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USING THE PORTER MODEL TO ANALYZE THE U.S. ELDERBERRY INDUSTRY

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Abstract: Elderberry, a perennial shrub native to North America with a variety of uses and benefits, is neither well known nor widely utilized as a specialty crop in the U.S. Up-to-date information is lacking with regard to the elderberry market or market potential. This research identifies the market participants along the value chain, the current status of the industry, direction, and future trends, elderberry market limitations as well as risks and potential opportunities for elderberry producers and processors.

A combination of quantitative (mail survey) and qualitative (phone interview) methods have been used. The theoretical model used for the survey and interview development and analysis is based on the Porter Five Forces Model (PFFM) which describes the competitive forces that coordinate and control the market. The PFFM has been used previously to shed light on the chestnut and shiitake mushroom specialty crop markets.

Seventy-four mail survey responses and 20 follow up phone interviews provided information on the market participants, challenges, opportunities and competitive forces in the elderberry industry.

Results show a nascent industry with mostly small scale participants poised for growth. Demand trends are favorable and prices are good across the value chain. Challenges include a limited domestic supply of fruit, few regionally adapted varieties suitable for commercial production, and high labor costs. Additionally, the absence of existing mechanical harvesting equipment limits future production potential and industry growth. Respondents identified low levels of competition within the industry at the present time. Based on identified market size and demand, opportunities exist to increase the domestic elderberry industry across the value chain.

Keywords: market analysis, specialty crops, quantitative and qualitative research

INTRODUCTION

Elderberry (*Sambucus canadensis*) is a shrub native to eastern North America, from Nova Scotia to Florida and west to Minnesota and Texas. The shrub produces small white flowers in June which form umbrella-shaped clusters of purple-black berries 4-6 mm in diameter. Elderberry is both a nutritionally-rich fruit and a concentrated source of very healthy phytochemicals (Charlebois et al. 2010).

The Porter Five Forces Model (PFFM) framework (Porter 1980, 2008) has been applied to describe the red cedar, chestnut and shiitake mushroom market (Gold et al. 2005, 2006, 2008). The PFFM looks at five areas of competition that market participants face including 1) barriers to entry (threat of new entrants), 2) bargaining power of suppliers, 3) bargaining power of buyers, 4) substitute products and 5) rivalry among existing firms.

This study applied the PFFM approach in order to broadly define the elderberry market, identify potential for growth and identify risks and potential opportunities for producers and processors in the United States.

LITERATURE REVIEW

In contrast to Europe (Charlebois et al. 2010) elderberry is neither well known nor widely utilized in the U.S. The literature on elderberry production and marketing in the U.S. is scarce. An elderberry improvement project was initiated in Missouri in 1997 (Byers and Thomas 2005). The project had three components: 1) collection of native elderberry germplasm and study of phenology and plant growth, harvest date, yield, panicle size, berry size, fruit quality, and disease and insect problems, 2) replicated evaluation of superior native germplasm to identify elderberry cultivars with sufficient merit for release and commercial planting and 3) cultural studies (i.e., pruning, and leaf foliar nutritive content) (Thomas & Byers 2004). The research team that conducted these studies also performed elderberry antioxidant and DNA studies. A comprehensive horticultural review was published in 2010 (Charlebois et al. 2010) which compiled literature from around the world about elderberry botany, horticulture, propagation, and uses.

On the marketing side, Weeder-Einspahr (2001) conducted a Midwest regional market assessment for small fruits, including elderberries. The study found that many of the jam and jelly companies in the Midwestern U.S. are small, often pick their own fruit from wild sources and process it themselves. However, several larger jam and jelly manufacturers do purchase large amounts of fresh fruit from growers, often under a verbal contract. Most wineries purchase concentrate from national suppliers, but also purchase fresh fruit when available. Smaller growers of fresh fruits for jam, jelly and wine markets have the best potential for success if they partner with these companies to produce fruit under contract. Juice processors require larger quantities and subsequent greater production investments by the grower. The possibility of addressing these markets in combination with others (e.g., nutraceuticals, organic colorings, etc.), and expansion of sales to small to medium processors could provide a market of sufficient size for a number of producers (Weeder-Einspahr 2001).

According to Byers and Thomas (2005), most of the elderberries grown in the Midwest are harvested for processing markets. Several wineries produce elderberry wines from the fruit, while the flowers and panicles are used to flavor wines. Elderberry juice or fruit are used for jam and jelly. Elderberry juice and concentrates are marketed as nutraceuticals. The pigments in elderberry juice are suitable for colorant use.

RESEARCH METHODS

Because little is known about the elderberry market and market participants (i.e., uncertainty about the number of elderberry growers and processors, no database for businesses involved in the elderberry industry, lack of official private, state or federal information about the industry) a combined quantitative and qualitative approach was used to obtain baseline information about the market and the industry.

The theoretical model used for the survey and interview script development and analysis is based on the Porter Five Forces Model (PFFM) (Porter 1980, 2008) which describes the competitive forces that coordinate and control the market. According to Porter, competition for profits in a given industry goes beyond regular competitors to include four other forces: customers, suppliers, potential entrants and substitute products. The interaction between all these forces defines an industry's structure and shapes the nature of the competitive interaction within that industry. While many factors can influence profitability in the short run, industry structure revealed in the competitive forces, establishes industry profitability in the medium- and long-run (Porter 2008).

The mail survey collected general information about market participants (e.g., position in the elderberry chain, products purchased, products sold, approximate annual gross sales figure derived from elderberry, percentage of elderberry in the business, length of time in the elderberry business, description and trends of supply and demand, and competition). A final question in the survey asked respondents if they would agree to participate in a follow up phone interview.

PASW Statistics (SPSS) 17.0 was used to analyze the data.

The mail survey was followed by interviews with people who agreed to participate in the second part of the research. A responsive interviewing approach of was used. Open-ended questions guided the conversation. The main questions followed the theoretical model, addressing all forces that influence competition based on PFFM. All interviews were transcribed verbatim and all records were maintained taking precaution to respect anonymity and confidentiality. During data analysis, concepts, themes and events were identified, refined, elaborated and integrated. Codes were assigned to the main concepts and themes, and information was sorted, summarized and analyzed. QSR NVivo 8 (QSR 2010) was used for data sorting, coding and categorizing.

RESULTS

Mail Survey Results

Out of 159 surveys sent to companies with any involvement in the elderberry value chain identified through Internet search and referral, 74 responses were obtained. Of the 74 respondents, 36% were primarily plant growers, 26% elderberry growers, 38% value-added producers (16% wineries, 6% nutraceutical companies, 16% value-added producers other than wineries and nutraceuticals). Most survey respondents were involved in more than one activity in the value chain. Surveys were received from all over the US: AR, CA, FL, IA, ID, IL, IN, KS, KY, LA, MA, ME, MI, MO, MT, NC, ND, NE, NH, NY, NV, OH, OK, OR, PA, SC, SD, TN, TX, UT and VA.

Respondents sell plants (42%), flowers (8%), berries (22%), juice (11%), concentrate (8%), wine (18%), and nutraceutical products (4%). Other value added products sold included frozen/dried fruit, juice, concentrate, jelly, preserves, sauce, jam, yogurt, ice cream, fudge, colorant. Out of 25 nurseries, 6 sell to elderberry growers, 2 supply to wineries, 5 to wholesalers, and 8 to retailers. Eleven nurseries supply to individual customers (e.g., home owners) and to agencies for restoration, reforestation and reclamation. Out of 16 elderberry growers, 3 sell elderberries to wineries, one to nutraceutical companies, one to other value-added producers and two to retailers. Twelve growers sell directly to consumers.

Elderberry fruit requires processing. Growers who sell directly to consumers produce value added products for sale or sell berries to consumers who make wine or jelly. Wineries (12) sell directly to consumers (6), to retailers (4), to other wineries (3). Value added producers (other than wineries and nutraceuticals) (10) sell to individual consumers (7), to retailers (7), distributors (2) and wholesalers (2). Nutraceutical producers (4) sell to other nutraceutical companies (1), value added producers (1), retailers (1) and health practitioners (1). Fifty-seven percent of respondents sell to a local market, 40% sell regionally, and 43% sell nationally. Most respondents sell to a combination of areas. Of those that sell locally, 29% sell 100% to a local market, 20% sell over 50% locally and 37% sell under 50% locally. Of those that sell regionally, 14% sell 100% regionally, 7% sell more than 50% regionally and 52% sell less than 50% regionally. Of those that sell nationally, 31% sell 100% nationally, 28% sell more than 50% nationally, and 36% less than 50% nationally.

Regarding trends in demand, 54% indicated that demand has increased in the past 5 years, 19% that demand remained stable, 1% that demand decreased and 26% had no opinion. Present demand is steady according to 47% of respondents, strong according to 24% and weak according to 13%; 59% think demand is going to increase in the next 5 years, 19% that demand will remain stable and 1% that demand will decrease while 21% don't know. Forty-one percent of respondents declare that the elderberry industry is non competitive, 21% moderately competitive while 38% don't have any opinion. Forty seven percent of respondents noted that present demand is steady, 24% felt that demand is strong and 13% that demand is weak.

Interview results

Twenty follow up phone interviews were conducted with people from the following states: AR, CA, IL, KS, MO, NC, NY, OK, SC, SD, VA and VT, comprising 6 growers, 4 value-added producers, 6 wine producers, 3 nutraceuticals and one plant grower. A respondent was considered a grower as his/her main position in the chain if he/she sells elderberries as the main product sold. Wild harvesters who pick and sell elderberry were also classified as growers. If an interviewee grows elderberry but use them exclusively to produce value added products, he/she was considered a value added producer.

Respondents varied from businesses that are predominantly elderberry based (4), to those that have a significant proportion of products that are elderberry based (8) along with others where is a minor component in their business (7). Four respondents are new elderberry producers, producing elderberry for less than five years. Six respondents have produced elderberry for 6-10 years, 5 respondents for 11-20 years and two respondents have produced elderberry for over 20 years.

Analysis of Porter's five forces

Threat of New Entrants: New entrants to an industry raise the level of competition, thereby reducing its attractiveness. The threat of new entrants depends on both the height of entry barriers and the reaction new entrants can expect from incumbents. To date, there are not many big players in the elderberry industry. However, bigger players can more easily access the limited product supply (e.g., fruit, juice, concentrate). The result is a higher price paid for supply by a potential newcomer and limited production because of limited supply. Entry into the elderberry industry requires some investment, depending on the position in the value chain. Buildings, freezers, and equipment are some of the necessary investments required to start an elderberry business. When new entrants are diversifying from other markets, they can leverage existing capabilities and cash flow. Presently, obtaining financing is a challenge because banks lack detailed financial information concerning the elderberry industry and are therefore reluctant to finance. Information about growing elderberry is lacking. In a few areas, universities, experienced growers or processors lower this barrier by organizing workshops and providing the necessary information to get started. The laws regarding alcohol create barriers in the wine industry. Different laws in different states are a major problem for wineries trying to get wine to the people that want it. Some states don't allow shipping wine out of the state, other states don't allow shipping wine into the state. FDA regulations limit the market because producers are not allowed to promote the medicinal values of elderberry unless clinical trials support the claims.

Bargaining Power of Suppliers: Most respondents indicated that domestic fruit supply is limited therefore they either supplement fruit with imported concentrate or limit their production. Import prices have increased over the past few years and imported concentrate is becoming harder to obtain. Most respondents prefer locally produced elderberry over imports. Some value added producers, including wineries, grow their own elderberry, others grow and purchase berries as a supplement, while some producers purchase their entire supply. Imports come from Germany or Poland but finding the right quality and a reliable supplier pose challenges to U.S. producers. One producer used a Canadian supplier. One nutraceutical company strongly preferred European elderberry varieties because more research has been done on European elderberry. Plant supply is also

limited. Some growers purchase plants (domestic or imports) and propagate. Challenges include 1) large quantities of plants for commercial production are not available, 2) locally proven varieties are hard to find, and 3) supply is not always reliable. Some respondents are pleased with the available supply, others mentioned shortages. Successful value added producers will draw more people into production. Additional plant and fruit supply is needed for the existing industry players to operate at full capacity or to grow.

Bargaining Power of Buyers: Buyers are the people/organizations who create demand in an industry. There are a variety of elderberry products sold by the interview respondents: plants - plants in pots, cuttings, seeds (dry berries); fruit - fresh elderberries by the pound, de-stemmed elderberries to winery, dry flower, dry fruit and fresh fruit to medicinal companies, de-stemmed elderberries for pies or jams, frozen berries; wine - different elderberry wines ranging from dry to sweet, pure and blended; nutraceuticals - juice, concentrate, extract, syrup; pure elderberry or in mixes; other value added - jelly, syrup, vinegar, fudge, barbeque sauces, salad dressing, carbonated beverages, cordial, juice blends, yogurt, jam, pie.

Wine is sold primarily at wineries and retail outlets. Some states allow wine shipment, others do not. Distributors have power in the wine industry making it difficult for wine producers to enter distribution channels and obtain grocer shelf space. Because the wine industry is tightly regulated, most elderberry wine is sold inside state borders. Wine prices are good, selling between \$10 and \$14 a bottle. According to interview respondents, demand for elderberry wine is increasing and it's driven by increased consumer interest in their health. Respondents report many repeat customers. The Internet is also helping to increase sales. Even if state laws prohibit shipping, potential customers find out about the wine on the Internet and travel to the winery.

Many value added products are sold by respondents - jelly, syrup, vinegar, fudge, barbeque sauces, salad dressing, carbonated beverages, cordial, juice blends, yogurt, jam, pie. Demand for value-added elderberry is not increasing for all respondents. They sold out or increased their sales in general but do not know if this is an upward trend. Demand for jelly is lacking in some states because other fruits are preferred by consumers.

Nutraceuticals sold include juice, concentrate, extract, syrup, pure elderberry or in mixes. Nutraceuticals are mostly sold nation-wide, direct to health food stores and to health food store distributors. Syrup and concentrate are also sold directly to the consumer. Fresh or frozen elderberries are sold through different outlets for various uses: to wineries for wine making for prices ranging from \$0.50 (with stems) to \$5 a pound (destemmed), in farmers markets or online to individuals (\$3 to \$5 a pound), and to nutraceutical manufacturers for \$11 a pound. Respondents stated that demand for elderberry fruit is high. Wineries are seeking more local supply. Chefs are increasingly interested in elderberries. The "buy local" trend supports the increase in elderberry demand. Plants are sold regionally and nationally. Demand for elderberry plants has greatly increased. As more people experiment and get into commercial production, demand for tested varieties is increasing.

Threat of Substitutes: A substitute performs the same or a similar function as an existing product. There are many substitutes for elderberry and elderberry products. Grape and fruit wines substitute for elderberry wine, other fruit/berry jellies substitute for elderberry jelly, and many juice, syrup or concentrates substitute for elderberry juice, syrup or concentrate. Capsule, tablets, extracts rich

in flavonoids, antiviral or antihistamine properties substitute for similar elderberry products. However, elderberry has distinctive properties that puts it in a class by itself. Even where no medical claims can be made, people perceive elderberry's unique health benefits. According to respondents, their customers recognize the health benefits of elderberry. Flavor and taste also differentiate elderberry from similar fruit/berries/products. Respondents describe the flavor of elderberry wine as complex and rich with a finish that provides a unique flavor. While elderberry appears to be a new product on the market it has a long history and tradition. It has been used for centuries as a natural remedy and to improve the taste of grape wine. Memories of grandpa's elderberry wine or grandma's elderberry pie are unique to elderberry. While elderberry can be substituted with other products, the exclusive properties make it a specific choice for many customers.

Rivalry among existing competitors: Rivalry can take many forms including price discounting, new product introductions, advertising, and service improvements. In this embryonic stage of the industry, competition is low but differs for different players in the market. Because of high demand and few growers, growers indicated no competition. Most grower respondents are the only growers in their region or if there are more growers, each has his/her own niche. For value added producers, because of the limited number of producers and limited supply, each elderberry producer has created his/her own niche market. Respondents that sell in grocery or health food stores compete for shelf space. Wineries also mentioned no competition and often cooperate for their collective benefit. For nutraceuticals the situation is different. There is competition from Europe and from leading brands (e.g., Sambucol). Regardless, respondents do not consider the industry to be competitive. Their products are differentiated by quality. According to one respondent, the European products which are the leading sellers, are inferior in quality and this provides domestic companies an advantage and the opportunity to offer high quality products without artificial ingredients, without sugar and without fillers.

CONCLUSION

The five competitive forces provided a framework for identifying the most important industry developments and for anticipating their impact on industry attractiveness. Elderberry is a nascent industry with high growth potential. As an industry still under development, there are only a few important entrepreneurs and innovators along with small scale participants. They sell to early adopter customers and focus their efforts on introducing the product and its uses to consumers creating product and industry awareness.

The industry is vertically integrated and most participate in multiple stages of the value chain: propagate their own plants, grow elderberry, and produce value added products (wine, juice or jelly). There is room for new entrants that differentiate through innovation, product features and brand, service or price. Entry into the elderberry industry requires investment, depending on the position in the value chain. When new entrants are diversifying from other markets, they can leverage existing capabilities and cash flow (e.g., vegetable producers, wine makers). Attracting institutional financing is difficult. If industry returns prove attractive, investors will provide new entrants with funding. Information about growing elderberry is lacking and requires trial and error to solve their problems. There is no dedicated equipment for fruit harvesting making the process labor intensive. People need to be trained to pick quality fruit. Respondents have to deal with little

known pests and non-labeled pesticides. The lack of quality standards at the industry level creates challenges for growers and producers alike.

The supply of tested varieties is limited and growers must purchase whatever is available and propagate their own plants. Processors face fruit shortages. Some value added producers produce their own fruit, others compensate with imported concentrate while others pay more to get the needed supply.

Demand trends are favorable. A variety of elderberry products are sold. Prices are good across the value chain. It is difficult to gain entrance into distribution channels because of low volumes and limited demand for elderberry wine. Farmers markets, tasting rooms, farm stores, local groceries or health food stores and Internet are the most widely used market outlets. Competition is low or non-existent with each firm creating its own niche. Firms need to establish perceptions of product quality, service superiority, or advantageous relationships with customers to develop a competitive advantage.

The industry is poised for growth but remains a high risk investment due to the multiple uncertainties revealed in this research. Industry leaders can play a critical role in helping to grow the industry for the benefit of all market participants. Expanding the overall profit pool creates win-win opportunities for all industry participants.

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