9.7%	487.44	21.6%

Table 25. Do You Think the Craft Brewing Industry Will Continue to Grow

Respondent's Opinion	Type of Brewery Category % of Sample				
	Full Sample	**Craft Brew Industry**	**Regional Brewers**	**Micro-breweries**	**Brewpubs**
YES	86.8%	91.2%	85.7%	87.5%	94.1%
NO	9.1%	8.8%	14.3%	12.5%	5.9%

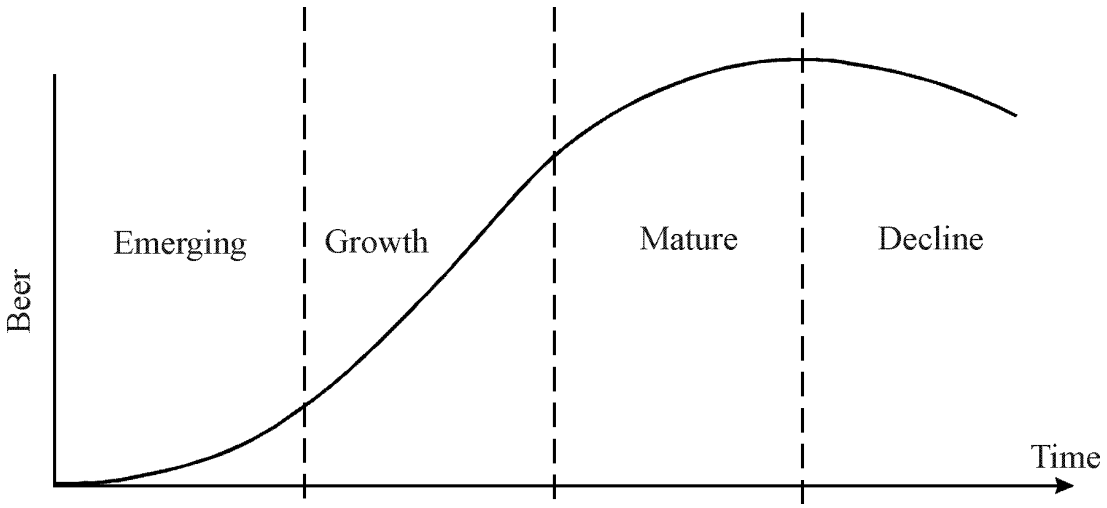
In a range of one to seven, with seven being the high, respondents generally perceived the knowledge or sophistication of their clientele regarding craft beer as moderate (Table 26). However, at least 80% of those responding to the survey projected clientele knowledge would improve in the coming year.

Table 26. Clientele Knowledge Regarding Craft Beer

Type of Brewery Category	Perceived Degree of Clientele Knowledge Mean Response	Projected Increase or Decrease in Clientele Knowledge % of Sample	
		YES	NO
Full Sample	4.22	79.2%	17.0%
Craft Brew Industry	4.23	83.0%	17.0%
Regional Brewers	4.44	82.9%	17.1%
Microbreweries	4.24	80.5%	19.5%
Brewpubs	4.19	83.6%	16.4%

Brewers responding to the survey were asked to consider the industry growth cycle shown in Figure 1 (Thompson and Strickland, 1996). Several facts are known about each of the stages of this cycle. During the "Emerging" stage, businesses experience low entry barriers, a lack of information, and capital shortages. Moreover, learning (experience) curve effects become important and businesses must induce customers to make an initial purchase.

Figure 1. Industry Growth Cycle



In the "Growth" and "Mature" stages of the cycle, businesses experience slowing demand growth (e.g., increasing at a decreasing rate), more head-to-head competition, and excess capacity as an industry. Further, the emphasis on cost and service become more important and there is a shake-out of the weaker firms in the industry.

During the "Declining" stage of the industry growth cycle, firms observe demand slower than the economy wide average. They also experience limited profit potential and fierce rivalry among firms in the industry.

Respondents indicated the location of their business and the industry as a whole in the industry growth cycle (Table 27). Those choosing the emerging stage were generally new businesses. Similar to the placement for individual businesses, the largest portion of respondents indicated they perceived the craft brewing industry in the growth phase of the cycle (Table 28). A higher frequency of responses indicated the industry fell in the mature phase of growth suggesting the industry was approaching its peak.

Table 27. Stage of Industry Growth for YOUR BUSINESS

Stage of Growth Cycle	Type of Brewery Category % of Sample				
	Full Sample	**Craft Brew**	**Regional Brewers**	**Micro-breweries**	**Brewpubs**
Emerging	15.5%	16.3%	8.3%	25.7%	12.8%
Growth	53.8%	56.3%	52.8%	60.2%	54.0%
Mature	23.7%	23.8%	30.6%	11.5%	29.9%
Declining	1.8%	0.9%	2.8%	0.9%	0.5%

Table 28. Stage of Industry Growth for CRAFT BREWING INDUSTRY

Stage of Growth Cycle	Type of Brewery Category % of Sample				
	Full Sample	**Craft Brew**	**Regional Brewers**	**Micro-breweries**	**Brewpubs**
Emerging	2.3%	2.2%	0.0%	2.7%	2.1%
Growth	49.4%	51.9%	42.9%	50.4%	53.2%
Mature	38.9%	38.4%	45.7%	34.5%	39.4%
Declining	3.2%	3.1%	2.9%	5.3%	2.7%

Respondents were asked whether or not they must investigate new markets to survive in the craft brewing industry. Answers were scaled from one to seven, with one indicating they strongly agreed with having to investigate new markets. According to the summary statistics, it appears most brewers feel new market investigation is a necessity (Table 29).

Table 29. Investigate New Markets for Industry Success

	Type of Brewery Category Mean Response				
	Full Sample	Craft Brew	Regional Brewers	Micro-breweries	Brewpubs
Investigate New Markets	3.02	3.05	3.11	2.82	3.10

Responses in Table 30 were calculated using the same scale range from one to seven. A score below 3 demonstrates that brewers are highly confident in the industry's malt supply.

Table 30. Reliability in Malt Supply for Craft Brewing Industry

	Type of Brewery Category Mean Response				
	Full Sample	Craft Brew	Regional Brewers	Micro-breweries	Brewpubs
Supply Reliable	2.38	2.39	2.31	2.21	2.51

Respondents were queried about the appeal of a Rocky Mountain Region grown malt for the craft brewing industry (Table 31). On the Likert scale from one to seven a mean response of four (4) would express a respondent was neutral to the question being asked. Brewers were almost neutral in their decision about the appeal of Rocky Mountain Region produced malt, but the responses were located toward the lower end of the scale indicating a slightly favorable outlook for regionally grown malt.

Table 31. Appeal of a Rocky Mountain Region Produced Malt

	Type of Brewery Category Mean Response				
	Full Sample	Craft Brew	Regional Brewers	Micro-breweries	Brewpubs
Rocky Mtn. Produced Malt	3.32	3.31	3.53	3.14	3.37

In section V, respondents indicated continued growth in the craft brewing industry. Production increased in 1996 and was expected to increase in 1997. Moreover, the largest portion of respondents indicated they believed the industry to be in the growth stages of the business cycle. This result indicates brewers believe sales and production will continue to increase, but at a slower (decreasing) rate, which will likely cause a shake-out of weaker firms in the industry. In accordance with the characteristics known about the growth phase of the industry cycle, respondents conclude the sophistication of the consumers in their industry will improve over time.

Conclusions and implications

Craft brewers comprise a smaller portion of the malt market as compared to large brewers. In 1996, craft brewers held under three percent of the total beer market. Since these brewers do not purchase a large share of the malt produced and marketed by

maltsters their concerns and desires may receive little attention. Conversely, megabreweries purchase a vast majority of malt produced and are thus able to exert some control over the malt market. However, craft brewers are slowly increasing their share of the beer market. Marketers of malt are presented with an opportunity to cater to the wants and needs of the craft brewing industry. This market will likely continue to grow and could possibly provide a malt supplier with profit potential.

Craft brewers consider all malt characteristics important. Several of these malt characteristics, however, are pivotal in craft brewers' purchasing decisions. Scaled questions with a range of one as a high to seven as a low typically had responses between one and three. Low mean responses reiterate the importance of these characteristics to brewers. A marketer of malt is presented with the opportunity to capitalize on the pivotal characteristics and market malt that is designed to meet the expressed requirements. An improvement of the malt in these crucial areas could help create demand by the craft brewing industry for a firm producing those characteristics.

Craft brewers consider individual malt characteristics of greater importance when purchasing specialty malt than base malt. The crosstabulation and chi-square analysis indicated substantially more attributes of speicalty malt are important in brewers' decision to switch or not switch specialty malt suppliers. Specialty malt provides unique characteristics associated with craft brewed beers. More characteristics are important to brewers for the specialty malt they purchase because these characteristics differentiate the uniqueness of beers. Specialty malt suppliers may be able to provide a specific product of higher quality that meets or exceeds the expectations of the craft brewer and thereby increase the demand for their malt products.

Currently craft brewers are not completely satisfied with the malt they receive. As a result, potential niche marketing opportunities exist. Brewers responding to the survey expressed the importance certain malt characteristics hold in their purchasing decision. Some of the needs and desires for malt, both base and specialty, are not met by the current maltster. Catering to the needs and desires of craft brewers provide potential niche marketing opportunities.

Malt needs and preferences in the craft brewing industry should be addressed by the malting industry. Catering to the needs and preferences of microbreweries or brewpubs presents potential marketing opportunities for malt suppliers. Malt barley producers in Wyoming and the Rocky Mountain region could benefit from an overall increased demand for malt, especially if the malt demand is locally or regionally produced. Respondents to the survey overwhelmingly preferred high quality 2-row whole kernel malt. This suggests increased market potential exists for the 2-row malt barley grown here as compared to the 6-row varieties grown in the midwest. Unfortunately, a large portion of the malt supplied to the craft brewing industry comes from maltsters using 6-row varieties.

Potential may exist for a small group of producers to benefit from these possible marketing opportunities by becoming the marketer, effectively cutting out the "middle-man" and retaining a portion of the profits earned for themselves. However, it must be remembered that this is a very small volume or niche market and it is likely only a small concentration of producers could capitalize on this potential.

Many issues must be addressed before a group of producers could consider producing and marketing their own malt. Another portion of this project studies the

feasibility of Wyoming or regionally produced malt products which could capitalize on the niche market potential in the craft brewing industry. That portion of the study considers such factors as benefits and costs, optimal plant size, barriers to entry, capital requirements, market environment, resource requirements and environmental considerations.

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Appendix 1

Survey Questions

Section I. Some General Questions About Your Business

1. What is your primary business? *(please check one)*

_____ Brewpub [a restaurant/brewery, majority (greater than 50%) of beer sold on-site]
or
_____ Microbrewery [sales of less than 15,000 bbl (17,600 hectoliters)]
or
_____ Regional Brewery [sales of 15,001 to 500,000 bbl (17,601to 586,700 hectoliters)]
or
_____ Large Brewery [sales of 500,001 bbl or greater (586,701 hectoliters)]
or
_____ Other

2. How many years has this operation been in business?

_____ years

3. What size *brewing system* are you using?

_____ barrels *or* _____ hectoliters

4. How much beer was *produced* (rather than sold) in your business in 1996?

_____ barrels *or* _____ hectoliters

5. What is your primary job function? ***(check one)***

_____ Owner/Operator
or
_____ Head Brewer
or
_____ Assistant Brewer
or
_____ Public Relations
or
_____ Management/Administration
or
_____ Other (please specify) _____

6. How many years have you worked in the craft brewing industry?

_____ years

Section II. Some General Questions About your Business's Malt Needs

1. **In what form do you order malt?** *(check all that apply)*

   _____ Two-row Whole Kernel Malt
   _____ Two-row Pre-ground Malt
   _____ Six-row Whole Kernel Malt
   _____ Six-row Pre-ground Malt
   _____ Malt Extract
   _____ Other (please specify) _____

2. **On average, how much ***base malt*** do you use ***per batch*** of beer brewed?**

   _____ pounds *(If whole kernel or pre-ground is used)*
   or
   _____ pounds *(If dry malt extract is used)*
   or
   _____ gallons *(If syrup malt extract is used)*

3. **On average, how much ***specialty malt*** do you use ***per batch*** of beer brewed?**

   _____ pounds *(If whole kernel or pre-ground is used)*
   or
   _____ pounds *(If dry malt extract is used)*
   or
   _____ gallons *(If syrup malt extract is used)*

4. **How much ***total malt*** did you use in 1996?** *(nearest 100 lbs)*

   _____ pounds *(If whole kernel or pre-ground is used)*
   or
   _____ pounds *(If dry malt extract is used)*
   or
   _____ gallons *(If syrup malt extract is used)*

5. **In a typical single order, what is the total quantity of malt you purchase?**

   _____ pounds *(If whole kernel or pre-ground is used)*
   _____ pounds *(If dry malt extract is used)*
   _____ gallons *(If syrup malt extract is used)*

6. **In what package type do you purchase the majority of ***base malt*****? *(please check one)***

_____ Bulk
or
_____ Bagged 50-55#
or
_____ Bagged 100-110#
or
_____ Malt Extract
or
_____ Other (please specify

7. **How often do you typically order malt?** *(please check one)*

_____ Weekly
or
_____ Twice monthly
or
_____ Monthly
or
_____ Quarterly
or
_____ Semi-annually
or
_____ Annually
or
_____ Other (please specify) _____

8. **For ***base malt*****, please estimate the average cost of malt delivered to your business (*****total cost of malt including shipping*****).**

_____ $ per pound *(If whole kernel or pre-ground is used)*
_____ $ per pound *(If dry malt extract is used)*
_____ $ per gallon *(If syrup malt extract is used)*

9. **In what package type do you purchase the majority of *specialty malt*?** *(please check one)*

_____ Bulk
or
_____ Bagged 50-5#
or
_____ Bagged 100-110#
or
_____ Malt Extract
or
_____ Other (please specify) _____

10. Please check the top three (3) types of *specialty malts* based on amount used by your business.

_____ Amber Malt
_____ Black Malt
_____ Brown Malt
_____ Caramel Malt
_____ Caramel Pils Malt
_____ Chocolate Malt
_____ Crystal Malt
_____ Dextrine Malt
_____ Honey Malt
_____ Munich Malt
_____ Peated Malt
_____ Roasted or Black Barley
_____ Rye Malt
_____ Wheat Malt
_____Other

11. For the three (3) *specialty malts* chosen in question 10, estimate the cost per pound of specialty malt delivered to your business (total cost of malt including shipping) for each, and circle the form in which you receive the *specialty malt*.

Type of Malt	$/ pound	(circle one)	
Ex **Caramel**	**$0.50**	**Whole kernel**	**Pre-ground**
1. _____	_____	whole kernel	pre-ground
		(circle one)	
2. _____	_____	whole kernel	pre-ground
		(circle one)	
3. _____	_____	whole kernel	pre-ground
		(circle one)	

Section III. Some General Questions About Maltsters

1. **Do you receive the majority of ***base malt*****:** *(check one)*

   _____ Directly from the maltster
   or
   _____ From a distributor/warehouse
   or
   _____ Other (please specify) _____

2. **Please list the maltster(s) from whom you purchase ***base malt*****?**

3. **Do you receive the majority of ***specialty malt*****:** *(check one)*

   _____ Directly from the maltster
   or
   _____ From a distributor/warehouse
   or
   _____ Other (please specify) _____

4. **Please list the maltster(s) from whom you purchase ***specialty malt*****?**

5. **How did you locate your current malt supplier?** *(check one)*

   _____ Personal contact with another brewer
   or
   _____ Contacted by malt supplier
   or
   _____ Trade journal
   or
   _____ Other (please specify) _____

Section IV. Specific Characteristics of Malt & Maltsters

A. **Evaluate the following questions about the ***physical characteristics*** of malt based on your business environment.**

Please CIRCLE the number of the most appropriate answer.

1. It is important to me that malt is free of foreign matter.

Base Malt: 1 2 3 4 5 6 7

Strongly Agree — Neither Agree nor Disagree — Strongly Disagree

Specialty Malt: 1 2 3 4 5 6 7

Strongly Agree — Neither Agree nor Disagree — Strongly Disagree

2. It is important to me that malt has minimal broken kernels.

Base Malt: 1 2 3 4 5 6 7

Strongly Agree — Neither Agree nor Disagree — Strongly Disagree

Specialty Malt: 1 2 3 4 5 6 7

Strongly Agree — Neither Agree nor Disagree — Strongly Disagree

3. It is important to me that the malt kernel size is consistent.

Base Malt: 1 2 3 4 5 6 7

Strongly Agree — Neither Agree nor Disagree — Strongly Disagree

Specialty Malt: 1 2 3 4 5 6 7

Strongly Agree — Neither Agree nor Disagree — Strongly Disagree

4. It is important to me that malt is ground uniformly.

Base Malt: 1 2 3 4 5 6 7

Strongly Agree — Neither Agree nor Disagree — Strongly Disagree

Specialty Malt: 1 2 3 4 5 6 7

Strongly Agree — Neither Agree nor Disagree — Strongly Disagree

5. **Overall, I am satisfied with the physical properties of the malt I receive.**

Base Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**
Specialty Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

B. Evaluate the following questions about the *chemical characteristics* of malt based on your business environment.

Please CIRCLE the number of the most appropriate answer.

1. It is important to me that malt has low moisture content.

Base Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**
Specialty Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

2. It is important to me that malt has high extract yield.

Base Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**
Specialty Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

3. is important to me that the malt color is consistent.

Base Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**
Specialty Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

4. **The level of protein (nitrogen) in malt is important to me.**

Base Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**
Specialty Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

5. **It is important to me that malt has a high mealy percent (glassiness of the endosperm).**

Base Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**
Specialty Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

6. **The minimum conversion time of malt is important to me.**

Base Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**
Specialty Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

7. **The wort properties (pH) of malt are important to me.**

Base Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**
Specialty Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

8. Overall, I am satisfied with the chemical properties of the malt I receive.

Base Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**
Specialty Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

9. Please list any other chemical characteristics of malt that are important which are not discussed above.

C. **Evaluate the following questions about the *services offered by maltsters* based on your business environment.**

Please CIRCLE the number of the most appropriate answer.

1. It is important to me that the maltster(s) who supplies malt offers technical support.

Base Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**
Specialty Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

2. It is important to me that the maltster(s) who supplies malt offers an accurate malt analysis.

Base Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**
Specialty Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

3. **It is important to me that the maltster(s) who supplies malt offers a guarantee and has a return policy.**

Base Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**
Specialty Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

4. **The timeliness of delivery of malt is important to me.**

Base Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**
Specialty Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

5. **The method of transportation of malt is important to me.**

Base Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**
Specialty Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

6. **The packaging of malt is important to me.**

Base Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**
Specialty Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

7. A malt that is specifically produced for the craft brewing industry is important to me.

Base Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**
Specialty Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

8. Overall, I am satisfied with the services offered by maltster(s) from whom I receive malt.

Base Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**
Specialty Malt:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

9. Please list any other chemical characteristics of malt that are important which are not discussed above.

D. Please consider the following questions.

1. Have you ever changed *base* maltsters? *(check one)*

_____ YES -- Did price: *(please circle one)*

increase

decrease

stay the same

_____ NO

If YES, please check the reasons for switching ***base* maltsters.**
(check no more than two properties in each of the three categories)
If NO, please check the reasons that might cause you to switch ***base*
maltsters.** (check no more than two properties in each of the three categories)

I. Physical Properties

_____ Foreign matter
_____ Kernel condition
_____ Kernel size
_____ Uniform grind
_____ Other (please specify) _____

II. Chemical Properties

_____ Moisture content
_____ Extract yield
_____ Color
_____ Protein (nitrogen) level
_____ Mealiness (glassiness)
_____ Conversion time
_____ Wort properties (pH)
_____ Other (please specify) _____

III. Services Offered by Maltsters

_____ Technical support
_____ Malt analysis
_____ Recourse for poor malt
_____ Timeliness of delivery
_____ Transportation method
_____ Packaging
_____ Malts unique to the craft brewing industry offered
_____ Other (please specify) _____

2. Have you ever changed ***specialty* maltsters?** *(circle one)*

_____ YES -- Did price: *(please circle one)*
increase

decrease

stay the same

_____ NO

If YES, please check the reasons for switching *specialty* maltsters.
(check no more than two properties in each of the three categories)
If NO, please check the reasons that might cause you to switch *specialty* maltsters. (check no more than two properties in each of the three categories)

I. Physical Properties

_____ Foreign matter
_____ Kernel condition
_____ Kernel size
_____ Uniform grind
_____ Other (please specify) _____

II. Chemical Properties

_____ Moisture content
_____ Extract yield
_____ Color
_____ Protein (nitrogen) level
_____ Mealiness (glassiness)
_____ Conversion time
_____ Wort properties (pH)
_____ Other (please specify) _____

III. Services Offered by Maltsters

_____ Technical support
_____ Malt analysis
_____ Recourse for poor malt
_____ Timeliness of delivery
_____ Transportation method
_____ Packaging
_____ Malts unique to the craft brewing industry offered
_____ Other (please specify) _____

Section V. Business and Industry Demographics and Trends

1. In terms of barrels produced, what change did your business experience in 1996?

_____ Increase; How many barrels? _____
or
_____ Decrease;How many barrels? _____
or
_____ No change

2. **In terms of barrels produced, what change do you project for your business in 1997?**

   _____ Increase; How many barrels? _____
   or
   _____ Decrease;How many barrels? _____
   or
   _____ No change

3. **Do you think the craft brewing industry will continue to grow? (circle one)**

   YES *or* NO

4. **How do you perceive the degree of knowledge/sophistication of your clientele regarding craft beer?** *(circle the number of your response)*

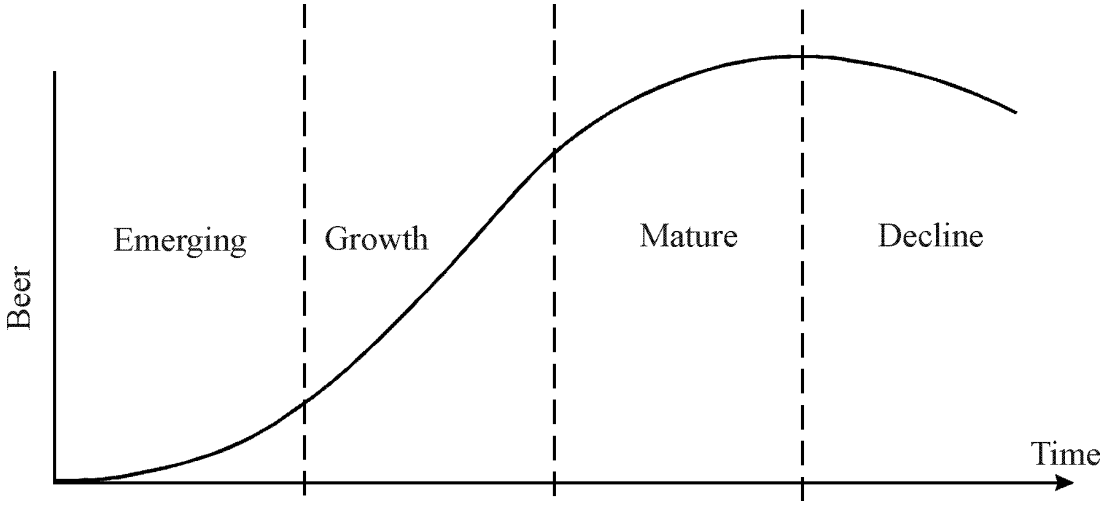
   1 2 3 4 5 6 7

   Low *Moderate* *High*

5. **Do you project that the degree of knowledge/sophistication of your clientele will improve in the next year?** *(circle one)*

   YES *or* NO

CONSIDER THE FOLLOWING CHART.



6. In which stage of the industry growth cycle do you perceive your business? *(circle one)*

1. **Emerging**
   or
2. **Growth**
   or
3. **Mature**
   or
4. **Declining**

7. In which stage do you perceive the craft brewing industry? *(circle one)*

1. **Emerging**
   or
2. **Growth**
   or
3. **Mature**
   or
4. **Declining**

8. To survive in the craft brewing industry, I must investigate new markets. *(circle the number which is most appropriate)*

1	2	3	4	5	6	7
Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

9. I am confident that the supply of malt for the craft brewing industry is reliable. *(please circle the number of your answer)*

1	2	3	4	5	6	7
Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

10. A malt produced in the Rocky Mountain region would be appealing to me as a craft brewer. *(please circle the number of your answer)*

1	2	3	4	5	6	7
Strongly Agree			**Neither Agree nor Disagree**			**Strongly Disagree**

THANK YOU FOR YOUR PARTICIPATION!

<u>COMMENTS</u>: