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Sarah Hodge
Staci Powell
Nick Spencer
Today’s Agenda

- Basic Microbrewery and Beer Information
- Our Product and Recipe
- Our Brewing Process and Schedule of Operations
- Marketing Analysis and Strategy
- Deterministic Model
- Financial Projections
Introduction

• What is a Microbrewery?
  – Produces less than 15,000 barrels of beer per year

• Advantage of a Microbrewery
  – Able to supply product at peak of freshness
  – Highest quality ingredients

• Craft Beer Production is Increasing
  – Up 3.4% in 2003
Raw Material Description

• Hops
  – Cultivated flower
  – Provide the bitter flavoring

• Malted Barley
  – Grain with kernels
  – Provide the sweet flavoring

• Yeast
  – Ferments (makes the beer)
  – Some provide fruity flavor
Types of Beer

• Differ by Yeast Temperature and Fermentation Time
  – Top-fermenting (high temps and short time)
  – Bottom-fermenting (low temps and long time)

• Top-fermenting
  – Ales, Wheat beers

• Bottom-fermenting
  – Lagers, Bock
Our Product

• Rooster Brew
  – An American Pale Ale

• What is a Pale Ale?
  – Lighter in taste than other microbrews
  – Pale golden color
  – Moderate hop and malt flavor

• Why Pale Ale?
  – Appeals to males and females
  – More flavorful than large-scale domestic beers
Recipe for Rooster Brew

- For 1 batch of a 30 barrel process
  - Pale Malted Barley – 1210 lbs
  - Water for Mash Tun – 5740 lbs
  - Cascade Pellet Hops – 24 lbs
  - Yeast – 4 lbs
  - Water for Boil Kettle – 7000 lbs
Fermentation Process
Bottling and Kegging

• Flash Pasteurization
• Bottle Rinsing
• Bottle Feeding
• Bottle Filling
• Bottle Labeling
• Case Packing
• 30 Barrel Process
  - Produces 6,000 barrels per year at 4 brews/week
# Equipment Cost for 30 Barrel System

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty.</th>
<th>Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mash / Lauter Tun</td>
<td>1</td>
<td>$31,135.00</td>
</tr>
<tr>
<td>Brew Kettle</td>
<td>1</td>
<td>$9,065.00</td>
</tr>
<tr>
<td>Whirlpool</td>
<td>1</td>
<td>$10,300.00</td>
</tr>
<tr>
<td>Brewer’s Platform</td>
<td>1</td>
<td>$5,200.00</td>
</tr>
<tr>
<td>Heat Exchanger</td>
<td>1</td>
<td>$6,500.00</td>
</tr>
<tr>
<td>Grist Hopper with Cover</td>
<td>1</td>
<td>$3,700.00</td>
</tr>
<tr>
<td>Fermenter</td>
<td>12</td>
<td>$16,480.00</td>
</tr>
<tr>
<td>Conditioning/Bright Vessel (glycol cooled vessel)</td>
<td>1</td>
<td>$11,555.00</td>
</tr>
<tr>
<td>Pressure Steam Boiler</td>
<td>1</td>
<td>$8,300.00</td>
</tr>
<tr>
<td>Sankey Keg Racker 1-Triple Head</td>
<td></td>
<td>$675.00</td>
</tr>
<tr>
<td>Sankey Keg Rinser/Washer 1-Three-Head Semi-Automated</td>
<td></td>
<td>$9,700.00</td>
</tr>
</tbody>
</table>

**Total - 30 Barrel Brewery Equipment Package**  
$342,059.55
## HAZOPS – Hot Water Tank

<table>
<thead>
<tr>
<th>Deviation</th>
<th>Cause</th>
<th>Consequence</th>
<th>Safeguards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature-More</td>
<td>Steam Coils too Hot</td>
<td>Water Fed to Mash Tun too Hot</td>
<td>Temperature Controller</td>
</tr>
<tr>
<td></td>
<td>Water Fed too Hot</td>
<td></td>
<td>Temperature Alarm</td>
</tr>
<tr>
<td></td>
<td>Controller Fails</td>
<td></td>
<td>Check Temperature Regularly</td>
</tr>
<tr>
<td></td>
<td>Alarm Fails</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature-Less</td>
<td>Steam Coils too Cold</td>
<td>Water Fed to Mash Tun too Cold</td>
<td>Temperature Controller</td>
</tr>
<tr>
<td></td>
<td>Water Fed too Cold</td>
<td></td>
<td>Temperature Alarm</td>
</tr>
<tr>
<td></td>
<td>Controller Fails</td>
<td></td>
<td>Check Temperature Regularly</td>
</tr>
<tr>
<td></td>
<td>Alarm Fails</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level-More</td>
<td>Pump Failure</td>
<td>Water Overflows/Equipment Damage</td>
<td>Level Alarm</td>
</tr>
<tr>
<td></td>
<td>Water Fed to Tank too Fast</td>
<td></td>
<td>Level Controller</td>
</tr>
<tr>
<td></td>
<td>Controller Fails</td>
<td></td>
<td>Check Level Regularly</td>
</tr>
<tr>
<td></td>
<td>Alarm Fails</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level-Less</td>
<td>Drain Valve Open</td>
<td>Not Enough Water to Mash Tun</td>
<td>Level Alarm</td>
</tr>
<tr>
<td></td>
<td>Water Fed to Tank too Slow</td>
<td></td>
<td>Level Controller</td>
</tr>
<tr>
<td></td>
<td>Controller Fails</td>
<td></td>
<td>Check Level Regularly</td>
</tr>
<tr>
<td></td>
<td>Alarm Fails</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Environmental Concerns

• Solid Waste
  – Spent grains, grain dust, hot trub, spent hop cones, excess yeast
  – All can be used as livestock feed – sold to local farmers

• Liquid Waste
  – Waste water and beer
  – Fix leaks & faulty equipment immediately

• Gaseous Waste
  – $\text{CO}_2$ from fermentation & vapor from boiler
  – $\text{CO}_2$ from fermentation negligible
Microbrewed Beer Consumer

Source- Adams Beverage Group
### U.S. Beer Market Shares

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2001</th>
<th>%Consumption Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td>85.66%</td>
<td>86.23%</td>
<td>-0.50%</td>
</tr>
<tr>
<td>Import</td>
<td>11.26%</td>
<td>10.75%</td>
<td>+0.51%</td>
</tr>
<tr>
<td>Specialty</td>
<td>3.08%</td>
<td>3.02%</td>
<td>+0.06%</td>
</tr>
</tbody>
</table>

Source: Beer Institute

- Anticipate Cornering 2% of Microbrewery Market
- Resulting in 0.06% of our Targeted Beer Market
Advertising Basics

• Communication of Goods and Services Available from Various Sellers
• Generate Demand by Offering Specific Information on a Product, Service or Brand
• Advertising Industry Composed of:
  – Media institutions
  – Clients
  – Advertising Agencies
Advertising Concerns

- Size of Total Advertising Budget
- Allocation of this Budget to Marketing Areas
- Allocation of the Individual Market Area Budgets Among Media (radio, news, etc)
- The Timing of Advertising
- The Theme of the Campaign
- The Effort Invested in Campaign
Basic Advertising Trend

Sales

Advertising Rate / Year

Source - Quantitative Theories of Advertising
Marketing Strategy

• Pricing
  – Price Rooster Brew at average microbrew selling price (Wholesale $13 per case)

• Advertise via Main Channels
  – Radio
  – Newspaper
  – Billboards
  – Direct-mail and Flyers
  – Website: www.bigcockbrewingcompany.com
Marketing Strategy

• Company Logo
  – Modeled after success of “Hooters”
  – Memorable and recognizable
  – Wide merchandising capabilities

• Merchandising
  – T-shirts, koozies, keychains, coasters, etc.

• Promotions
  – Sponsorships
Projected Sales

- Beer Consumption Increases by 1.5% Each Year Until 2010

- Gathered Data on Consumption in Each Market

- Used 1.5% Increase and Expected 0.06% Market Share to Estimate Projections
Competition

• Other Microbreweries
  – New Belgium Brewing Company
  – Boston Beer Company
  – Spoetzle Brewery

• BCB’s Competitive Edge
  – Deterministic model to determine optimal size, location and market
  – Process with highest level of automation
  – Aggressive marketing of Rooster Brew
Preferred Customers

• Most Important Customers: Owners and Managers of Liquor Retail Outlets

• On-Premise: Bars, Pubs, Restaurants, Hotels, Taverns, etc.

• Target Establishments Already Offering Microbrewed Beers

Potential Customers

- Wholesale Clubs and Supercenters
- Drug Stores
- Liquor Stores
- Supermarkets
- Convenience Stores
- On-Premise

Bar Graph: Potential Customers by Millions of Barrels

- On-Premise: 50.0
- Convenience Stores: 40.0
- Supermarkets: 30.0
- Liquor Stores: 20.0
- Drug Stores: 10.0
- Wholesale Clubs and Supercenters: 0.0
Beer Distribution

• Distributing is an Industry Within the Beer Industry

• One of the Most Important Components in Microbrewery Operation

• Distributors
  – Purchase beer from brewers
  – Market beer to retailers
  – Sell beer to retailers
Our Distribution

• Not Pursuing Self-Distribution
  – Buy, rent, or lease trailers and trucks
  – Purchase insurance
  – Hire licensed drivers

• Will Hire Professional Distributor
  – Assume risk of retailer non-payment
  – Reduce capital requirements
  – Maintain freshness of product
## Startup Task Timeline

<table>
<thead>
<tr>
<th>Task</th>
<th>Week</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Register Business</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Find Investors</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Hire CEO</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Hire Brewmaster</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Find Site Location</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Lease Warehouse</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Warehouse Preparation for Equipment</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Contact Raw Material Suppliers</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Contact Equipment Suppliers</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Order Equipment</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Hire Assistants</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Install Equipment</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Order Raw Materials</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Initial Marketing</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Preliminary Production</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Bottling and Kegging</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Distributing</strong></td>
<td></td>
</tr>
</tbody>
</table>
Where to Build?

Largest Market – 20.5MM bbl per year
Lowest Competition – 2 Microbreweries
Lowest State Excise Taxes - $0.11 per bbl
Lowest Leasing Prices - $32,000
Closest to Barley – Same Location
Closest to Hops – Same Location
Deterministic Model

• Simultaneous Consideration of all Possible Given Scenarios for a Project

• Realistic Constraints

• Results
  – Optimal operations
  – Future operations, expansions
The Deterministic Model

• Input Variables
The Deterministic Model

• Output Variables
Brewery Locations

• 61 Possible Brewery Locations

• Based Upon
  – Entrepreneurial Activity
  – Small-Business Growth
  – Job Growth
  – Risk

• Source: Dun and Bradstreet
Market & Brewery Locations
Distance

- Calculated for
  - Raw Material to Brewery
  - Brewery to Market
- Latitude and Longitude for Locations

\[
D_{1,2} = 3963 \cdot \arccos \left[ \sin \left( \frac{\text{lat}_1}{a} \right) \cdot \sin \left( \frac{\text{lat}_2}{a} \right) + \cos \left( \frac{\text{lat}_1}{a} \right) \cdot \cos \left( \frac{\text{lat}_2}{a} \right) \cdot \cos \left( \frac{\text{lon}_2}{a} - \frac{\text{lon}_1}{a} \right) \right]
\]

\[
a = \frac{180}{\pi} = 57.2958
\]

\[
\text{lat} = \text{city latitude}
\]

\[
\text{lon} = \text{city longitude}
\]
## Advertising

<table>
<thead>
<tr>
<th></th>
<th>Radio</th>
<th>TV</th>
<th>Newspaper</th>
<th>Magazine</th>
<th>Billboards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>$1.53</td>
<td>$11.26</td>
<td>$6.66</td>
<td>$4.91</td>
<td>$1.43</td>
</tr>
</tbody>
</table>

- Cost Per Day to Reach 1,000 People
- Linear Relationship Between Advertising Cost and Increase in Market Share
- Model Capable of Choosing Whether to Advertise and to What Extent
Competition

• For Every Market Location
  – Evaluated size
  – Evaluated number of breweries

• Implemented Market Percentage Reduction Based on Competition Factor
Reinvestments

• Model Selects up to 40% of Profit to Reinvest

• Reinvestment Used For:
  – Advertising
  – Expansions
  – Future breweries
The Code

\[\text{build(brewery)}.. \quad \text{sum}(tp,b(brewery,tp)) = 1;\]

\[\text{brewerynum}.. \quad \text{sum}(tp,\text{sum}(\text{brewery},b(brewery,tp))) = 2;\]

\[\text{maxbrewery(brewery,tp)}.. \quad \text{breweryprod}(\text{brewery,tp}) = \text{capacity(brewery,tp)};\]

\[\text{constraint2(brewery,tp)}.. \quad \text{sum}(\text{market},\text{sales(brewery, market,tp)}) = \text{breweryprod(brewery,tp)};\]

\[\text{Costbarley(brewery,tp)}.. \quad \text{purchCbarley(brewery,tp)} = \text{sum}(\text{barleyloc},\text{barley_purchase(brewery,barleyloc,tp)}) \times \text{barleyprice};\]

\[\text{Amountbarley(brewery,tp)}.. \quad \text{sum}(\text{barleyloc},\text{barley_purchase(brewery,barleyloc,tp)}) = \text{breweryprod(brewery,tp)} \times \text{barleyweightperbbl};\]
Sensitivity Parameters

- Production Cost per Barrel
  - Energy
  - Gas
  - Sewage
  - Labor
  - Water
  - Bottles
  - Labels

- FCI Brewery
- FCI Expansion
- Working Capital Brewery
- Working Capital Expansion
- Federal Income Taxes
Tabulated Parameters

- State Excise Taxes
- Leasing
- Selling Price
- Market Size
- Market Share
Sensitivity

• With Advertising Cost:
  – Spending $96,000
  – NPW $5.4 million
  – Indianapolis (1), Milwaukee (4)

• Without Advertising Cost:
  – NPW $5.2 million
  – Louisville (1), Milwaukee (4)
Sensitivity

• Increasing Freight Cost by 20%
  – No Change in Brewery Locations
  – No Change in Market Locations
  – NPW reduced by $100,000

• Increase Raw Material Costs
  – No Change in Brewery Locations
  – No Change in Market Locations
  – NPW reduced by $700,000
Risk

• Nine Parameters Chosen from Sensitivity Analysis
• Based on Uncertainty of Parameters
Scenarios

• Best Case Scenario
  – Net Present Worth $12.2 MM

• Worst Case Scenario
  – Net Present Worth -$59,000
Risk Results
Results

• Brewery Locations
  – Indianapolis, Indiana
  – Milwaukee, Wisconsin (Not built until 4th year)
• Net Present Worth
  – $5,413,000
• Expansion
  – Milwaukee expands by 9,000 barrels in 4th year
• Markets
  – Illinois: 3,600 barrels sold in 1st year
  – Indiana: 2,400 barrels sold in 1st year
  – Wisconsin: 15,000 barrels sold in 4th year
Financial Projections

• Estimated Investment Capital of $420,000
  – $340,000 Equipment Costs
  – $80,000 Working Capital
    • Leasing
    • Electricity & Natural Gas
    • Sewage
    • Labor
    • Licensing

• Sell Product for Approximately $180/barrel
  – 30 Barrel Process at 4 Batches/Week
  – $90,000/month in Sales
Financial Projections

• 10-Year Break-Even Analysis

• 10-Year Cash Flow Analysis
Summary

• Decided to Build Microbreweries
• Too Many Parameters for Classical Modeling
  – Used Deterministic Model
• Conducted Analysis
  – Market
  – Sensitivity
  – Uncertainty
  – Risk
• Obtained Optimal Results
  – Maximizing Net Present Worth