

THE PRECARIOUS NECESSITY OF HOPS

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Abstract

The hop plant is responsible for the distinct flavor and aroma found in every beer. In 2007, poor harvests in Europe and Australia, as well as a depressed market price produced an insufficient world supply of hops. This discrepancy initiated an upwards price shock that has changed the nature of the craft segment of the beer industry. The effective utilization of supply chain risk management techniques allow breweries to decrease their costs and ensure the supply of the raw materials that they need to prosper. In my thesis I chose the medium of a nationwide survey sent to every member of the Brewers Association that provided an email address in the 2009/2010 Brewers Resource Directory as well as three interviews with Colorado brewers of different sizes. I received 110 responses to the survey, including the Sierra Nevada Brewing Co, the Stone Brewing Co and the Odell Brewing Co among others. I conducted my interviews with the Bristol Brewing Co in Colorado Springs, the New Belgium Brewing Co in Fort Collins and MillerCoors in Golden. It is my hypothesis that hops merchants engage in opportunistic pricing structures that quote smaller breweries at higher prices. By forming coops, micro brewers can increase their market power to better negotiate contracts with the hops merchants. I also discuss a variety of strategies that brewers could use to ensure a more stable price and supply of hops.

KEYWORDS: (Hops, Procurement, Supply Chain Management)

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CHAPTER 1

INTRODUCTION

Beer is proof that God loves us and wants us to be happy.
-Benjamin Franklin¹

Commercial brewing has enjoyed a strong and profitable tradition in the US since the colonial period. Immigrants to the US produced the beers of their home countries and the diversification of brewing styles has been linked to influxes in immigration from different regions of Europe, where commercial beer arguably began. For instance, the lager style of brewing was brought to the US with German immigrants and accounted for 90% of total beer production in the 2008 domestic market.² The reason for this huge discrepancy is the dominance of the largest brewers such as Anheuser-Busch and MillerCoors that produce almost exclusively light lager beers. For an example of scale, “Budweiser and Bud Light, Anheuser-Busch’s two leading brands, currently capture approximately one third of beer sales nationwide.”³ However, smaller brewers are slowly but steadily gaining ground in the domestic beer market thanks to their emphasis on taste and an often excessive amount of raw materials used in their beers.

¹ Franklin, Ben, quoted by Oliver, Beermeister (Dallas and Chicago: World Beer Company, 2009) Available online at: <http://www.worldbeercompany.com/BlogRetrieve.aspx?BlogID=3220&PostID=61916>

² Rojas, Christian, "Price Competition in U.S. Brewing," *Journal of Industrial Economics* 56, no. 1 (2008): pg 4.

³ Ibid, 5

The hop plant is responsible for the distinct taste and aroma of the beer that we enjoy. The characteristics of the plant ensure that the hops market will always be volatile in nature. This volatility necessitates supply chain risk management strategies that take unpredictability and fluctuations into account in an effective and practical fashion.

“Between the late 1990s and early 2000s an excess of hop production caused a price depression. The worldwide hop acreage dropped by almost 50% in the last 10 years.”⁴ This price depression caused American hop farmers in the Pacific North-West to leave the market due to the attractive price of crops like corn, and poor harvests in Australia and Europe further decreased the global supply of hops.⁵ The result of this decrease in global acreage was a substantial increase in the market price of hops that has affected brewers of every size. “The cost increases are the largest we’ve ever faced” said Jim Koch, founder of the Boston Beer Co., maker of Samuel Adams Boston Lager.⁶ This supply shock is testament to the price elasticity of supply that is observed in the global hops market. Additional reasons for such volatility range from the many diseases and pests that can infect crops to poor weather conditions and the natural cyclicity of this commodities market.

Hops are grown all over the world with major centers in Germany, the Czech Republic, the United States of America and New Zealand. The global shock in supply strained many breweries and put others out of business. The repercussions from this

⁴ Mozny, Martin, Mirek Trnka, Zdenek Zalud, Tim Sparks, Radim Tolasz, and Jiri Nekovar, "The impact of climate change on the yield and quality of Saaz hops in the Czech Republic [electronic resource]," *Agricultural and Forest Meteorology* 149, no. 6-7 (2009): 914.

⁵ "Trouble brewing," *Economist* 385, no. 8560 (2007): 48.

⁶ Wall Kesmodel, David, and Janet Adamy, "Why Price Increases Are Brewing for Craft Beers," *Wall Street Journal* - Eastern Edition 250, no. 81 (2007)

market activity are felt by breweries to this day. Larry Bell of Bell's Brewery in Michigan has had to substitute other varieties of hops in two of their beers because he could only secure 60% of the aromatic Czech Saaz hops that he normally uses due to a poor harvest in Europe.⁷ The Saaz region of the Czech Republic is one of the oldest hop growing regions in the world and due to the climatic and terrain characteristics of the area is the only region in the world that produces Saaz hops of the quality that has come to be expected. For breweries, adjusting the recipes of their beers can have negative consequences as consistency is a desired trait and such adjustment can negatively impact sales.

This thesis attempts to discover how breweries of different sizes effectively source their hops and whether the multi-tiered breweries can use the same supply chain risk management strategies. There is no available research on the nature of brewer's sourcing techniques and I therefore look to other commodity industries with similar actor characteristics to form comparisons and conclusions for brewers. Furthermore, this study aims to give brewers a better understanding of the nature of the hops market.

In the following chapter I will review pertinent literature on supply chain management and comparative commodities markets, consistently interpreting the ramifications for domestic brewers. Chapter three begins with an in depth analysis of the characteristics of the hops plant, as they have direct implications for the volatility of this commodity market. An analysis of the literature on aggregate commodities markets and the beer industry follows and sets the stage for my hypothesis and discussion of my theory. Chapter four explains my methodology as well as how and why I have conducted the study in such a fashion. Chapter five reviews the results from the study while chapter

⁷ Ibid

six interprets these results, forming concrete conclusions and possible strategic options for domestic brewers.

CHAPTER 2

REVIEW OF LITERATURE

As I am coming to the end of my historical review and after almost 50 years in the trade, I am inclined to compare the hop market with the ocean: After the high tide comes the low tide, but there are always new currents which determine how the tides come and go, and I have not seen a single season that was like another.¹

This quote was written by Heinrich J. Barth, the heir to one of the only remaining hop merchant companies in operation today. His ancestors have been very involved in the hop trade since the 19th century and have been shipping hops from Germany to the United States since 1868.² His thoughts are a testament to the volatility and unpredictability of the global hop market. These spikes can have disastrous consequences for brewers around the globe; however, through effectively managing their supply chains, breweries of different sizes can make strides to smooth out this market and ensure their access to the crop that gives their beer its distinct flavor.

In this chapter, I will discuss the scholarly literature about supply chain management. Throughout the text I will pay special attention to the differences in management techniques used by firms of different sizes and the implications for brewers. I will also analyze the supply chain particularities found in other food and beverage

¹ Barth, Heinrich J, Christiane Klinke, Claus Schmidt, 4th ed, *The Hop Atlas: The History and Geography of the cultivated Plant*, (Nuremberg: Joh. Barth & Sohn, 1994) pg 23.

² Ibid, 40

industries. In the section directly below, I will analyze the literature on brewers demand for hops and the obstacles that have arisen in recent years.

Breweries and the Necessity of Hops Risk Management

The recent hops price shock was immediately pertinent to brewers across the globe. The consequence was an increase in the retail cost of beer due to the rise in input costs as breweries scrambled to settle contracts to ensure the supply of these raw materials. For example, Brian Owens, the brewmaster of the O'Fallon Brewery reported that a particular variety of hops he once bought for \$3 a pound, now costs him five times that.³ "Many smaller breweries cannot find what they need at any price. Industry giants like Anheuser-Bush and Miller are better off, thanks to long-term contracts. But even Anheuser-Bush has been forced to raise prices for its six-packs."⁴

The craft segment of the industry is defined by a production of less than 2 million barrels per year, and a dedication to making strong tasting beer by adding ingredients that enhance instead of lighten the beer's taste.⁵ The financial strain that craft brewers experienced is exponentially higher than that of the large industrial brewers.

They [mass market breweries] use much less hops and barley in most of their beers, which is why they are lighter in taste and calories. A barrel of craft brew Sierra Nevada Pale Ale, for example, has about twice the malt and as many as five times the hops of a mass-market brew, like Budweiser or Miller High Life.⁶

³ "Trouble brewing," *Economist* 385, no. 8560 (2007): 48.

⁴ Ibid, 48

⁵ Brewers Association: *Craft Brewer Defined*, Boulder, Available online at: <http://www.brewersassociation.org/pages/business-tools/craft-brewing-statistics/craft-brewer-defined>

⁶ Kesmodel, Adamy,

In this industry and especially in the craft segment, effective supply chain management techniques are necessary for the longevity and profitability of a firm due to the at times excessive use of raw materials that characterize craft beer. Differences in brewer size likely necessitate varied supply chain management strategies that will align the daily operations of the firm to their ultimate business strategy for optimal performance and profit maximization.

In this thesis I will analyze the supply chain management techniques utilized effectively by Large Brewers (LB) Regional Brewers (RB) and Micro Brewers (MB). Large Brewers are defined by an annual production of over 2,000,000 barrels per year while Regional Brewers produce between 15,000 and 2,000,000 barrels and Micro Brewers produce less than 15,000 barrels.⁷

Supply Chain Management

Stadtler and Kilger define Supply Chain Management (SCM) as “the task of integrating organizational units along a supply chain and coordinating material, information and financial flows in order to fulfill (ultimate) customer demands with the aim of improving the competitiveness of a supply chain as a whole.”⁸ Figure 2.1 below portrays what Stadtler and Kilger call the *House of Supply Chain Management*. The house is a tool that describes the essential components of an industrial supply chain. I will use this rubric to explain the strategies and inherent difficulties that brewers negotiate in the hops market. As an example throughout this section and due to the limits

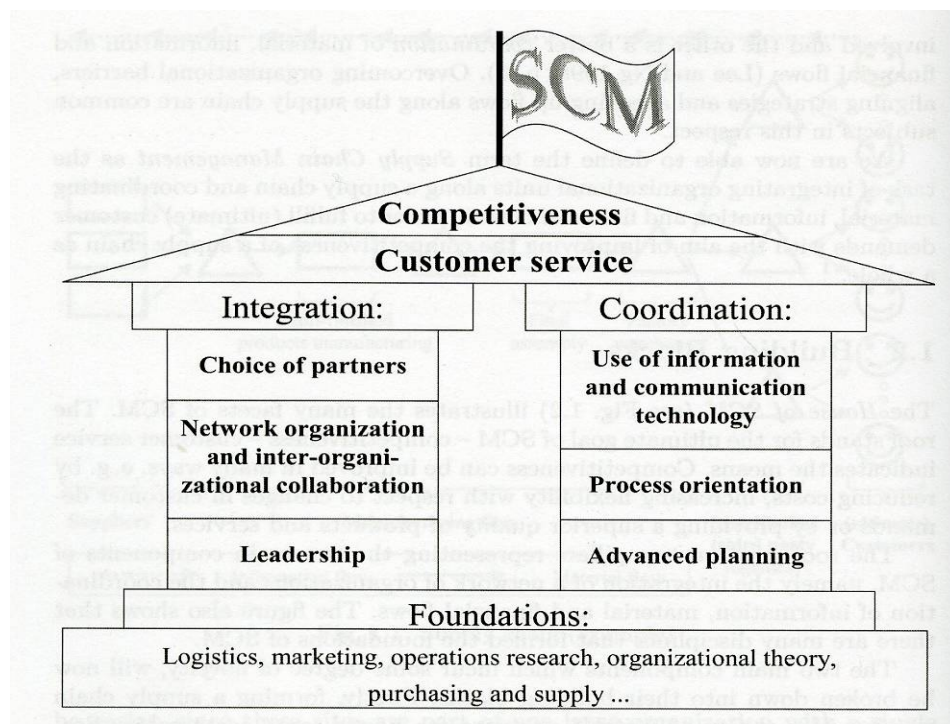
⁷ Brewers Association: *Market Segments*, Boulder, Available online at: <http://www.brewersassociation.org/pages/business-tools/craft-brewing-statistics/market-segments>

⁸ Stadtler, Hartmut, Christoph Kilger, eds. 4th ed, *Supply Chain Management and Advanced Planning: Concepts, Models, Software, and Case Studies*, (Berlin: Springer-Verlag, 2008), 1.1.

of my study, I focus exclusively on the hops supply chain as defined by the growers as initial agents and concluding with the brewers as final consumers in an effort to be concise and to have resonating conclusions for domestic brewers.

Figure 2.1⁹

THE HOUSE OF SUPPLY CHAIN MANAGEMENT



The roof and ultimate goal of the *House of Supply Chain Management* is competitiveness with customer service just below. The roof is supported by two pillars: integration and coordination, which rest upon the foundation that is comprised of logistics, marketing, operations research, organizational theory, purchasing and supply, and the day to day operations of the firm.¹⁰

⁹ Stadtler, Kilger, 12

¹⁰ Stadtler, Kilger, 1.2

Competitiveness

“Competitiveness can be improved in many ways, e.g. by reducing costs, increasing flexibility with respect to changes in customer demands or by providing a superior quality of products and services.”¹¹ In the context of this thesis, this means that the multi-tiered breweries use different organizational strategies to carve out market segments that can sustain them.

Due to the inherent differences in scale, the varying sized breweries compete against different tiers of the market and use different competitive strategies. LBs compete mostly against themselves due to the international scale at which they operate and their emphasis on value. They brew almost exclusively cheaply made light lager beers that dominate our domestic market. However, due to the growing success of the craft segment, LBs have begun to diversify their portfolios by brewing stronger tasting beer, examples of which include the Blue Moon line made by SABMiller and Bud Light Golden Wheat, brewed by Anheuser Bush InBev. These two companies control approximately 33.8% of the world beer production.¹² RBs such as the Boston Beer Co, Sierra Nevada Brewing Co, and the New Belgium Brewing Co have been carving out a growing market segment since the 1980s by competing directly with the LBs with an emphasis on superior quality. RBs also compete with the MBs due to their craft characteristics. MBs inevitably compete amongst themselves and RBs; however, the main challenge for both the RBs and MBs is to convince the consumer to purchase craft beer instead of the mass produced light beer brewed by the LBs.

¹¹ Stadtler, Kilger, 1.2

¹² Barth, Stephan, ed, 2008: *Market Leaders and their Challengers in the Top 40 Countries*, (Nuremberg: Joh. Barth & Sohn SmbH & Co KG, 2009), 13.

Regardless of size, breweries must methodologically manage their supply chains to ensure that they are receiving the quality input materials that they require at a price that is both fair to them and sustainable; however, the strategies themselves will vary dependent on size. One advantage to size concerns the amount of time that breweries can afford to spend on managing their supply chain and market research. Larger breweries can most likely devote substantial amounts of time upon these issues as their size allows them to hire employees exclusively concerned with procurement. Smaller brewers will probably be forced by smaller revenue streams to include procurement in the job description of a utility position. Therefore it is probable that the more time companies spend on supply chain management, the better options and prices they receive, as is to be expected in any industry due to the efficiency inherent in focused specialization.

Customer Service

Stadtler and Kilger break Customer Service down into three distinct segments: pre-transaction, transaction and post-transaction. However, due to my definition of the hops supply chain as noted in the beginning of this section, I will limit the scope of customer service to the value and degree of satisfaction derived from the varied products. I will assume for the sake of continuity and simplicity that the value the consumer experiences from beers produced by LBs is based on the monetary value of the product relative to quality, while the RBs and MBs target consumers that prefer a superior quality beer relative to the price.

Integration

There is a rich body of literature exclusively concerned with the different integration strategies that are used in today's increasingly global economy. Integration is

an intrinsic part of any supply chain as it entails the sourcing of materials and services that firms need to carry out their day to day operations. I will start with a broad classification of the industrial beer chain and develop a syntax which will be used to discuss the varying strategies that are encountered. The first distinction that must be made is the nature of the economic environment that is my focus. The supply chain of LBs appears to be a producer-driven chain. “Producer-driven commodity chains are those in which large, usually transnational, manufacturers play the central roles in coordinating production networks.”¹³ On the other side of the spectrum, and what craft brewers face is the buyer-driven commodity chain, characterized by industries that are dominated and controlled by large retailers, marketers and branded manufacturers. These institutions usually set up decentralized production networks mostly in third world countries and production is generally carried out by contractors.¹⁴ The buyers in this relationship are the hops merchants who control pricing and availability for the smaller brewers.

In the guise of a producer-driven commodity chain, LBs are the producers and they physically create the finished product. Their size allows them to dictate the terms of contracts and exert control over other actors in their supply chain. “This [producer-driven orientation] is characteristic of capital- and technology-intensive industries” where initial investments are a formidable barrier to entry.¹⁵ The equipment required to brew beer on an industrial level costs great amounts of money and decades of investment are

¹³ Gereffi, Gary, “A Commodity Chains Framework for Analyzing Global Industries,” mimeo, Department of Sociology, Duke University (1999), 1.

¹⁴ Ibid, 1

¹⁵ Ibid, 1-2

required to be able to produce over 2,000,000 barrels per year. Another key characteristic of such a chain is the ability of lead firms to exert control over the upstream and downstream agents in the supply chain, which is observed with respect to LBs. Furthermore, “the lead firms in producer-driven chains usually belong to global oligopolies” which is again witnessed with LBs.¹⁶ Lead firms are distinguished from the rest of the network by their degree of control and access to major resources and assets, such as product design, new technologies, brand names, or consumer demand.¹⁷ In the context of my study, firms such as SABMiller and Anheuser-Busch InBev are the lead firms and thus have the ability to exert control over the hop merchants; however, smaller craft breweries find themselves at the mercy of these merchants.

On the other side of the spectrum, there are a very condensed number of hops merchants that control very substantial portions of the world’s flow of hops due to their processing capabilities. The cost of production and cold storage facilities creates a market environment with high barriers to entry that creates a buyer-driven commodity chain with respect to craft brewers. Because an individual craft brewery cannot realistically purchase the facilities necessary to both process and store hops, merchants will generally dictate prices and terms of contracts to craft breweries.

Integration has three sub-categories according to Stadtler and Kilger: choice of partners, network organization and inter-organizational collaboration, and leadership. Because complete vertical integration in the beer industry is rare to non-existent, firms must do business with other organizations to procure the raw materials that they need to

¹⁶ Ibid, 2

¹⁷ Ibid, 3

survive. Therefore, partners must be chosen carefully to ensure that an effective positive synergy is created between organizations to better the supply chain as a whole.

Working from Gereffi's classifications, the integration system is further refined by Sturgeon's distinction between value chains and production networks.

A "chain" maps the vertical sequence of events leading to the delivery, consumption, and maintenance of a particular good and service, while a 'network' maps both the vertical and horizontal linkages between economic actors, i.e., recognizing that various chains often share common economic actors and are dynamic in that they are reused and reconfigured on an ongoing basis.¹⁸

This implies that the production network encompasses at least two value chains that share a common economic agent. In the case of both LBs and craft brewers, this common actor refers to the hop merchant companies, of which there are only several. Most breweries will incorporate a hop merchant into their value chains through contracting, and this merchant will also be used by many other brewers out of necessity due to the small number of available merchants. Therefore, there are particular links that connect brewers all over the map through their mutual dependence. This forms a large network that could be mapped and evaluated against the other networks that function in the market in terms of their respective value to the MB, RB, or LB. Sturgeon continues to develop a working model of these economic actors and the governance styles that they necessitate.

Economic actors include the integrated firm, the lead firm, the turn-key supplier, the retailer, and the component supplier.¹⁹ These terms are essential to the analysis of governance styles and strategies that occur in any industry as they describe the full

¹⁸ Sturgeon, Timothy J, "How Do We Define Value Chains and Production Networks?" Background Paper Prepared for the Bellagio Value Chains Workshop, Bellagio, Italy, (September 25-October 1, 2000), 6.

¹⁹ Ibid, 10

spectrum of integration possibilities that firms can pursue in the name of higher profitability and increased capabilities.

The integrated firm refers to an organization that has been completely vertically or horizontally integrated into the operations of the firm. Their activities can range from product strategy, to product definition and design, to manufacturing, sub-assembly, and component manufacturing to marketing, sales and distribution. With respect to the discussion of hops supply chain management, examples of integrated institutions can include growers that sell exclusively to one brewer, and therefore designate their entire crop to the firm to which they belong. The brewery must be able to use all of the growers harvest for this to become a feasible option, and so size is an issue of practicality.

Turn-key suppliers are also known as full-package suppliers and specialize in a certain core competency. This could be the manufacturing and design of complex parts and services, or process R&D. Examples in the brewers' world include production contractors that brew, bottle and distribute. Brewers' such as the Boston Beer Co have used such organizations to expand their capabilities and market segment. The hop merchant companies are also an example of turn-key suppliers as they offer brewers of all sizes a finished product that the brewers do not have the capabilities to create in the form of highly processed hop cones and extracts.

The retailer bears no weight in this production-centric study, as such I will pass over it. A component supplier produces discrete elements for the production of full products. Examples include growers that contract directly with brewers but don't relinquish their autonomy. These growers offer a raw, unprocessed product.

When deciding among partners to engage with in a value chain, the “selection criteria should not be based solely on costs, but on the future potential of a partner to support the competitiveness of the supply chain.”²⁰ Once a suitable partner has been found, network organization and inter-organizational collaboration must be efficiently conducted. The method of coordination will be dependent upon the nature of the integration present in the business relationship. The forms of governance in global value chains will be explored in depth in the subsequent section.

Coordination

Coordination consists of three building blocks: these are the utilization of information and communication technology, process orientation, and advanced planning.²¹ With certain business operations software, one can achieve instantaneous universal knowledge of supply chain resource flows, effectively decreasing the order lead time and improving customer service and overall competitiveness in turn. Process orientation aims at coordinating all members of the supply chain to function in the most efficient manner; “streamlining cross-company processes is the next great frontier for reducing costs, enhancing quality, and speeding operations.”²² Performance indicators can be used to identify problem areas and bottlenecks, which can then be planned for accordingly. Stadtler and Kilger’s definition of coordination refers to one company’s activities aimed at streamlining their own functions with respect to their value chain; however, there exist many formats within which these functions can exist. Different

²⁰ Stadtler, Kilger, 1.2.2

²¹ Ibid, 1.2.3

²² Ibid, 1.2.3

value chains require their own distinct forms of supplier relationships dependant upon the nature of the organizations involved, and these techniques are described below.

Gereffi, Sturgeon and Humphrey have created a holistic view of the global commodity chain and production networks coordination mechanisms. In their words:

We acknowledge, as do most other frameworks that seek to explain industry organization [...] that market-based relationships among firms and vertically integrated firms (hierarchies) make up opposite ends of a spectrum of explicit coordination, and that network relationships comprise an intermediate mode of value chain governance. What we add to this conceptualization is an extension of the network category into three distinct types: modular, relational, and captive.²³

They illustrate five types of relationships between lead firms and their suppliers: these are markets, modular value chains, relational value chains, captive value chains, and hierarchy.²⁴ The virtues of these varying techniques are founded upon three factors: the complexity of information, the extent to which it can be codified, and the capabilities of the supplier.²⁵ I will look at the five types of lead firm-supplier relationships and analyze them in terms of these factors and what that may imply.

The market is best represented by the spot market. It is characterized by the greatest extent of flexibility with respect to suppliers and low switching costs. The market features low complexity of transactions, a high ability to codify transactions and a high ability level of the supply-base. The degree of coordination necessary is low as is the power asymmetry. For many years craft brewers could rely solely upon the spot market for their supply of hops because the price was low and the supply was readily available. Ironically the depressed price was what gave way to the crisis of 2007/2008, and the change in the nature of the market. Now, most breweries are engaged in

²³ Gereffi, Gary, John Humphrey, and Timothy Sturgeon, "The Governance of Global Value Chains," *Review of International Political Economy* 12, no. 1, Aspects of Globalization (2005): 83.

²⁴ Ibid 83-84

²⁵ Ibid, pg 85

contracts for their base hops and rely upon the spot market only for the specialized hops that use in seasonal beers. Because of this “arms-length” relationship to their suppliers, brewers that engage exclusively in the spot market are most at risk to supply and price disruptions as was experienced in 2007/2008.

In modular supplier relationships, supplying firms make products to the specifications of the lead firm. Turn-key suppliers are an example of a modular agent. In this scenario the complexity of transactions are high, as are the ability to codify transactions and the capabilities of the supplier. The degree of coordination and power asymmetry are moderately low due to the supplier’s capabilities and the ease with which communication can be effectively coordinated. Hop merchants are an example of modular suppliers in the brewers’ value chain. There is essentially no switching cost, and they all have the same core competencies in the processing of hops.

Relational supplier interactions feature complex interactions between buyers and sellers which often results in mutual dependence due to the high level of asset specificity. Trust and reputation, or family ties effectively create a bond that is more substantial than a contract. The complexity of transactions is high, the ability to codify the information is low; however, the capabilities of the supplier are high. There is a high degree of coordination due to the complexity and ability to codify the transactions. While no example of this comes to mind, relational supplier networks could be incredibly valuable for both brewers and growers if it could be properly cultivated. By working together, the brewer and grower could determine a flexible price that is both low and sustainable for both parties, and then pay a merchant to process the raw hops.

A captive relationship refers to a supplying firm that is dependant upon the lead firm due to the high associated switching cost and sometimes due to contractual obligations. A high degree of monitoring is required on the part of the lead firm due to the abilities of the supplier. The complexity of transactions is high and the degree of coordination and power asymmetry are high due to the low capabilities of the supplier. The ability to codify transactions is high. A hops specific example of a captive value chain can be found in the grower's relationship to hop merchants. In this value chain the merchant is the lead firm dealing with a MB, or an RB over whom they hold the power. The grower is dependant upon the merchant for access to the market and their processing abilities. The cost of switching could be formidable if the grower cannot find another way to market; if the growers harvest cannot be sold, they will not be able to sustain themselves and will be forced to exit the market.

In a hierarchy, the firm is vertically integrated with explicit managerial control designated by the lead firm. The complexity of transactions can be high, however the ability to codify transactions and the capabilities of the supplier are both low. This is the highest level of necessitated coordination and power asymmetry due to the status of the supplier as a subsidiary. Merchant owned farms are an example of a hierarchy. The merchants must manage the fields and their growers, as well as decide what to grow.

A supplier's definition as one of these classifications is not static, and firms can develop their capabilities and move towards autonomy. An example of this mobility can be observed in Hopunion, a domestic grower's coop that caters to the needs of craft brewers.

Referring again to the supply chain management “house” depicted at the beginning of this chapter, advanced planning is concerned with three planning levels: the short-term, medium-term and long-term. All together, the three create a comprehensible plan that is concerned with the longevity of the supply chain and its immediate success. Today there exist Advanced Planning Systems, software that produces/uses “a closer integration of modules, adequate modeling of bottleneck capacities, a hierarchical planning concept and the use of the latest algorithmic developments”²⁶ to effectively create an optimal performance outline of the future that can then be adjusted accordingly to the specific needs of the company by the top management. However, these systems are expensive and will not be affordable to the smaller brewers. It is probable that RBs and LBs take advantage of this software to coordinate their procurement.

Foundation

The last component of the *House of Supply Chain Management* is the foundation is comprised of logistics, marketing, operations research, organizational theory, purchasing and supply, and the day to day activities of the firm. The foundation of the supply chain will be different for every tier of the beer industry due to the resources and assets available to the drastically different segments of the market. For instance the marketing strategies adopted by a LB will be on a completely different scale than a MB due to the market share and target consumers that the company focuses on; however the RB bridges the gap. The problem of organizational theory will vary immensely as well. This refers to the forms of value chains and governance outlined above, and will be explored in depth in chapters three and four.

²⁶ Stadtler, Kilger, 1.3.2

The purchasing and supply management techniques will be drastically different between breweries at all levels due to the intrinsic differences in market power. In the beer industry, an extraordinary percentage of the annual hop harvest is sold through forward contracts. For instance, the rates at which hop harvests are forward contracted in Germany for the years 2009 to 2012 are 95%, 90%, 85%, and 80% respectively. In the USA, contract rates for the same time period are 100%, 95%, 85%, and 80% respectively. In the Czech Republic these rates are similarly 100%, 95%, 70%, and 60%.²⁷ These three nations are responsible for the vast majority of hops brought to market. This implies that the purchasing and supply strategies of brewers are heavily dominated by forward contracting. Due to the lack of public research available on brewer's procurement methods, I will concentrate in the subsequent section on the different forms of contractual relationships observed in a variety of commodity markets.

In this economic atmosphere, the supply chain must be flexible to allow for the negotiation of diverse economic events, such as the price shock of 2007/2008 in the world hop prices and supply. Steps to be taken in the aim of risk management include “1) identifying underlying sources of risks, 2) determining the gateways by which such risks can manifest, 3) assessing the potential impact of these risks under various scenarios, and 4) providing the measures for mitigating and coping with these impacts.”²⁸ How the LBs RBs and MBs conduct this risk management will be explored in chapter three and four.

²⁷ Meier, Heinrich, ed. *The Barth Report: Hops 2008/2009*. (Nuremberg: Joh. Barth & Sohn GmbH & Co KG, 2009), 9.

²⁸ Enyinda, Chris I, Alphonso Ogbuehi, Charles Briggs, “Global Supply Chain Risks Management: A New Battleground for Gaining Competitive Advantage,” *Proceedings of the American Society of Business and Behavioral Sciences* 15, no.1 (February 2008): 284.

Firm Size and Agricultural Commodity Markets

I will now analyze several examples of commodity supply chains that effectively illustrate supply chain risk management techniques and sourcing strategies used by firms of different sizes in other similar industries. While these examples are oriented around growers and exporters, there are clear similarities in smaller and midsized companies' abilities to engage in the market. In her 2009 essay, Newman discusses the complexities of the supply chain for coffee, in which there are several mirrored characteristics to that of hops:

While increased volatility in coffee prices did not drive the initial concentration process of the industry at the international trader level, the increasing need to engage in futures trading has reinforced the concentration of international traders. During the last two decades mid-sized traders with unhedged positions suffered major losses. They also found themselves too small to compete with larger ones. In this way, mid-sized trading companies either went bankrupt, merged with others, or were taken over by the largest trading companies.²⁹

This market bears several similarities to the hops industry. The concentration observed at the merchants level is precisely what happened to the hop merchants. It appears that as world beer production grew, so did the demand for raw materials and the merchants as well; by increasing their capabilities merchants were able to capture larger shares of the market due to the products and services they could offer due to their ingenuities. This strategy to maintain longevity will be revisited shortly. In Germany, this was further concentrated by the actions of the third Reich as many of the hops merchants were Jewish businessmen.³⁰

²⁹ Newman, Susan A, "Financialization and Changes in the Social Relations along Commodity Chains: The Case of Coffee," *Review of Radical Political Economics* 41, no. 4 (Fall 2009): .

³⁰ Barth, Klinke, Schmidt, 44

From the brewers perspective this can be seen in light of the 2007/2008 price shock. Smaller brewers that relied on the spot market were incredibly disadvantaged, and many are still feeling the repercussions, due to both the limited supply of hops and the oligopolistic power of the merchants. Because the commodity was in short supply across the globe, foreign companies tried to replace their typical supplies with American hops increasing the domestic demand and with it the price. On the other hand, due to the oligopolistic power of the merchants, brewers were forced to engage in forward contracts of a mid to long term duration at an extremely high price that could be charged at the time. The brewers had no option but to sign the contracts because their survival necessitated a year long supply of hops and breweries that could not sustain the increase in costs or were unable to secure contracts were forced to close their doors.

Along these lines, small Ugandan coffee farmers created cooperative marketing chains that featured “smallholder producers organized at the village level into primary societies, which are in turn organized into a regional cooperative union” as a means to effectively manage price risk.³¹ In this way, smaller farmers shared the risk associated with the cultivation of commodities on an increasingly volatile market.³² This is both necessary and effective because the smaller coffee farmers do not have access to risk management techniques and assets and the basic economies of scale that larger farmers enjoy. Local exporters in the coffee industry cannot engage in futures markets “owing to relatively small export volumes at any one time compared with the lot sizes in New York and London and their limited access to the necessary finance to engage in derivatives

³¹ Ibid, 17

³² Newman, 9

trading activities.”³³ This is important to keep in mind with regard to brewers, as the economic environment is very similar; access to assets and risk management techniques play a large part in a firm’s ability to weather adverse economic times. However, the Ugandan market is now dominated by private local traders due to the liberalization of the market. Now, local traders pick up the coffee from growers and bring the harvests to the manufacturing factories of the international merchants.³⁴

Examples of currently active cooperative marketing groups, or producer clubs, include Mexico’s Agricultural Products Options Program, and Guatemala’s National Coffee Association.³⁵ This strategy increases the market power of the farmers by an exponential degree and allows them to access markets that guarantee margins. When producer clubs are well organized and the capabilities of the members are high, there can be very substantial advantages to such coordination. This is seen in Mexico where:

Group members are jointly obligated to meet contract requirements. In return, the starch company offers a forward purchase agreement for the maize at a fixed price and partly pre-finances inputs and technical advice. The company also partially pre-finances crop insurance, so that farmers are not penalized when crops fail. By addressing both price and yield risk, the arrangement allows farmers to adopt newer technologies more readily.³⁶

The model provides an incredible incentive, as most small growers cannot afford to insure their crops. This mirrors the growers coop in the Czech Republic that successfully navigates the supply network and effectively negotiates with large multi-national conglomerates. By cooperating with each other, these coops and unions increase their market power to the point where they can conduct business and receive a fair price from

³³ Ibid, 16

³⁴ Ibid 14

³⁵ Larson, Donald F, Jock R, Anderson, Panos Varangis, “Policies on Managing Risk in Agricultural Markets,” *The World Bank Research Observer* 19, no. 2 (2004): .

³⁶ Ibid, 216

the largest merchant institutions in the world, regardless of whether they are upstream or downstream from said companies.

The UK's supermarket industry appears to be a classic example of a buyer-driven commodity chain. Supermarkets in the UK function much like the international traders of coffee; however they have even more control over their suppliers due to the intense quality and safety specifications upon which they base their diversification.

Their size and market power means that the decisions they take to win customers and comply with food standards regulations define what the other actors in the chain have to do. The requirements they specify for cost, quality, delivery, product variety, innovation, food safety and quality systems help to determine what types of producers and processors are able to gain access to the fresh vegetables chain and the activities they must carry out.³⁷

The retail grocery market features an oligopoly of several large supermarket chains.

There are two prevailing sourcing strategies utilized by these large firms: some supermarkets employ vertical integration techniques and actually own fields; while others use a combination of vertically integrated growers and modular or relational importers/exporters to keep their reliance and their costs as low as they can.³⁸ These risk management solutions each have their unique advantages and disadvantages and by using both, supermarkets can reap the benefits of both techniques. Vertically integrated farms allow for a higher ability to monitor and ensure the specific quality standards that the company requires, while the low switching costs associated with modular value chains allows grocers to keep their costs low by dispersing the risk to the growers that supply

³⁷ Dolan, Catherine, John Humphrey, Carla Harris-Pascal, "Horticulture Commodity Chains: The Impact Of The UK Market On The African Fresh Vegetable Industry," *Journal of Development Studies* 37, no. 2 (December 2000), 1.

³⁸ Ibid, 16

them. These strategies are not available to all supermarkets however; the ownership of a company farm could be prohibitively costly for smaller grocers.

The supermarkets have decided that they can achieve lower costs and higher reliability by using fewer large importers/exporters; hence importers in the UK have vertically integrated exporters in Africa into their value chain.³⁹ This has become an intimidating barrier to entry for farmers as well as importers. All of the produce is exported from Africa by plane with the largest exporters taking a clear advantage due to scale by securing long-term contracts with cargo plane companies.⁴⁰ This has enhanced these firms' ability to supply their UK importers with a reliable just-in-time supply which has become the market standard; a solution to the need for the changing demands and fresh produce with a short shelf life. Smaller exporters and retailers are disadvantaged by not having the capacity to fill a cargo plane on a regular basis and thus are forced to use commercial airlines, running the risk of the planes cargo bay filling up due to passenger traffic and their food spoiling.⁴¹ Further disadvantages for small exporters entail their ability to invest in the necessary assets to improve their capabilities. The UK importers and supermarkets are increasingly looking for finished products in prepared and packaged vegetables, ready to eat produce, and this necessitates labeling technology as well. "As a result, small and medium-sized exporters, and small growers have been marginalized from the supermarket chain."⁴² I will subsequently argue that these dynamics are similar to those that have prevailed in the hop market.

³⁹ Ibid 16

⁴⁰ Ibid 26-27

⁴¹ Ibid, 27

⁴² Ibid, 23

The Supply Chain of the Hops Market

The growing and selling of hops today is based on experience reaching back to the last century and even earlier. The knowledge, built up over the ages, about how to deal with this difficult commodity forms a sound basis for the changes and innovations which have taken place in the cultivation and sale of hops.⁴³

The market is now international, having grown with the trading companies and the apparently perpetual growth of the world wide beer market. At its height in 1895, the Nuremberg market in Germany sustained 364 registered hop merchants, but featured 30 major companies that controlled almost 95% of the market.⁴⁴ Today, “hops are a classic international trading commodity on the markets for agricultural produce.”⁴⁵ The US is one of the worlds foremost producers of hops, however, domestic brewers also choose to import hops from all over the world in the aim of differentiation as every variety of the crop features distinct tastes and bittering values. “Trade between the individual importing and exporting countries is at present relatively free of tariffs and other barriers to trade, as only a few hop-producing countries protect their growers through customs duties.”⁴⁶ This freedom in the market enables the flexibility of the world market. Hop merchants and brewers attempt to stabilize their costs in this market by using forward contracts.

To reduce the risk faced by both growers and breweries against fluctuating world prices, the bulk of hops produced world-wide are sold under forward contracts on a fixed price basis for 3-5 years, and sometimes up to 10 years, ahead. This means that up to 80% of a crop is sold, and price and buyer determined, before it is harvested. Between 80 and 90% of all hops are sold by way of forward contracts. Any residual quantities, the volume of

⁴³ Barth, Klinke, Schmidt, 30

⁴⁴ Ibid, 36

⁴⁵ Ibid 39

⁴⁶ IBID, pg 40

which depends on the size of the harvest, are sold on the spot market where prices fluctuate considerably according to supply and demand.⁴⁷

Conclusion

“Many times it has been tried with the best intentions to overcome the hop cycles, but in vain. So, I have to resort to the wisdom that: the best market order is the price.”⁴⁸

Due to this cyclical nature observed in the hops market, brewers must take steps to protect themselves against the fluctuations of the market. It appears that forward contracting is an effective means for brewers to decrease the intrinsic risk in this market if it can be engaged in at both a time of the brewers choosing, and in a calculated fashion. This is due to the ability of forward contracts to create a linear demand for growers. If the growers know the quantities that they must cultivate before the season begins, then they can calculate their costs and a sustainable rate can be settled on that is profitable for both the grower and the brewer. The various forms that these contracts can take and their respective virtues will be examined in the following chapters.

⁴⁷ Ministry of Agriculture and Forestry, The, New Zealand, *International Market for Hops: Selling Hops on the International Market*, Available online at: <http://www.maf.govt.nz/mafnet/rural-nz/profitability-and-economics/producer-boards/structure-of-hop-industry/hopmb002.htm>

⁴⁸ Barth, Klinke, Schmidt, 23

CHAPTER 3

THEORY

In this chapter I will describe the nature of the hop plant, as certain characteristics of the plant bear upon the functionality of the market in general. Subsequently I will analyze commodities markets, then the beer industry as a stepping stone to my hypothesis. A discussion of the hypothesis will follow, analyzing the implications and environments in question.

The World of Hops

Demand for hops has, since the beginning of its cultivation been directly related to world demand for beer. An amusing theory claims that some of the earliest colonists of America landed at Plymouth Rock “because their store of beer had run out. Thus in 1620 they landed in Massachusetts Bay and not in their original destination, Virginia.”¹ The settlers quickly began to cultivate hops because ventures into the forests of the “New World” to collect wild hops could be deadly due to Native American attacks.²

An understanding of the nature of the hop plant is essential to an analysis of hops price volatility, as it is due in part to the characteristics and cultivation of the plant. The hop is a member of the hemp family (*Cannabaceae*) and the order of nettle plants

¹ Barth, Klinke, Schmidt, 125

² Ibid, 126

(*Urticaceae*). It is a dioecious crop, meaning that one plant will have exclusively male or female flowers. The female plants form the cones that are responsible for the distinct taste, aroma, and natural preservatives found in beer. “Each hop growing region imparts its own terroir to the hops. Therefore, the same variety of hop grown in two different locations will differ in flavor and aroma.”³ When pollinated, the cones form seeds which decrease the quality of the hops, but double the yield and make the crop more resistant to diseases which can eradicate whole fields at a time, such as *Peronospora*.⁴ In historical hop growing regions such as the Saaz region in the Czech Republic and the German region of Hallertau, where the quality of the hops is of the utmost importance, there have been laws requiring the destruction of male plants as one plant has the potential to pollinate a very large area.

The hop is propagated on a domestic level by the use of cuttings of other plants. It is a perennial plant and the root system can achieve an age of over 50 years.⁵ During the harvest the entire bine is cut, leaving only the rootstock to remain underground through the winter until new shoots grow in the following spring. “Bine” refers to a “twining plant stem” and is most often used in reference to the hop plant.⁶ The rootstock is approximately 30 to 40 cm’s in length and 10 to 15 cm thick and stores nutrient reserves which enable the plant to reach heights of 75 cm with practically no other

³ Hamm, Alison Kay, “Colorado Hops: Craft Brewery Survey Results,” PhD diss., Colorado State University, 2008, 2.

⁴ Barth, Klinke, Schmidt, 237

⁵ IBID pg. 46

⁶ Dictionary.com, *Bine Definition*, Available online at: <http://dictionary.reference.com/browse/bine>

nourishment.⁷ The shoots that grow from the rootstock can reach lengths of over two meters under ground and supply the hop bine with the water that it will need. “The best harvests are obtained from loamy or sandy soil. Hops always need a loose, deep, well drained soil,” and are exclusively grown between the 35th and 55th degrees of latitude in both the northern and southern hemispheres.⁸ Long summer days are essential for optimal yields and in the “traditional” hop regions of Saaz, Hallertau and England the crops receive 18 hours of daylight during their growing period.⁹ With these “favorable conditions the bines can grow by up to 35 cm in a single day, but the average is about 10 cm.

The rootstock remains dormant during the winter months until April when shoots begin to grow. In May, leaves and bines form; the bines are trimmed until two or three remain and are trained to grow up the wire trellis in a clockwise fashion. “In about mid-June when the hops have climbed halfway up their trellises, the laterals start to grow. They grow from the axils of the main leaf and have the same structure as the main shoots.”¹⁰ Because the valued hop cones grow primarily on the laterals, their development is essential to good yield. The total length of the laterals can reach an astounding 110 m per plant. “By late June or early July the hops have reached the top of the trellises. They then flower, and after a flowering period of 3 to 4 weeks the cones form, mature and are ready for harvest.”¹¹ If the crop is harvested too soon, yields will

⁷ Barth, Klinke, Schmidt, 46

⁸ Ibid, 48

⁹ Ibid, 48

¹⁰ Ibid, 46

¹¹ Ibid, 47

be poor and their concentration of the bitter alpha acids undesirably low. Harvested too late and the cones tend to disintegrate and fade, which clearly implies poor quality.

Because the hops must be harvested quickly once they are fully matured, farmers grow a variety of different hops that mature at different points in the season so that the valuable cones don't rot on the vine.

Once the bines have been cut, the cones must be picked and dried, and today they are then converted to pellets and extracts that have a longer shelf life and a controlled homogenous quality. In 1994, the US exported hops in three forms: extract 61%, pellets 26%, and cones 13%.¹² Hop-picking machines have been in use in the US since 1878 and by 1968, all the hop growers of Germany were using these machines to great success.¹³ The processing of the hop cones requires extensive facilities that growers cannot afford on their own. This has led to the economic power of the merchants because the modern brewer requires these processed hops to ensure a homogeneous product as well as to prevent their equipment from jamming up due to the stems and leaves of the raw hops.

Our modern varieties of hops have been bred for distinct characteristics. Once solely a wild crop, it has been successfully domesticated and scientifically grafted to fight pests and diseases, and to produce higher yields and ratios of the acids which give the cones their value. Examples of risks to growers include *Peronospora*, a disease which causes the cones to turn brown and harden; Powdery mildew, which causes deformities of

¹² Ministry of Agriculture and Forestry, The, New Zealand, *International Market for Hops: International Trade in Hops and Hops Products*, Available online at: <http://www.maf.govt.nz/mafnet/rural-nz/profitability-and-economics/producer-boards/structure-of-hop-industry/hopmb002.htm>

¹³ Barth, Klinke, Schmidt, 56-57

the cones and Botrytis, which damages the tips of the cones is occasionally observed.¹⁴ One of the legendary hop varieties, Hallertau Mittelfruh is so susceptible to wilt disease that it is no longer cultivated on a large scale and has been replaced by new varieties.¹⁵ The hop grower must also combat pests such as the hop aphid, red spider mites, and the clay-colored weevil; however, there are strict laws determining the use of pesticides in the major hop growing countries of today. These diseases and pests as well as weather abnormalities can devastate yields and create world-wide shortages.

Every major hop producing country from Germany to China has created its own varieties to better cope with the environmental conditions encountered and the demands of their local brewing industries. For instance, Germany has always been known for the incredible varieties of aromatic hops that are required for the more delicate lagers that they have been brewing for centuries. When the variety Hallertau Mittlefruh proved to be too delicate, they cultivated new kinds of strong aromatic hops featuring large concentrations of alpha and beta acids such as Huller and Perle. More recently varieties known as Select, Magnum, and Tradition have been released, but these have been created to allow the German hop growers to compete with the ever increasing demand for varieties featuring very high bittering values that reflect the global consumer's change in taste.¹⁶ Varieties have been created to mature quickly, have higher yields, higher alpha and beta acid contents. Depending on the nation, hop breeders might be state institutions or private interests and academics. While these new varieties have their clear advantages, they have also made the market more volatile. The increasing trend is for growers to

¹⁴ Ibid, 54

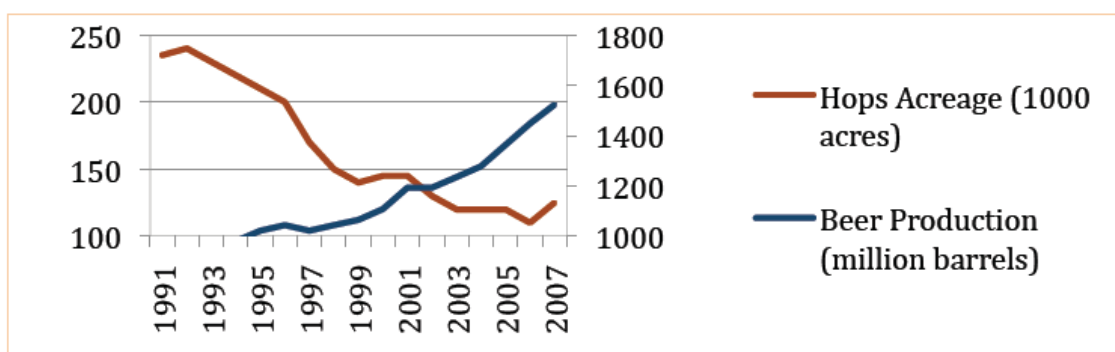
¹⁵ Ibid, 54

¹⁶ Ibid, 63

produce hop varieties with higher alpha contents as brewers require smaller quantities of these hops to attain their desired bitterness levels. As a result, hop acreage has been decreasing for the last 20 years as beer production has been steadily rising due to the cultivation of varieties with higher yields and higher concentrations of alpha acids as seen below.¹⁷ This has encouraged the further concentration of hop farmers which causes more extreme consequences to growers leaving the market for other crops as was experienced in 2007. The large average size of hop farms in the US has also heightened the consequences for brewers when growers leave the market.

Figure 3.1¹⁸

WORLD HOPS ACREAGE VS. WORLD BEER PRODUCTION



The growing patterns of hops further encourage the cyclicity of this market.

It takes 12 years to develop a new variety, from the first experiments to cultivation in the hop-growing region. And three more years – bringing the total up to 15 – elapse before the new variety produces a marketable quantity for harvesting, as young hops plants only produce their first full yield after three years.¹⁹

This development of varieties has been of great value to both brewers and growers as plants are now more resilient to the adverse effects of disease and pests, and contribute

¹⁷ Hamm, 2-4

¹⁸ Hamm, 3

¹⁹ Barth, Klinke, Schmidt, 65

increasingly to the demands of today's brewers and consumers. These developments also allow for breweries to have more flexibility in their brewing due to the availability of various substitutes for particular varieties of hops. However, because it takes three years for a hop crop to produce their full yields, when growers respond to the incentive of high prices, their contributions tend to overcorrect the equilibrium due to these increasing yields.

Commodities Markets

While commodities markets can range substantially in characteristics and cyclicity, there are some common themes that emerge. Due to the natures of different industries, there can be a wide variety in the barriers to entry. These can range from the time required for crops to fully mature to prevailing climate conditions and the assets required for cultivation and harvest. All of these variables affect the nature of the market; however, there are certain general characteristics that prevail across industries.

Cashin et al. conducted a study on the nature of world commodity markets. Their first conclusion was that commodity markets feature a cyclical behavior across the board, through the specific timing, severity and duration of the cycles varies across different commodity markets.

Empirical evidence has generated several stylized facts about real commodity prices: they are often dominated by long periods of doldrums punctuated by sharp upward spikes; they have a tendency to trend down in the long run [and] shocks in commodity prices tend to persist for several years at a time.²⁰

²⁰ Cashin, Paul C, John McDermott, Alasdair Scott, "Booms and Slumps in World Commodity Prices," *Working Paper of the International Monetary Fund* 99, no. 155 (November 1999): 3.

However, there are no overarching patterns to the lengths of these booms and slumps besides the fact that on average, “there is an asymmetry in commodity-price cycles, as the duration of slumps exceeds the duration of booms by nearly a year.”²¹ This discrepancy has direct implications for brewers. It is extremely difficult to accurately predict when these booms and respective slumps will occur because “the probability of a slump in prices ending is independent of the time already spent in the slump. This finding of no duration dependence in slumps also holds for most commodities in boom periods.”²² In the context of breweries sourcing hops, these characteristics of commodity price cycles imply significant difficulty for brewers in predicting future hops prices (more on this below).

Behind commodity price volatility in the hops market, and partially explaining the phenomenon, is what agricultural economists call the “cobweb effect.” The cobweb effect occurs in commodity markets that feature a lag time between aggregate demand and supply. An example is a crop that requires at least a season before producing a fully matured yield. A negative shock in prices initiates a pattern in the market that is dependant upon the relative elasticities of supply and demand. As seen below in figure 3.2, when the respective elasticities are equal, a rectangular pattern emerges from harvest to harvest due to the lagged response time between an event and the necessary market response. In other words, we start at Q1 P1 where price has been depressed because the market supply is quite large. Due to the depressed price, growers leave the market and in the subsequent harvest, the market supply is now at Q2, while the price has jumped to P2.

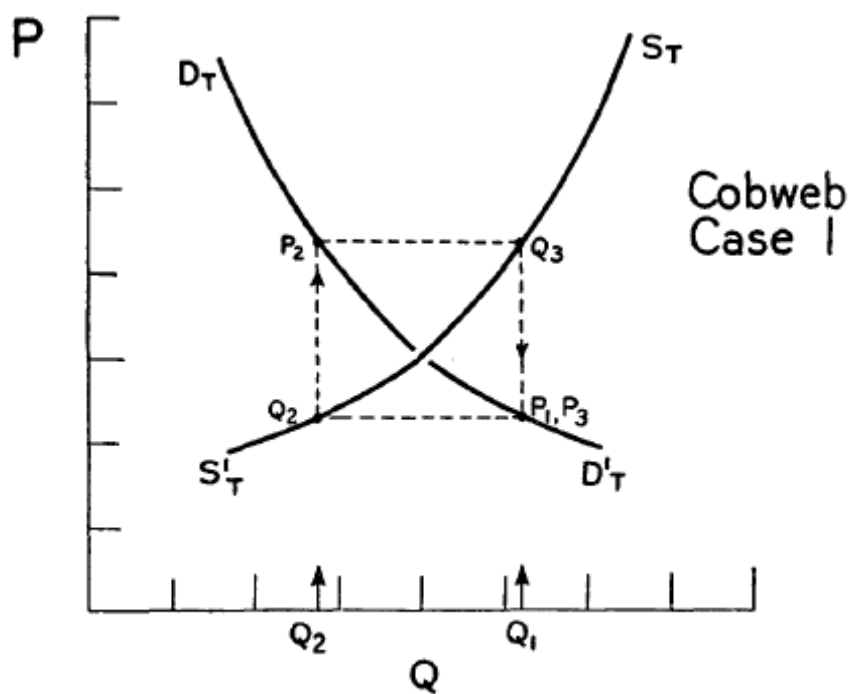
²¹ Ibid, 19

²² Ibid, 19

The high price then encourages an increase in production, moving the supply to Q_3 , and lowering the price to P_3 . Because P_3 is identical to P_1 , the cycle begins anew, and no market equilibrium is ever reached “as long as price is completely determined by the current supply and supply is completely determined by the preceding price.”²³

Figure 3.2²⁴

COBWEB MODEL



Two other patterns exist in the “cobweb model.” If the elasticity of demand is greater than that of supply, the market spirals towards equilibrium, instead of maintaining a consistent shape. In this case, an unexpected natural event initiates the sequence and after a period of time the market is back to equilibrium. The counterpart is observed if the elasticity of supply is greater than that of demand and thus initiates a pattern that

²³ Ezekiel, Mordecai, "The Cobweb Theorem," *Quarterly Journal of Economics* 52, no. 2 (1938): 263.

²⁴ Ibid, 262

constantly spirals outward. However it was subsequently found that the observed lengths of commodity cycles were longer than the model predicted.²⁵ While the Cobweb Effect is not an accurate tool for predicting market fluctuations, it does portray an accurate, basic explanation of commodity markets with a lag period.

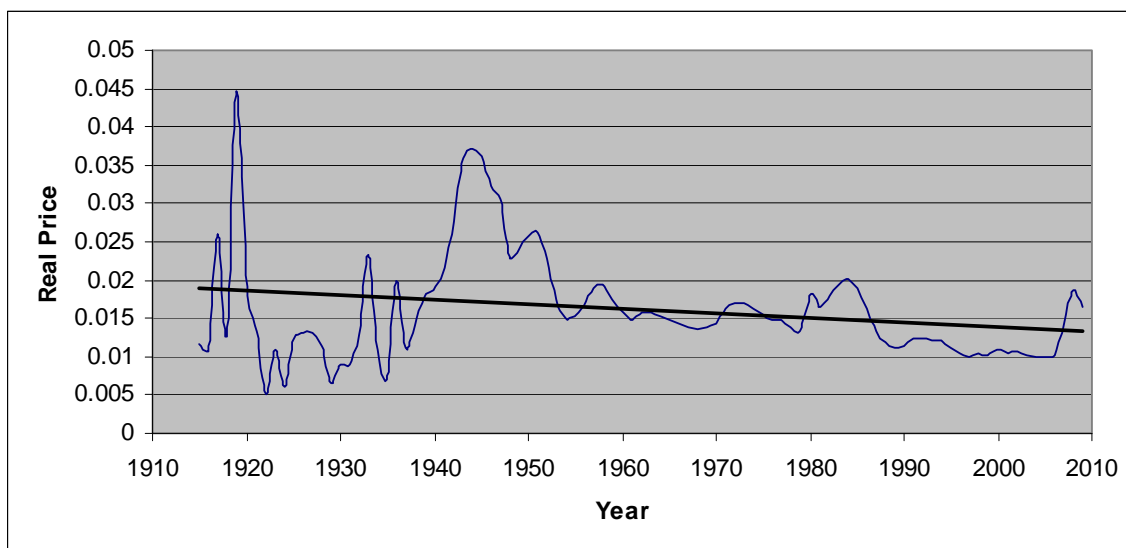
In regards to the hops market, as mentioned above, there is a three year lag between when a shoot is planted and when it produces its first matured yield. This lag has the potential to strongly affect the stability of the market by either flooding the market with hops or severely limiting the availability due to the high cost to brewers of a grower leaving the market. The inability to accurately predict market trends for hops necessitates supply chain risk management techniques that take the natural volatility of commodities markets into account in a practical way. For example, forward contracting can be used as an effective means of decreasing a firm's susceptibility to risk under certain conditions. However, brewers must use caution when negotiating contract terms due to the second commodities market conclusion from Cashin et. al. above: there is a persistent downward trend in the real value of commodities on the world market. Furthermore, Brown et al. observed that the prevailing downward trend in real commodities prices is also due in part to the prices for primary commodities falling with respect to that of manufactured goods in the global economy.²⁶ The implications of this trend for contracting will be discussed below.

²⁵ Pashigan, Peter B, "Rational Expectations and the Cobweb Theory," *Journal of Political Economy* 78, no. 2 (March/April 1970): 338.

²⁶ Brown, Oli, Alec Crawford, Jason Gibson, "Boom or Bust: How Commodity Price Volatility Impedes Poverty Reduction, and What to Do About It," (Winnipeg: the *International Institute for Sustainable Development*, 2008): 5.

Figure 3.3

AVERAGE REAL PRICE OF HOPS (1915-2009)



What does this mean for breweries? Figure 3.3 shows the downward trend of the average real price received by hops growers in the US since 1915. The price information was collected from the United States Department of Agriculture's (USDA) National Agricultural Statistics Service (NASS) division, and a consumer price index was used that was taken from the US Bureau of Labor Statistics with base years 1982-84. The hops price statistics are the annual average prices earned by farmers for hops in the years 1915 through 2009 in the US as found in the original data. The line of best fit clearly denotes a downward trend in the market. If the persistent shocks and associated volatility mentioned above hold true for the hops market, then it is further aggregated by the growth characteristics of hops.

The three year maturity of hops plants with regard to the "cobweb effect" means that producer reactions to booms in the price received for hops will produce a lagged increase in the supply of hops and subsequently increase the volatility that characterizes

commodities markets. The downward trend implies that it is disadvantageous for breweries to engage in long term price fixed contracts because the market price should eventually decrease below that of the initial time of the agreement. If the firm is a price setter, then there are still consequences to long term forward contracting. Laura Hansen, the lead hop buyer for MillerCoors in North America explains how she deals with this trend:

I've purchased hops now to 2015, I'll buy about the same amount but maybe a ten % [increase per year]. As it gets out further there are percentages, I might only have 40% contracted for 2014, and 20% for 2015, so there's a percentage that goes down, but I'll definitely be 100% contracted for the current crop year and [the] 2 following crop years.²⁷

By engaging in mid-term contracts with multiple actors, Hansen hedges risk inherent with dealing with one supplier plus ensures that merchants and growers know what she will expect year down the line.²⁸ This form of contracting is quite profitable for both the merchants/growers that she engages with as well as for her company; furthermore, it stabilizes the market by allowing ample time for growers to ensure that the supply she needs will be available. Hansen even sets “an increase each year to cover possible growing cost increases” despite the downward real trend in market price that is observed.²⁹

The Beer Industry:

²⁷ Laura Hansen, interview by author, Golden, Colorado, 22 February 2010.

²⁸ Ibid

²⁹ Ibid

The beer industry is a classic oligopoly which has recently been further concentrated due to the consolidation of MillerCoors. In 2003, MillerCoors and Anheuser-Bush controlled nearly 80% of the domestic market share for beer.³⁰ Both of these companies are under the umbrella of larger international conglomerates known as SABMiller, and Anheuser-Busch InBev; however, due to my focus on the domestic market I will focus on MillerCoors and Anheuser-Bush. These firms are the major players from these two conglomerates in the US and function at an autonomous level. Their market segment is slowly being marginalized, however, by what is being called the craft renaissance. In 1983 only 43 brewing companies operated in the US; in 1997 there were 1,273 breweries, surpassing Germany for the first time in at least two centuries.³¹ Today, there are 1,525 breweries, representing the highest domestic total in 100 years. “The craft brewing sales share as of December '08 was 4% by volume and 6.3% by dollars.”³² For a sense of scale, the entire market sold 210,619,000 barrels of beer in 2008. Total craft sales came in at 8,493,765 barrels which represents an output of RB’s at 5,749,556 barrels, contract brewers producing 1,161,583 barrels, MBs producing 886,494 barrels, and brewpubs producing 696,132 barrels.³³

What was the reason for this explosion? Consolidation on the parts of the LBs and a history of attempting to lighten the taste of beer gave birth to an exodus led by craft

³⁰ Rojas, 5

³¹ Carroll, Glenn R., and Anand Swaminathan, "Why the Microbrewery Movement? Organizational Dynamics of Resource Partitioning in the U.S. Brewing Industry," *The American Journal of Sociology* 106, no. 3 (2000): 716.

³² Brewers Association: *Facts*, Boulder, Available online at: <http://www.brewersassociation.org/pages/business-tools/craft-brewing-statistics/facts>

³³ Brewers Association: *Beer Sales*, Boulder, Available online at: <http://www.brewersassociation.org/pages/business-tools/craft-brewing-statistics/beer-sales>

brewers who run small transparent enterprises. By focusing on enhancing the taste of their beer to the upmost using traditional brewing methods, these brewers created a market segment that is loyal and represents a growing demand. It's a segment dominated by a myriad of self proclaimed experts, through which information travels fast, ascertaining the legitimacy of brewers across the map.³⁴

The movement can be well encompassed by a statement made by Fritz Maytag, of Anchor Brewing out of San Francisco, one of the oldest of the MBs: "most people won't like our beer."³⁵ The craft beer industry is focused on consistently capturing more of the stagnated domestic beer market by emphasizing quality, ingenuity and a diversity of product offerings. The LBs have attempted to break into this growth market to limited success.

One matter that has proven especially problematic for the major breweries is their identity as large mass producers. Miller Brewing's president and chief operating officer notes that 'research says 30 percent of consumers will not buy an Anheuser Busch product, and another 30 percent will not buy a Miller product. They think that all [products brewed by a particular brewery] taste the same, and [their] mind is closed.'³⁶

While large brewing companies certainly have the ability to make strong tasting specialty beer, the market is resistant due to their size and typical brewing methods. "Identity problems of the kind faced by mass-production and contract brewers emanate from questions of legitimation [sic]: aspects of these organizational forms conflict with specialty brewers claims about tradition and authenticity."³⁷ Due to the incredible success of the craft segment, some Micro Brewers increased the scale of their operations

³⁴ Carroll, Swaminathan, 731-732

³⁵ Ibid, 731

³⁶ Ibid, 727

³⁷ Ibid, 733

to attempt to increase their distribution networks, riding the tide of this growth market; their efforts gave way to the birth of the Regional Brewers whose growth and sustainability is a testament to this niche market's prominence.

Hypothesis

Because of variations in size, breweries of different kinds will have to use different hops sourcing strategies. The techniques and strategies that a LB can pursue are not necessarily available to the RB, or the MB. Differences in size translate into advantages in terms of market power, asset and revenue levels, recognition and credibility, and abilities to access credit markets and specialized staff. It is my hypothesis that the differences in sourcing strategies originate from the variations in size and scale among brewers and their relative powers of negotiation in the market. Through time and energy spent on the negotiation of supply chain details, breweries, on a level relative to their size and output should be able to substantially influence their options and prices in their supply networks. Furthermore, the availability and prices paid for hops will on average reflect the annual output of the breweries. Below I discuss each of these in turn.

Discussion

The most immediately pertinent advantage of size is market power. Due to the levels of production exhibited by LBs and the nature of oligopoly, their needs in terms of raw materials such as hops are extraordinarily large and this is reflected in their interactions in the market. As an example, MillerCoors produces over 5 million barrels per year, compared to Bristol's 7,500. The business that the LBs represent is very

attractive to hop merchants and growers, who will be willing to lower their margins in order to guarantee the sale due to the volume that is negotiated. The hops supply network is interesting because it features both an oligopoly manifested by the LBs, and an oligopsony controlled by the hop merchants as dictated by the size of the brewers in question. I believe that MBs and RBs are largely at the mercy of the merchants and thus take part in an oligopsony, while the LBs can exert enough power over the merchants that for the LBs, the market outlook is that of an oligopoly. An oligopoly is defined by an environment in which: “a particular market is controlled by a small group of firms. An oligopoly is much like a monopoly, in which only one company exerts control over most of a market. In an oligopoly there are at least two firms.”³⁸ The counterpart, oligopsony is an environment “similar to an oligopoly (few sellers), this is a market in which there are only a few large buyers for a product or service. This allows the buyers to exert a great deal of control over the sellers and can effectively drive down prices.”³⁹ Examples of oligopsony include the fast food chain industry, where companies such as McDonalds control the meat market and have substantial power over the market price for meat, as well as the labor and animal rights standards.⁴⁰

The interaction between the LBs and the merchants in the hops supply network is interesting because both groups control substantial aspects of the market from setting the price to the world supply of hops. The respective market powers of these actors will be examined in depth in chapter 5. RBs are quite large and have stronger market power than

³⁸ Dictionary.com, *Financial Dictionary: Oligopoly Definition*, Available online at: <http://dictionary.reference.com/browse/oligopoly>

³⁹ Dictionary.com, *Financial Dictionary: Oligopsony Definition*, Available online at: <http://dictionary.reference.com/browse/oligopsony>

⁴⁰ Ibid

the MBs, who, due to their size of operations and hop orders, find themselves at the bottom of the food chain for procuring hops. With regard to price, I believe that due to their size, LBs will be price setters, and MBs price takers; however, the position of the RBs is not as clear. If we compare it to the fresh produce industry that was analyzed in chapter two, the small and even the medium sized exporters and growers in that market were marginalized due to the size and capabilities of the larger exporters/growers. Recall that large exporters and growers could afford to adapt to the changing market environment faster and invest in the necessary assets to diversify their competencies.

The fresh produce example is of course from the supplier's end of the market; however, the situation is comparable in that small and medium sized firms experience difficulty reaching the markets and materials that they require due to the size of their operations. In times of shortage in the hops market, the LBs and RBs have priority over the MBs due to the relational ties between growers/merchants, and their mutual desire to conduct more business in the future. As Laura Hansen of MillerCoors states:

Most brewers will just ask for a quote and get a price from the merchants and pick the best price, but in my case we purchase a little differently where I know the cost that goes into growing because I have that relationship with growers, and I know what their fertilizer costs are and I know what the market price is, I know what the market demand is, so I set the price. So if I need Hersbrucker hops from Germany, I'll go to the HVG, which is the growers coop, Barth and Steiner, and say this is the amount I want and this is my price, do you accept it or not?⁴¹

It is my hypothesis that the cost and availability of hops that the multi-tiered brewers negotiate will directly reflect their size. LBs will pay less for their hops for two reasons: market power that is reflected in the negotiations, and the sheer volume that they require. Merchants are willing to settle on lower than average prices due to the net profit that business with the LBs entails. The sales order is so large that even at a lowered

⁴¹ Hansen, Interview

margin, the merchants still do quite well; the merchants can also better gauge the volumes of hops that they will require for the subsequent duration of the contract which allows them to better control the natural volatility of the market. On the other end of the spectrum, when MBs attempt to contract, the merchants take an opportunistic stance in that they are very much the price setters in this relationship. There are not that many merchants for MBs to do business with and this allows them to take advantage of the small sales orders of the microbrewers by charging a premium or beyond premium price because the MBs must procure the hops they need for their daily operations. Therefore, in a shock year such as 2007/2008, the merchants have so much power over the MBs, particularly those attempting to form new contracts, that they can negotiate terms which are in the merchants favor and can have repercussions for years.

As an example, I made a business plan for an organic MB in Colorado Springs for an Entrepreneurship class. I inquired into the price paid for organic hops by a RB that must remain anonymous. The price that the RB reported was \$7.50 less per pound than the figure the MB was quoted at. If this happens on a regular basis, MBs consistently pay higher prices for their raw materials than do the RBs and LBs, and this clearly affects their bottom line. This is an example of the opportunism in pricing dynamics that MBs face in dealing with merchants and growers, exclusively due to the market power of the merchants.

Another advantage of size is the difference in scale of revenue streams and assets. With higher revenue streams, companies can more readily adapt to the changing requirements of their supply chain, and adjust their capabilities and core competencies. For reference, a company's core competencies are the functions that they do most

efficiently and profitably. As an example, the total revenue of Anheuser-Busch InBev as of 12.31.09, comes in at \$36,758,000,000, while the Boston Beer Co, a large RB has a total revenue of \$415,053,000 as of 12.26.09.⁴² Their total assets are worth \$112,525,000,000, and \$262,936,000 respectively in the same time period.⁴³ An example of the advantages to these differences can be found in the fresh produce example from chapter two. There is a tremendous barrier to entry formed by the changing requirements of the UK supermarkets upon their importers/exporters. The increasing emphasis on the importation of finished goods has required that exporters develop the facilities and capabilities to achieve the quality standards dictated by the supermarkets. Only the largest exporters can afford to purchase assets that meet the required standards of hygiene and efficiency; as a result, the smaller exporters don't get considered due to their lack of such capabilities. Exporters must be able to produce "a variety of packaging and product presentations, ranging from loose produce (just one case), to cellophane wrapped, trimmed produce in trays, vegetables prepared and ready to cook, and combinations of vegetables in one tray."⁴⁴ African exporters must now be able to not only clean and trim, but package, bar-code and label the produce as well.⁴⁵ Exporters must have costly cold storage facilities because every hour that the vegetables are

⁴² Mergent Online, *Anheuser-Busch InBev, the Boston Beer Co*, Available online at: <http://0-www.mergentonline.com.tiger.coloradocollege.edu/compsearchresults.asp?searchtype=compname&searchtext=Anheuser-Busch+InBev&codetype=sic&industrycode=&Index=null&country=null&bstype=text>

⁴³ Ibid

⁴⁴ Dolan, Catherine, John Humphrey, Carla Harris-Pascal, "Horticulture Commodity Chains: The Impact Of The UK Market On The African Fresh Vegetable Industry," *Journal of Development Studies* 37, no. 2 (December 2000) 13.

⁴⁵ Ibid, 20

subjected to the African heat, they lose eight hours of shelf life.⁴⁶ Large exporters have invested in state of the art washing facilities that feature cooled, chlorinated water.⁴⁷

Dolan et al. state:

Further investment is required if exporters wish to move into high-value-added activities such as ready-prepared vegetables and salads. These require 'high care' facilities that meet European hygiene regulations. One importer estimated that it would require an investment of US \$500,000 to set up a processing unit for such products.⁴⁸

Relating this to brewers, LBs and RBs can afford to spend some of their revenue stream on technologies and staff that will focus exclusively on raw materials procurement and maintaining optimal supply chain efficiency. As an example, both New Belgium and MillerCoors have large warehouses to store their raw materials for extended periods of time, which decreases their transportation costs and optimize the efficiency of their operations. By contrast, the smaller revenue streams of the MBs make up-front purchases for a season's worth of raw materials an impossibility, eliminating their ability to use a sourcing strategy that MillerCoors considers a strategic advantage. Laura Hansen purchases all of the hops that MillerCoors uses in a year in one upfront payment. This is an advantage because "if you're buying [hops] from the grower, you have to pay for it once per year, and we're set up where we can do that."⁴⁹ Furthermore, she believes that it makes the process easier in general.⁵⁰ Smaller breweries might not have the capital available to invest in such a fashion, putting them at risk of not procuring the

⁴⁶ Ibid, 25

⁴⁷ Ibid, 25

⁴⁸ Ibid, 26

⁴⁹ Hansen, Interview

⁵⁰ Hansen, Interview

necessary hops an exposing them to potential price risk over the course of the production run.

Additionally, size could also affect a firm's ability to access credit markets, which may further reduce the cash on hand that MBs exhibit, limiting their ability to engage in such bulk hops purchases. In the UK fresh produce market discussed above,

exporters that wish to source part of their output from smallholders face a number of well-known problems that exist irrespective of the markets being supplied. These include the need to provide credit at interest rates affordable to small farmers, loan defaults and side selling (i.e. selling produce to buyers other than the provider of credit and inputs).⁵¹

Access to credit can affect a firm's ability to invest in the assets that will allow them to move into new markets or compete better in their existing one. Differentiated capabilities can allow a firm to increase both their market share and net profitability. If this is the case, costs will be higher on a relative scale due to the various fees associated with making smaller more frequent purchases, staggered payments, or paying interest on loans.

Differences in size can affect the ability of brewers to access forward contracts due to perceived credibility and recognition. Typically, new breweries start on a small production level; if a merchant or grower doubts their ability to survive the time period specified in a contract, they will not be willing to forward contract with the firm. During the price shock of 2007/2008, company's relationships with their merchants played a substantial role in guaranteeing access to the hops that they required. Mike Bristol of the Bristol Brewing Co, a MB, explains:

We've used Hopunion for 15 years now and we try to play on that. When there were all these issues a couple years ago where certain guys weren't getting hops, I called them up and I said 'hey, I know we're not your biggest account, but we've also been doing

⁵¹ Ibid, 29-30

business with you for 15 years, so I really do expect to have a certain amount of seniority when you're allocating certain hops, and I think the same on pricing.⁵²

Furthermore, Bristol goes on to say that he thought how Hopunion had dealt with the shock had been fair due to the existing relationship that they had with the merchant; "But had I, at that same point in time, started calling up other suppliers [...] my guess is they would probably not have been terribly excited about [a new contract] because they were still trying to take care of their existing customers."⁵³ The lack of an existing relationship prohibited the access of brewers to the forward contracting risk management tool and exposed firms to the volatility of this commodities market. Hansen explains that "the brewers that were going to get their hops were the brewers that had a contract."⁵⁴ On the other side of the spectrum, SABMiller is the second largest brewing conglomerate in the world and their name is known and respected by the merchants. Their business is desired and all they have to do is express their interest in a particular contract and they will find a taker. "From a growers point [of view], to have a Coors direct contract and an Anheuser-Busch contract was the best, was like gold to them."⁵⁵

Finally, variations in the sizes of breweries affect their ability to hire specialized staff. New Belgium and MillerCoors both have employees whose sole responsibility concerns raw materials sourcing, from general procurement to gathering market information and forecasting. As an example, Laura Hansen leads a team of 12 that meets once per month and discusses the hops market environment, including the latest on new

⁵² Mike Bristol, interview by author, Colorado Springs, Colorado, 25 march 2010.

⁵³ Ibid

⁵⁴ Hansen, Interview

⁵⁵ Ibid

breeds of hops, and forms a long-term plan that depicts their strategy in the years to come.⁵⁶ MBs cannot generally afford to spend what money they have on such highly specialized employees as they are trying to keep their costs at an absolute minimum in order to compete in the market. This lack of information could lead to poor supply chain management decisions that will ultimately raise costs and decrease the profitability of the brewer. If MBs could develop a strategy to increase their knowledge of the market, they would experience direct cost saving advantages.

Conclusion

It is my hypothesis that the supply chain risk management strategies that are used effectively by LBs are not available to the MB due to the extraordinary difference in scale. RBs bridge the gap due to the extent of their assets and higher revenue streams; they can afford to improve their capabilities and output to compete directly with the LBs through their emphasis on higher quality. The subsequent chapter will design a framework through which my hypothesis will be tested.

⁵⁶ Ibid

CHAPTER 4

METHODOLOGY

The purpose of this thesis is to explore the world of hops from the brewers' perspective and answer two questions: how do brewers successfully minimize risk in their supply chain, and can these strategies be improved or replicated by other breweries of different sizes? As explained above, the price of hops can have a direct effect upon the price of the finished product of our brewers. Research has not been done or at least made public on the supply chain management techniques of domestic brewers; however research on similar commodity chains sheds some light upon the opportunities of the variously sized breweries.

This chapter will examine the strengths and weaknesses of a variety of research methods, and analyze the medium that I chose. My design and the population chosen will also be explored in depth to explain my logic and create an operational definition of my study that allows for reproduction and further research possibilities.

Research Methods

When one is confronted by a question, there exist a myriad of different methods from which to choose in order to explore the unknown. These different methods all have intrinsic strengths and weaknesses, and a niche in which they might be able to explain more than any

other possible method. There are two main categories of research though most methods use facets from both: Description and Validation.¹ Description is qualitative in its nature, while validation is quantitative. Every method can be discussed in terms of its position on the continuum between purely qualitative and quantitative research. An understanding of the nature of these two basic methods allows us to better analyze existing methods. The subsequent table portrays the basic characteristics of both.

Table 4.1²

QUANTITATIVE VS. QUALITATIVE RESEARCH

Quantitative Research	Qualitative Research
<p>Assumptions</p> <ul style="list-style-type: none"> • Social facts have an objective reality • Primacy of method • Variables can be identified and relationships measured 	<p>Assumptions</p> <ul style="list-style-type: none"> • Reality is socially constructed • Primacy of subject matter • Variables are complex, interwoven, and difficult to measure
<p>Purpose</p> <ul style="list-style-type: none"> • Generalizability • Prediction • Causal explanations 	<p>Purpose</p> <ul style="list-style-type: none"> • Contextualization • Interpretation • Understanding actors' perspectives
<p>Approach</p> <ul style="list-style-type: none"> • Begins with hypotheses and theories • Manipulation and control • Uses formal instruments • Experimentation • Deductive • Component analysis • Seeks consensus, the norm • Reduces data to numerical indices • Abstract language in write-up 	<p>Approach</p> <ul style="list-style-type: none"> • Ends with hypotheses and grounded theory • Emergence and portrayal • Researcher as instrument • Naturalistic • Inductive • Searches for patterns • Seeks pluralism, complexity • Makes minor use of numerical indices • Descriptive write-up

¹ Krathwohl, David R, 2nd ed. *Methods of Educational & Social Science Research: An Integrated Approach*, (New York: Addison-Wesley Educational Publishers, Inc., 1998), 25.

² Glesne, Corrine, Alan Peshkin, *Becoming Qualitative Researchers: An Introduction*, (White Plains: Longman, 1992),

Table 4.1-Continued

Researcher Role	Researcher Role
<ul style="list-style-type: none"> • Detachment and impartiality • Objective portrayal 	<ul style="list-style-type: none"> • Personal involvement and partiality • Empathic understanding

Further characteristics of descriptive, qualitative methods include case studies, hands-on exploration featuring verbal description of an environment, and unstructured and spontaneous data collection with little treatment.³ The opposite side of the spectrum, validation through quantitative research methods, features controlled experiments often concerned with the verification of an explanation. This will often take place in a laboratory featuring measurements and statistics; the study is carefully planned and structured.⁴

This of course represents a continuum on which many methods exist. Krathwohl holds that survey research is directly in the middle of this spectrum, featuring characteristics of both description and validation-based studies, dependent on the research and the researcher themselves. Survey research can be either exploratory or explanatory, or both, and the same goes for verbal description vs. measurement and statistics. Questionnaires are carefully planned, while interviews may not be.⁵

Other research methods include action research that attempts to create a solution to a practical problem, classification schemes and theory building that results in an effective syntax with which to analyze and organize an existing phenomenon. Evaluation studies attempt to answer an applied question in value or worth while experimentation follows a quantitative, controlled approach to validate a hypothesis. Historical research can be either

³ Krathwohl, pg 26

⁴ Ibid, 25

⁵ Ibid, 26

qualitative or quantitative and attempts to create a hypothesis through the analysis of past events; longitudinal studies have a very long duration and examine the effect of time upon an independent variable. Meta-analysis combines several quantitative studies into a single conclusion, and single-subject studies follow one subject through time as an indication of a larger situation.⁶

Empirical research is “the less glamorous craft of examining factual and material evidence and sense data to develop descriptions, measurements, comparisons, and tests of hypothesized relationships that are themselves part of the speculative side of scientific work.”⁷ Empirical work is based on first hand data gathered by the researcher themselves, or by analyzing existing data sets in a creative way, because creativity is the cornerstone of empirical research. Every empirical study is creative to some extent or another, though all must include this characteristic.

In summary, qualitative research aims to uncover the complex relationships between actors in an environment in an effort to understand the independent actions of different parties. Quantitative research aims at creating a generalized solution that explains and validates an existing hypothesis. Both qualitative and quantitative research have their advantages and disadvantages; however studies are the strongest and most complete when they contain aspects of both. I have attempted to create a holistic study that describes an occurring situation and validates my hypothesis. In the subsequent sections I will describe the details of my study, and the theory behind my actions.

⁶ Ibid, 28-31

⁷ Simon, Julian L, *Basic Research Methods in Social Science: The Art of Empirical Investigation*, (New York: Random House, 1969), 5.

The Medium

To study the supply chain risk management techniques utilized by domestic brewers, I have chosen to use a nationwide survey and a series of three interviews. The nature of the questions asked in both the survey and the interviews aim to unearth the nature of the dichotomy between the risk management strategies used by LBs, RBs and MBs, and create a framework with which to create meaningful conclusions and possible strategies for brewers to pursue in the name of greater profitability.

In combining a survey with a series of interviews I have created an empirical, qualitative/quantitative analysis of the brewer's environment with respect to their supply chain for hops. By using this approach, it is my intention to capture the nature of the differences in successful supply chain risk management strategies and the inherent barriers through the words and experiences of the brewers themselves, theoretically fostering a dynamic understanding of the supply chain through the positions of the multi-tiered brewers.

It is my opinion that by including aspects of both qualitative and quantitative research methods I have created a study that can effectively both describe an existing market condition and validate my hypothesis. The interviews were largely qualitative and thus descriptive in nature. It was my goal to give the interviewees the opportunity and incentive to explain the environment in which they exist and how it is affected by the market for hops. My surveys featured many multiple choice questions of a quantitative nature with the aim of creating a more scientific understanding of the barriers that exist and how the multi-tiered breweries successfully interact with the sometimes much larger forces in their supply chain.

Population

My research design combines a series of three interviews and a survey sent out to 895 domestic brewers via SurveyMonkey. I conducted the interviews with a LB, a RB and a MB. These breweries were chosen out of convenience due to feasibility. The MB was the Bristol Brewing Co in Colorado Springs. I had held a business management internship at the brewery and Ken Andrews, Bristol's micro-biologist helped me to get interviews with MillerCoors, a LB, and the New Belgium Brewing Co, a RB.

For the survey, I received contacts from two sources. I borrowed a copy of the *2009-2010 Brewers Resource Directory* from the Bristol Brewing Co, and sent an email to every brewer who supplied an email address. I also received a contact list from Ali Hamm, a graduate of Colorado State University's horticultural masters program. She had compiled a survey of hops usage in Colorado several years ago to great success, and her contacts were extremely helpful. Then in response to requests to forward the survey I sent another five emails beyond my initial contacts for a total of 895 surveys. Therefore my population is the brewers in the *Brewers Resource Directory*, and my sample are those breweries that supplied an email address.

Research Design

As mentioned above, my research design comprises a series of three interviews and a national survey. I will describe the goals and details of the interview questions, and then describe the survey in a similar fashion.

The interviews are comprised of a short background questions followed by a series of qualitative questions aimed at understanding the procurement practices of these multi-tiered

breweries, and how the companies weathered the financial storm of 2007/2008. The first set of background questions seeks to classify the brewery more accurately while the latter, more quantitative questions attempt to get an objective sense of the relationships between these three varied breweries and their suppliers.

I continue with broader questions aimed at understanding the positions of these breweries in their markets and supply chains. First I try to understand the relative ease with which these companies procure their hops and how exactly they negotiate the market. These questions attempt to gauge the advantages of size in the market place and learn which strategies are most effective for the various companies. The following questions examine the firms' positions in their markets and the relative strength of their supply chains. Questions 6 & 7 in the broader section attempt to explain the barriers and obstacles that prohibit the implementation of the companies' ideal hop procurement systems. The concluding questions pry into how the flow of hops is orchestrated. I wrote two optional questions to be asked if they were not previously addressed. These address leadership in the company and whether the firm uses an advanced planning system to coordinate the flow of hops. The questions asked are replicated in the table below.

Table 4.2

INTERVIEW QUESTIONS

General Questions:	
Classification	<ol style="list-style-type: none"> 1. Brewery name 2. Location 3. Types of beer brewed (average #) 4. Size of operation (barrels per year) 5. Consumer base (national/regional/local) 6. Number of employees

Table 4.2-Continued

Supplier Relationship	<p>7. Types of hops required for operations (average #)</p> <p>8. Quantities used per barrel (weight in lbs)</p> <p>9. Number of hops suppliers</p> <p>10. Location of hops suppliers</p> <p>11. Location of hop fields</p>
Broader Questions:	
Hops Procurement Practices	<p>1. Is sourcing hops a problem for your brewery? Why? Is it a constant problem? Intermittent one?</p> <p>2. How do you procure your hops (forward contracts/vertical integration/spot market)? Have you always conducted procurement this way?</p> <ul style="list-style-type: none"> • If contract: Fixed price/flexible price and how is this negotiated? Measured in acreage/weight/alpha content? How is the length of the contract determined? When do you engage? Do you contract with merchants or growers? • If vertical: How many acres do you own? How is it cultivated? How are the growers paid (salary/weight/alpha acids/hourly wage)? Is it sufficient for the needs of the company? In the event of a surplus or shortage, how is that compensated for/sold?
Market Position	<p>3. Who are your biggest competitors?</p> <p>4. How have your competitors been managing their hop supplies? Have their methods been successful?</p> <p>5. Does your supply chain create competitive advantage for your company with respect to your competitors? How?</p>
Obstacles & Barriers	<p>6. In an ideal world, how would you set up your hops procurement system?</p> <p>7. What obstacles exist to implementing such a system? Are there procurement strategies that are unavailable to a brewery of your size?</p>
Material Flow	<p>8. How do you manage your hop supply (inventory/just in time)?</p> <ul style="list-style-type: none"> • Just in time: Who is responsible for maintaining appropriate levels? <p>9. How does your master brewer(s) know what and when to brew (schedule/direction from upper management)?</p>
Optional Follow-up	<p>10. Is there a central leadership figure or group in the company?</p> <p>11. Do you use an advanced planning software system?</p>

The survey questions were largely based on the interview questions; however, they were adjusted to better suit the survey format. As an incentive for participation, I offered electronic access to everyone who took my survey. The survey questions feature most of the

goals of the interviews. The general information section creates an objective classification of the brewery through basic quantitative questions. The hops usage section explains how the breweries use and source their hops on a basic level including price information. The hops procurement section allows for a classification of effective sourcing strategies by having breweries describe their procurement strategies and their respective levels of success. The forward contract segment applies to breweries that engage forward contracts and uncovers how the contracts negotiated. Most breweries engage in forward contracts, even those that did not before the 2007/2008 harvest are currently engaged in contracts due to the actions of the hops merchants. The forward contract information can be classified by its ability to satisfy the needs of the firm and thus successful supply chain management strategies can be analyzed. The market obstacles section allows brewers to describe the difficulties that they face in the market, and what they would prefer. The follow-up questions are administrative so I can pursue interesting answers and effectively circulate my completed thesis. The survey questions are replicated in the table below.

Table 4.3

SURVEY QUESTIONS

General Information	<ol style="list-style-type: none"> 1. Brewery Name 2. Location 3. Number of different beers brewed per year (average #) 4. Output (barrels per year) 5. Consumer base: national/regional/local (multiple choice, one selection) 6. Number of employees
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Table 4.3-Continued

Hops Usage	<ol style="list-style-type: none"> 1. Number of different hops varieties used per year (average #) 2. Average weight of hops used per barrel (in lbs) 3. Number of hops suppliers 4. Average price paid per pound of hops (in dollars)
Hops Procurement	<ol style="list-style-type: none"> 1. Sourcing hops is a problem for your brewery: never/sometimes/often/constant/other-open response (multiple choice, one selection) 2. How do you typically procure your hops: spot market/forward contracts/company owned farms (multiple choice, multiple selections) 3. Is your usual method of procurement meeting the needs of your organization: yes/no (multiple choice, one selection)
Forward Contracts (only answered if forward contracts was selected in the hops procurement section)	<ol style="list-style-type: none"> 1. Do you engage with: merchant companies/growers/other breweries (multiple choice, multiple selections) 2. Average term of contract (in years) 3. How is price determined: fixed/forward market price at the time the contract is signed/time sensitive forward market price/formulated (multiple choice, multiple selections) 4. (If fixed) price is set by: merchant or grower/brewer/settled through discourse (multiple choice, single selection) 5. (If formulated) how is the rate calculated? Is it set for the duration of the contract, or does it adjust with variables (open response)
Market Obstacles	<ol style="list-style-type: none"> 1. Who are your biggest competitors: large brewers/regional brewers/microbrewers/brew pubs (multiple choice, multiple selections) 2. In an ideal world, how would you set up your hops procurement system? What obstacles, if any, exist prohibiting you from implementing such a system? (open response)
Conclusive Information	<ol style="list-style-type: none"> 1. Are you available to answer follow-up questions about your responses: yes please call me at/yes, please email me at/no thanks 2. Email address at which you would like to receive access to my completed work in may

The quantitative nature of many of my survey questions will allow me to compare and contrast the effect of my variables on price in an effort to better understand the factors that contribute to prices paid for hops by the variously sized breweries. As this thesis is primarily descriptive in nature, I will use my data to take averages and compare the responses from the multi-tiered breweries in an attempt to gauge the effects of the various sourcing strategies and size on price.

Conclusion

These questions and their respective responses will allow me to paint a realistic picture of the brewers' world, the difficulties they face in managing their supply chains and the risk management techniques that have been successful.

CHAPTER 5

RESULTS AND DATA ANALYSIS

The interviews conducted with the Bristol Brewing Co, the New Belgium Brewing Co and the MillerCoors Brewing Co confirmed most of my hypothesis. The data collected from the survey imply differences in both the availability of hops and the price paid for hops by the multi-tiered breweries. Below, I will systematically discuss the results of my interviews and survey with respect to the hypothesized sources of necessitated variety in procurement strategies in the order of: market power, assets and revenue which I will tie to access to credit markets, recognition and credibility, and specialized staff.

Market Power

I will discuss the results of market power on the negotiating powers of brewers and implications for price, moving from LBs to MBs systematically. It was hypothesized that the price paid for hops is directly proportional to the size of the brewery. As observed in chapter 3, Laura Hansen the hop buyer for MillerCoors stated that she sets a price that she believes is fair for the merchants and growers and then sends that price to several merchants and coops that can provide her with the quantities and varieties that she requires. When asked if sourcing hops was ever a problem for her and her company she

responded “No, not at all. It never has been, even when there was a shortage a couple years ago.”¹ Due to the size of MillerCoors, she has the power to set a price that is sustainable and in years of surplus the company chooses not to stock up because “if you stock up then you’re going to be shorting them in the future. You’ll have to short them eventually, so really for us it doesn’t work out.”² MillerCoors is in a position where the amount that they procure affects the market to the extent that they would rather pay the low prices that they set and make strides to stabilize the market and their supply than to take advantage of low prices in surplus years. If they stocked up substantially in a surplus year, it could cause a supply shock the subsequent year if hops cannot be sold at the market price due to growers exiting the market.

New Belgium hasn’t had trouble in procuring the hops they need. When asked if there were any barriers to sourcing hops in a situation such as the shortage years of 2007/2008, Zach Baitinger, the hop buyer for New Belgium replied: “I don’t think so. As long as you’re willing to pay for them, I don’t really think there’s a barrier there.”³

Furthermore, Baitinger continues:

we can get the hops we need when we need them. We’re bigger than Bristol, but smaller than Miller[Coors], so there are price advantages to being our size; not as big as they are for Miller, but there are some advantages. It’s just hard right, it’s great to capitalize on buying hops when prices are low, but if you don’t have a home for them it doesn’t do you any good. You can make adjustments, but if you make too many adjustments then your customers notice. I think our goal is to be consistent, and maybe our raw material prices do this [waves his hand] but I think that’s to be expected.⁴

¹ Hansen, Interview

² Ibid

³ Zach Baitinger, interview by author, Fort Collins, Colorado, 10 March 2010.

⁴ Ibid

In contrast to MillerCoors, a LB, New Belgium, a RB, is a price taker that engages in forward contracts whose price is fixed at the forward market rate at the time the contract is signed.⁵ The RB has no trouble procuring the hops they need in shortage years, as long as they are willing to pay the increased rate dictated by the market, but availability is not a problem due to the market power they command as dictated by their size.

In contrast to the RBs, Bristol, a MB, is more susceptible to market fluctuations. In the midst of the shortage, the medium-term availability of the hops the firm needed was in question. “One of the problems that we’ve had and a lot of other brewers had is that when everything went crazy we just wanted to make sure that we got our supply.”⁶ The consequences of brewer’s reactions to the shortage, was a tendency to overestimate the volume that they required. Many brewers are now locked in at contracts well over the spot market prices for volumes of hops that they don’t need and can’t use.⁷⁸ With respect to relative prices, Bristol continues:

I honestly don’t know what New Belgium is paying for hops, or Odell, or Coors for that matter. I know it’s significantly cheaper than us. [...] I could find out for breweries that were publicly traded, I could find that out. I could find out for Red Hook, I could find out for Sam Adams, if I really wanted to know. I could find out their cost per barrel just because they have to report that. I wouldn’t be able to tell exactly what they’re paying for hops but I could get an idea based on their costs; but it’d probably just depress me, so I’ll just keep rolling the way we’re doing it. [Laughs]⁹

During the hop crisis of 2007/2008, Bristol had difficulty securing the exact varieties that they wanted and typically used. This scarcity resulted in changes to their recipes, affecting the consistency of their beers. “When everything went crazy a couple years

⁵ Baitinger, Interview

⁶ Bristol, Interview

⁷ Ibid

⁸ Hansen, Interview

⁹ Bristol, Interview

ago, there were certain hops that they couldn't get us and we had to make some substitutions. [...] They were upfront about [saying] 'hey, we're going to have some problems here but here's what we can do otherwise.'"¹⁰ In summary, the Bristol Brewing Co is a price taker and the availability of hops is not guaranteed in adverse years. The relationship between output and average price paid for hops is seen in the figures below. 13 of the breweries in figure 5.1 are RBs while 74 were MBs. The graph features extreme discrepancies due to factors such as the different contractual details concerned with fixed vs. flexible forward market prices, the lack of forward market involvement, the number and nature of the suppliers engaged with. However, this graph nicely portrays the wide variations that brewers pay for hops and further strengthens the reality of the need for careful attention to supply chain management. Figure 5.2 displays the difference in average prices paid for hops between MBs and RBs as reported by the respondents to my survey. This difference comes in at \$1.26 per pound of hops which is a substantial amount when it is multiplied by the volume of hops that breweries use in a year.

¹⁰ Bristol, Interview

Figure 5.1

THE RELATIONSHIP BETWEEN OUTPUT AND PRICE

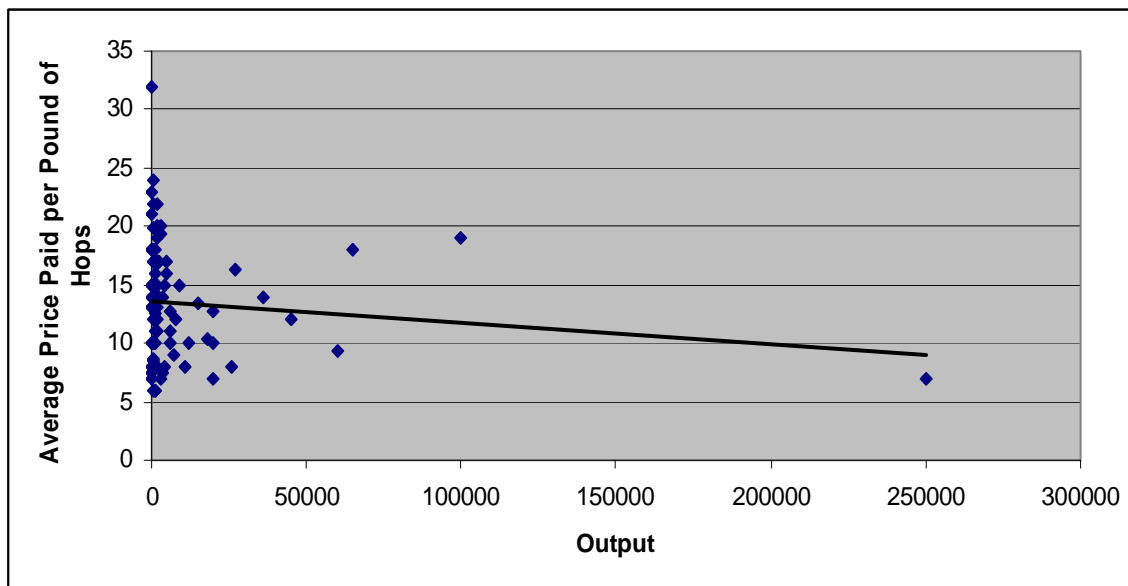
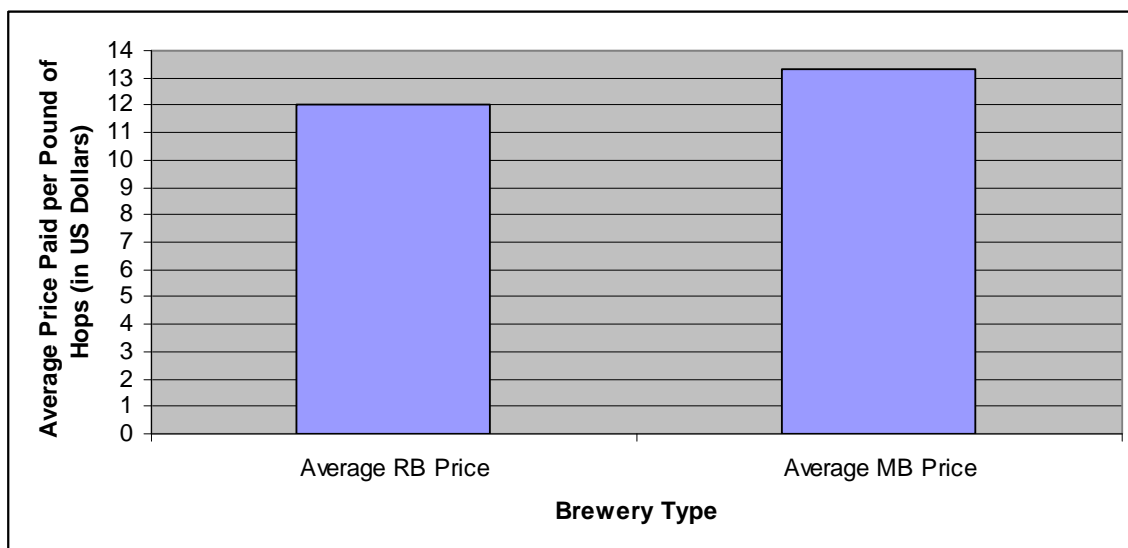


Figure 5.2

AVERAGE PRICES PAID FOR HOPS BY RBS AND MBS



The hops market is complicated in that it manifests itself differently depending on the sizes of the brewers, the merchants involved, and changing market conditions. The

different dynamics in potential market dynamics strictly due to size will be discussed first in terms of the LBs environment and then analysis of the positions of RBs and MBs will be discussed in turn. In the world of forward contracting, there are three dominant contractual arrangements with respect to price that will first be defined and then applied the brewers' environment. These are fixed price contracts, where the supply agents in the network set the price at the outset for the duration of the contract based on their own calculations. The second is a contract that is also set for the duration of the contract, but that reflects the forward market rate at the time the contract is signed. The third is a flexible contract in which the brewers' and supply agents agree to a pricing structure that adjusts with the forward market rate for the duration of the contract.

When LBs procure hops, they are the price setters and therefore exhibit more power in the market than do the large merchants. In this oligopolistic setting, the two LBs in the domestic market use their power to ensure the prices and volumes that they desire. They control the nature of their contracts with respect to the three negotiable rates discussed above. However, the advantage in negotiating power is not always in the hands of the LBs. When asked how the duration of the contracts is negotiated, Hansen of MillerCoors replied that "sometimes it's really dictated by the market, like when there was a hop shortage, even for us, the growers and the dealers were in the head position, they could dictate how long [contracts endured]."¹¹

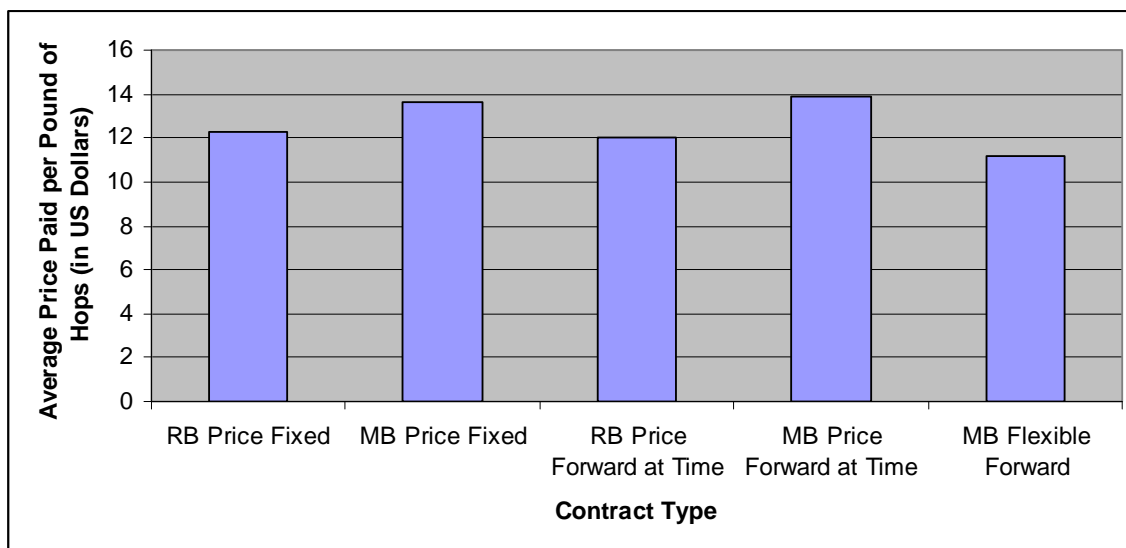
Conversely, when MBs and even RBs interact with the merchants, they are price takers. For RBs and MBs, the hops market is an oligopsonistic setting due to the power of the largest hops merchants, who set market standards for the craft segment due to the volume of hops that they control. According to Hansen, there are two large hops

¹¹ Hansen, Interview

merchant companies, SS Steiner and the Barth Haas group that function at an international level. In an environment such as the shortage of 2007/2008, the power of the merchants and growers is particularly strong and they can lock breweries in at exorbitant prices for mid- to long-term contracts. Hansen explains the market outlook for craft breweries in the midst of the shortage: “if you needed hops that year, they were going to sell you hops, but you had to sign a 4 year contract, and it was a high priced 4 year contract. Those high contracts are still in place.” How these variations in contractual details affect brewer’s prices is portrayed below.

Figure 5.3

RELATIONSHIP BETWEEN BREWER’S COSTS AND CONTRACT TYPE

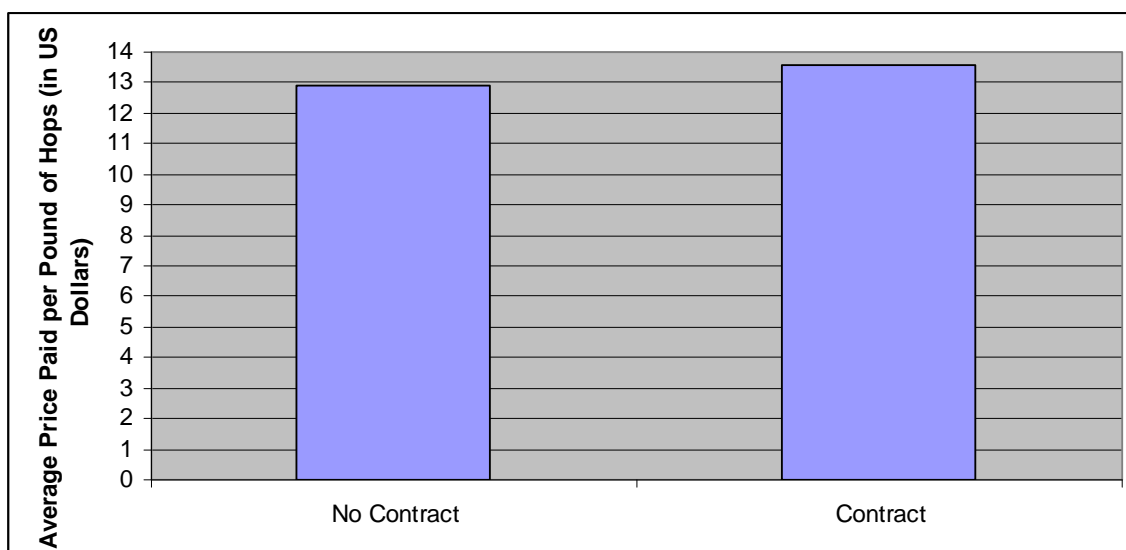


This graph shows the differences in average prices paid for hops dependant upon the nature of the contracts in which brewer’s are engaged. None of the RB respondents are engaged in flexible forward market pricing structures, which could be a reflection of the low response rate; however, it could be testament to the negotiating power of the merchants. The lower rate observed in the MB flexible forward category reflects the

decreasing market price since the crisis and now represents an average difference of approximately \$3.00 per pound of hops. MBs that engaged in flexible forward contracts have profited from the natural fluctuation of the market. Breweries that completely avoided engaging in forward contracts are on average paying less for their hops; though the difference is minimal as observed in figure 5.4 below. Furthermore, it can be assumed that they paid higher prices in 2007/2008 than did companies that locked in to contracts due to the nature of the spot market.

Figure 5.4

AVERAGE PRICE PAID FOR HOPS BY BREWERIES IN
CONTRACTS VS. NO CONTRACT



Assets and Revenue

LBs and RBs have large revenue streams that they can use to adjust quickly to the demands of the market. The ability to present large sums of money quickly allows for fluid interactions between merchants and breweries. Contracting directly with growers is

difficult if you don't have a large production facility due to the desired volumes that growers prefer to contract and the upfront payment that they necessitate.¹² LBs and RBs can more easily commit to 4 years of particular hops varieties as they have more consistent demands and have a better idea of what they will need in the future.

MillerCoors has a large storage facility for hops in Golden Colorado, as well as Yakima Washington and they purchase all of their contracted hops in one up front payment. Once they have it the company distributes itself to the various MillerCoors breweries across the nation, but it allows Laura Hansen to spend her time on other things such as market information. With upwards of 8,000 employees and two large storage facilities, MillerCoors can streamline their supply chain by having their employees focus on their own core competencies. In other words, they have plenty of employees to effectively manage the warehouses and internal distribution, which lets her focus on the activities that has allowed her to make the MillerCoors supply chain more functionally competitive than that of Anheuser-Busch, their larger competitor.¹³

Because New Belgium and Bristol don't have a compatible revenue stream, or storage facilities of the size or caliber comparative to MillerCoors, they must pursue other strategies. I asked Zach Baitinger of New Belgium if he thought having a warehouse for hops would cut costs.

We are able to store our hops for a certain amount of time with our vendors and then usually by that time we're ready to take them. So no, I'd rather have someone else pay for storage. [...] I don't think it would make sense because then you would need a warehouse manager and a team of people; and it's just better to let other people use their core competencies to do those things rather than have us try to do them. [...] We make

¹² Hansen, Interview

¹³ Hansen, Interview

beer, that's what we're good at, and we need other people to grow hops, store hops, make malt, grow barley, etc.¹⁴

Bristol pursues a similar strategy, and relies on close inventory monitoring to make sure that they have the materials they need when they need them. In conclusion, there are certain strategies that best fit brewers of different sizes. MillerCoors has the assets and resources required to make an upfront purchase and internal warehousing a cost efficient method. New Belgium and Bristol use the facilities of their vendors to maximize the space available to them.

The degree of a company's revenue stream and the value of their assets also affect their ability to receive credit. The ability to take out substantial loans would be necessary for most craft brewers to afford to contract directly with growers, due to the generally small amount of excess capital that they can afford to maintain. Access to credit also affects brewers' ability to increase their capabilities, facilities and corresponding powers of negotiation in the market.

Recognition and Credibility

There are intrinsic advantages in credibility due to size and establishment; however, breweries of every size can develop relationships in that will increase both the profitability and stability of their supply networks. During the hops crisis, Mike Bristol of the Bristol Brewing Co relied on the relationship that he had established from 15 years of business with his vendor Hopunion to ensure seniority when it came to the allocation of hops.¹⁵ He believes that Hopunion, which is a grower's coop that conducts business

¹⁴ Baitinger, Interview

¹⁵ Bristol, Interview

exclusively with craft breweries, handled the matter well, and that they've been fair ever since.

We wrote a three year contract with Hopunion, and then once everything settled down, they actually came back to us and said, hey if you're willing to go with a five year contract, we'll adjust the price in the two and three year contract, because that three year contract was written in the storm and so the pricing on it was fairly high.¹⁶

Not all MBs are so lucky however. A substantial amount of the survey respondents complained about over estimating their demands and paying exorbitant prices for the hops on mid-term contracts.

Another form of profitable relational interaction is observed in Laura Hansen's relationship with the growers with which MillerCoors contracts directly. They desire her business and buying directly from the growers is Coors tradition of 30 years.¹⁷ A history of fair, sustainable pricing has developed the company's reputation and built trust between her and the growers with which she does business. Hansen's relationship with the growers has allowed her to develop a first hand knowledge and rapport that keeps her in touch with growers costs and rewards her with better market information that she can use to bargain more effectively with the merchants.

We're an unusual case because I have that grower interaction. [...] In my case we purchase a little differently where I know the cost that goes into growing because I have that relationship with growers, and I know what their fertilizer costs are and I know what the market price is, I know what the demand is, so I set the price.¹⁸

In conclusion, by developing trusting relationships in the industry, brewers, regardless of size can gain better access to market information, prices and raw materials in shortage years.

¹⁶ Bristol, Interview

¹⁷ Hansen, Interview

¹⁸ Ibid

Specialized Staff

The size of brewers directly affects their ability to hire specialized staff. Mike Bristol describes the predicament from the MBs point of view.

Because we're small it's more difficult to have five hops suppliers, because we don't order that many hops and then the administrative headache is significant when you start doing that. I think that is probably a big hurdle to being small. If you're big and you have somebody that that's all they do, you can have a lot more complexity to the system.¹⁹

However, the problems don't stop there. Zach Baitinger fulfills this role of exclusively sourcing raw materials for New Belgium and the administrative headaches are still substantial. In response to a question on price, Baitinger responded "I certainly don't know what Cascade hops in 2012 are going to cost or should cost."²⁰ He talks to several vendors and negotiates contract terms until he has a sense of the market and makes a decision based on these findings.²¹ Laura Hansen of MillerCoors has the advantage in that once she contracts for the hops, distribution and logistics are orchestrated by others allowing her to focus on her core competency. She also has the "hot board" of 12 that is involved in market research and so she constantly has a very good idea of what hops should cost five years down the road.²²

¹⁹ Bristol, Interview

²⁰ Baitinger, Interview

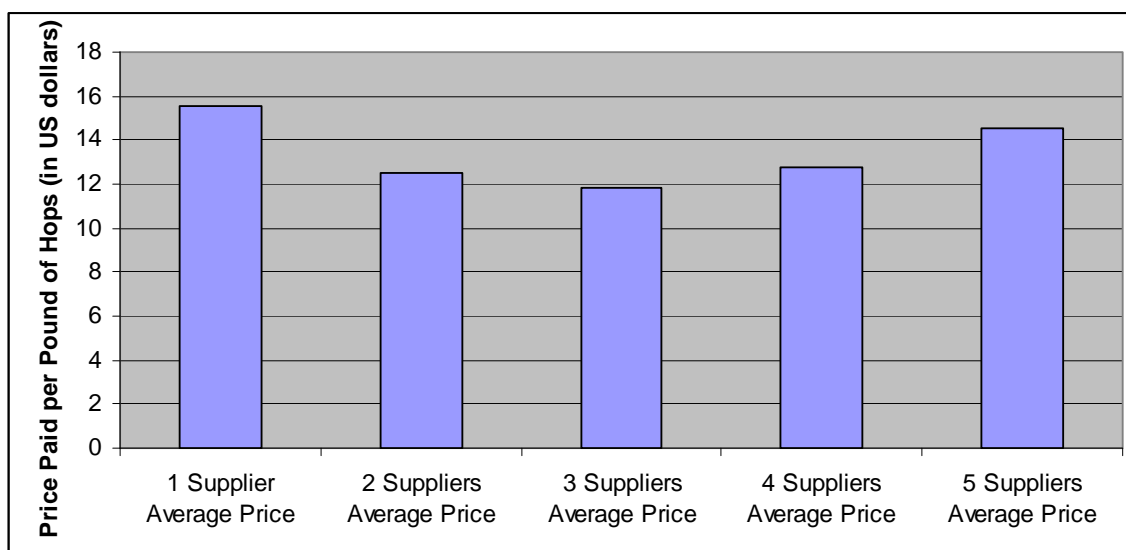
²¹ Ibid

²² Hansen, Interview

The economies of scale and respective revenue streams inherent in size make it easier for larger breweries to hire specialized staff; however, from the MBs perspective time spent negotiating with suppliers can have direct implications on their bottom line. While the coordination of a more intricate supply network has been described by MBs, including the Bristol Brewing co, as a more time consuming unnecessary logistical headache, the effort could pay for itself.²³ The subsequent graph shows the overarching trend between the number of suppliers and the average prices paid by the survey brewers.

Figure 5.5

NUMBER OF SUPPLIERS VS. AVERAGE PRICE OF HOPS



This graph shows a clear advantage to sourcing from more than one supplier. Breweries that procured hops from three sources paid on average \$3.75 less than brewers' that sourced from just one supplier. On the other hand, it appears that at a certain point, too many suppliers' results in a disadvantageous price. This is likely due to the smaller

²³ Bristol, Interview

volumes that are procured from each supplier the more merchants are included which agrees with my hypothesis. Furthermore, if breweries are continuously changing suppliers and sourcing from many merchants, then it is probable that the lack of a trusting relationship also affects the prices paid for hops.

In conclusion, the larger the brewery, the more they can afford to spend on the specialized staff that will keep them updated on the latest in market information and trends and ensures that the company is receiving the best price that they can.

Conclusion

In sum, many of the advantages that larger brewers enjoy are inaccessible to craft brewers, however through strategies such as the development of relational supply networks and an increased emphasis on market information, craft brewers can gain advantages in the hops market that ensure the availability of supply and better prices. In the next chapter this data will be applied to functional conclusions for brewers and effective size sensitive supply chain risk management techniques will be further discussed.

CHAPTER 6

CONCLUSION

This chapter will interpret the results from my study with the goal of creating substantial conclusions for domestic brewers in terms of risk management strategies. I will quickly recapitulate my results and then develop strategies that could increase profitability for MBs and RBs, the respondents of my survey. Concluding the chapter will be a section on future directions for research.

Results and Implications

There are intrinsic advantages to size in the hops market which allow and necessitate different sourcing strategies. The most deeply imbedded is market power which is immediately reflected in the negotiating ability of the firm. LBs such as MillerCoors are price setters and due to the scale of their hops orders they dictate the terms of the contracts in which they engage. RBs enjoy a pricing tier that is reflective of their size. LBs never have difficulty in procuring the hops varieties they desire. RBs seldom experience problems in procurement as long as they're willing to pay premium prices. MBs, on the other hand, are most susceptible to the opportunistic pricing dynamics of the merchants. Availability in shortage years is not guaranteed and MBs are often manipulated in such environments and forced into overly priced mid-term contracts

just to guarantee the supply of hops that they need to survive. One of the MB respondents in my survey complained that “they had us over the barrel [...] and said that if we didn’t sign longer contracts, they wouldn’t be able to guarantee us any hops at all.”¹ Some RBs had trouble as well; however, the issue at hand was price instead of availability.

We feel like the big merchants created an environment where the brewers felt panic, and were fooled into contracting hops years in advance, at outrageous prices and the contract price never came back down with the market until we wasted untold time and energy in negotiation of the contracts.²

Brewers that negotiated with Hopunion, a growers coop, had more reasonably priced contracts that adjusted if the brewers were willing to extend the duration of the contract in which they were currently engaged.³ The merchants were not as flexible and one MB respondent complained that the price that they’re still paying for hops is three times the respective spot market price.⁴

The scale of assets and revenue streams that breweries possess allow them to pursue particular sourcing strategies. MillerCoors owns two large hops storage facilities that allow them to pay upfront for their entire years supply of hops and then self distribute, which is one of the strategic advantages they have over competitors. Their staffs at these warehouses manage distribution and allow Laura Hansen, their hop buyer, to focus on her core competencies concerned with market information and trends. Their revenue stream allows them to make these large upfront payments that physically put

¹ Survey Response,
26 March 2010

² Survey Response
5 April 2010

³ Bristol, Interview

⁴ Survey Response
26 March 2010

their year's supply of hops in their hands, but also allows them to contract directly with growers. Contracting with growers necessitates a one time exchange assumingly due to their lack of storage facilities. The facilities required for processing and storage have been reported in my survey as a barrier for MBs as well as RBs to pursue this procurement strategy. This obstacle will be discussed in depth later in this chapter.

Credibility and Recognition increase profitability by creating a trusting relationship between brewers and their merchants and growers. Laura Hansen of MillerCoors has developed relationships with growers that allow her to better negotiate terms with merchants due her knowledge of grower's costs. For 30 years now, Coors has been buying hops directly from growers and charging a fair price. This developed the trust that her relationship thrives off. If the growers she contracts with don't have post-harvest facilities, which most do not, she contracts the processing to merchants. On a smaller scale, the Bristol Brewing Co has been doing business with their supplier Hopunion for 15 years. This allowed them a measure of seniority which helped to procure the hops that they needed in 2007/2008, though they couldn't get all the varieties they desired.⁵ Hopunion later adjusted the prices of the contract signed at the time of the crisis to better reflect the market price, contingent upon an extension of the contract.

Finally the specialized staff that breweries can afford is particularly significant. MillerCoors, with their "hot board" of 12 collects very accurate market information that further increases their powers of negotiation even further. They confidently contract 5 years into the future and set the price that they know will be both fair and sustainable which in turn adds stability to their supply network. While New Belgium has an employee that is exclusively involved in raw materials procurement, he is also

⁵ Bristol, Interview

responsible for maintaining the flow of all raw materials which takes a substantial amount of time. For this reason, forecasting and in depth market information are not stressed as much and knowledge of the cost to growers is not present, which influences their negotiating ability. Instead, they compare the rates of many merchants and procure accordingly; however, this technique doesn't nurture trusting, profitable, long-term relationships.

The implications for brewers are several. Research and analysis of commodities markets and particularly the hops market has lead me to believe strongly in the value of forward contracting. Commodities markets are cyclical in nature and the duration of these cycles can't be accurately predicted. Forward contracting should be seen as a way for breweries to stabilize their supply networks while simultaneously stabilizing the aggregate market because growers and merchants gain a better understanding of the demand for hops and can plan acreage accordingly. Volatility in this market should be both expected and planned for. 2007/2008 is certainly not the last time that such a spike will occur and breweries that were exclusively engaged in the spot market prior to the shock were affected the most by the swing in market price.

From the craft brewer's perspective, there are significant advantages to contracting with growers coops such as Hopunion, due to the grower owned nature of the company. The potential for higher profitability implies that merchants do in fact engage in opportunistic pricing practices that are not dictated by the forces of supply and demand. This in turn means that engaging in forward contracts with growers should be the most cost efficient and sustainable way to procure hops.

If contracting with merchants must be conducted, a flexible forward market pricing structure will come the closest to reflecting the natural forces of supply and demand in a forward contract. Of the survey respondents, MBs that pursued flexible forward contracts are currently paying on average \$2.79 less per pound of hops than MBs engaged in other contractual engagements.

The survey featured a question asking how breweries would set up their ideal hops procurement system. There were three recurring responses which I will analyze in turn. The first was for the spot market to be both stable and fair. I can say with the utmost confidence that the spot market will never be consistently stable and as long as merchant companies are involved, it will seldom be fair; furthermore, in the words of Zach Baitinger of New Belgium, “if you need any volume, it’s just too risky.”⁶ The second response to the procurement system question was engaging in short to mid-term overlapping contracts. In this forward contracting model, the brewery is contracted for anywhere from 75-100% of their hops in the present year and then decreasing by approximately 25% each year. Any and all additional hops required are purchased on the spot market which allows room for specialty and seasonal beers. The overlapping contracts allow for growth as the firms future expected need is re-calculated every year and contracted for accordingly. By conducting procurement in this fashion, breweries ensure that they have a claim to hops in the event of a shortage. The third response was purchasing directly from the grower; however, the barrier that many brewers cited was the cost and availability of the processing and storage facilities necessary to make this an immediately practical option. If this could be circumvented, I believe that forward contracting directly with growers for base hops and relying on the spot market for

⁶ Baitinger, Interview

additional need and specialty beers would be the most cost efficient procurement strategy available to brewers.

This now brings me to my overarching conclusion. Recall from chapter two that coffee farmers formed coops to reach the otherwise insurmountable volumes necessary to engage in the global futures market. It is my opinion that brewers, especially MBs, should form regional cooperative buying programs to increase their market power and thus their powers of negotiation. In so doing, merchants will be forced to take the brewers seriously because they would now represent a much more substantial hops sales order.

Grower's cooperatives could also be a potential solution to the problem of procuring hops directly from growers. The cooperative, or multiple cooperatives, could invest in a processing plant and storage facilities that meets the needs of the participants. By aggregating need and resources, this would be both a practical and feasible option. Growers would be interested in such a program because both parties desire a fair and sustainable price. When asked if she thought MBs are able to engage in direct contracts with growers, Laura Hansen responded "they are if they want to. I know that the growers absolutely would be happy to do it. I think that because of the small quantity that they buy it's a little more challenging."⁷ The problem of volume would be addressed by the aggregation of companies' demands. What would be formed is an extension of the concept of the growers coop into a larger supply network that would substantially increase the stability of the market for both the growers and breweries involved. The overwhelming outlook that I have seen and experienced through this study is summed up by Mike Bristol.

⁷ Hansen, Interview

My view is we need a sustainable hop supply, and so it doesn't do any good for all of us as brewers to hammer [the growers] into submission when they're not making any money, and for many years they weren't making any money which is what got us into this situation.⁸

A coop system would work for three reasons. First, the craft beer segment of this industry is a growth market. Even though aggregate beer sales were down 2.2% in 2009 over 2008; craft sales increased by 613,922 barrels during the same time period of economic recession.⁹ This implies that gaining aggregate market share is the challenge and goal, more than taking it from other craft brewers. The second reason is by aggregating their demand in such a fashion, MBs and RBs would theoretically lower their prices and thus become more competitive in the larger market. Lastly, the third and most pertinent factor for the potential success of a coop program is that the framework already exists in most states and even in certain cities. Existing brewer's guilds could very easily be converted into a hop sourcing cooperative, and, if applied to a vertically integrated farming system could function largely like a union. Research would need to be done on what these facilities would cost; however, if there was coordination among several cooperatives, this would be a viable option.

Directions for Future Study

It is often the case that a descriptive study leads the way for heavily quantitative research. A continuation of this study would attempt to quantitatively prove the trend between output and price paid for hops. This could be done by inquiring into exactly what breweries pay for different types of hops. If breweries are hesitant to release hop

⁸ Bristol, Interview

⁹ Brewers Association: *Beer Sales*, Boulder, Available online at: <http://www.brewersassociation.org/pages/business-tools/craft-brewing-statistics/beer-sales>

specific price information, it might be easier to ask price information about one variety such as Cascade that is heavily used by brewers across the nation.¹⁰

A study that applied my model to the barley and malt market would be very informative as well.

Hops are certainly a significant part, but the grain side is really the bigger issue just because of sheer volume. On a small brewing scale like ours, we'll use 1100 lbs of grain and depending on the beer we'll use 10-20 lbs of hops. So even when hops prices tripled, it wasn't as if our overall costs tripled. Now unfortunately it happened in the same year that malt prices went up 20%, so that was a huge hit. That was a bigger issue, but it's interesting because the publicity was much more on the hops side, but from a financial point of view, our hit was really on the malt side.¹¹

A similar study on the market dynamics of grain would be a great addition to the literature in the brewer's field.

Finally, a study delving into the cost associated with investing in processing and storage facilities would be imperative in determining the feasibility of vertically integrating growers into the supply network. Accompanying this study would be research on the volume of hops that could be processed in a timely fashion to determine the maximum number of individual companies that could engage in such a cooperative.

If acted upon, hops guilds could revolutionize the nature of the way in which the commodity is procured. Furthermore, the implications for potential cooperative action would allow craft brewers to be in direct control of their hops supplies and would simultaneously stabilize the supply networks for regional hop unions. The movement to such a union environment is not implicit in the formation of buyer's cooperatives however, and discussion should be led in the direction of the increased potential for

¹⁰ Hamm, 5

¹¹ Bristol, Interview

stability and control of prices, while in the long term researching the costs associated with investment in production facilities.

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