Preferences for eco certified wines in the United States

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Abstract

Purpose – This study aims to analyze the wine industry's response to changing societal attitudes towards the environment. Environmental considerations are now an increasingly important factor in both production and purchasing behavior. While many eco-certifications exist, there is still consumer confusion between the multitude of eco wine certifications, lack of clarity about what consumers think about the wines, and not enough data about their willingness to pay (WTP) for these environmental characteristics.

Design/methodology/approach – This study clarifies what the various wine eco certifications are, quantifies consumer knowledge and ascertains their WTP for five environmental or sustainable wine certifications, namely, biodynamic, fair trade, organic, natural and sustainable. The authors surveyed 456 wine drinkers in the USA.

Findings – The authors found that millennials, women, unmarried individuals, those purchasing eco-certified foods, low-income individuals and those looking to celebrate a special occasion have a higher WTP for eco-certified wines compared to respondents who are older, male, married, do not buy eco-certified goods, have higher incomes and are purchasing the wine for a regular occasion. They recommend marketing and targeting those in the former group for environmental or sustainable wines.

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Originality/value – The study is the only research project, of this kind, to evaluate five types of eco-certifications for wine in a single WTP analysis.

Keywords Wine tourism, Sustainable tourism, Economic sustainability, Ecolabeling, Environmental management, United States of America, Green issues

Paper type Research paper

1. Introduction

The environment has been recognized as a critical success factor for the wine industry (Sampedro *et al.*, 2010) and the industry is transforming into a "green" business (Silverman *et al.*, 2005). While the industry changes, consumers are amending their behaviors to integrate the environment into their purchasing behavior for wine (Barber *et al.*, 2009). Researchers are taking notice and are studying consumers to understand their motivations for purchasing eco certified wines (Olsen *et al.*, 2012). However, in the literature, it is evident that there is still significant confusion about the many types of environmental wine certifications and what the consumer thinks about these wines (Tait *et al.*, 2019; McEwan and Bek, 2009; Hughner *et al.*, 2007; Siderer *et al.*, 2006). Consumers are unsure what the certifications represent when purchasing these types of wines (Penn, 2010). There is also a mismatch between consumers' attitudes about environmental certifications and their actual purchasing behaviors (Schaufele and Hamm, 2018).

Given this gap in the literature, comparing the different certifications and understanding consumer preferences for these types of wine, this study seeks to answer the following research questions:

RQ1. What are the major certifications and how are they defined, with respect to wine?

RQ2. How can consumer knowledge of these certifications be quantified?

RQ3. What are consumers' willingness to pay (WTP) for five different environmental wine certifications (organic, biodynamic, natural, fair trade and sustainable)?

RQ1 will be addressed in the literature review and *RQ2* and *RQ3* will be explored by means of a survey of wine consumers and the method and results of this activity form the basis of the remainder of the paper.

This research hopes to inform the theory of wine business and also act as a practical indicator for an industry undergoing change. This paper will help to understand the consumer and their knowledge and motivations surrounding eco certified wines. In addition, the results can be used by the industry to shift marketing and production processes to match consumer knowledge, demand and trends.

Our paper is organized into six sections. Section 2 offers a review of the literature and includes our hypotheses. Section 3 explains our survey design and statistical methodology. Section 4 presents our results. Section 5 includes a discussion of our research and the implications for wine researchers, producers and marketers. Section 6 identifies our conclusions, implications, study limitations and makes recommendations for future research.

2. Literature review

The research already conducted on this topic spans a variety of fields and is very interdisciplinary. To add to this discussion, we first compiled the research on environmental certifications in the wine industry. Next, we organize this literature into environmental wine consumption, WTP and consumer preferences for certified wines. Our research identifies a

literature gap encompassing these topics and helps those in the hospitality and tourism fields to understand the human behavior and appropriate marketing opportunities for eco-certified wines.

2.1 Environmental/eco-certifications

There is a literature base focusing on the different environmental certifications for wine, but very few studies consider more than one of these certifications and some have proprietary reports only available to their members (Burns, 2018). We specifically are interested in five certifications, namely, biodynamic, fair trade, organic, natural and sustainable. At the time of this study, after consultation with producers and retailers and upon a thorough review of the literature, these were selected as the most prevalent wine eco-certifications. Amongst those, we find that the most ubiquitous certifications include sustainable and organic. Meanwhile, the biodynamic or fair trade labels tend to be geographically-oriented. Surprisingly, the natural certification has the least amount of information available. We identified these five different certifications in the literature and describe them below: organic, biodynamic, natural, fair trade and sustainable.

Organic wine is produced using organic manure and mostly without synthetic fertilizers, pesticides, chemicals, hormones or antibiotics (Gil *et al.*, 2000). Yet, even though there are a growing number of wineries certified as organic around the world (Viniflhor, 2007), the term organic confuses consumers given the different regulations set by different government bodies (Crescimanno *et al.*, 2002). For example, in France, no synthetic additives or genetically modified organisms are allowed. However, in the USA, chemicals are allowed if they are approved by the USA Department of Agriculture. Similarly, other countries have chemicals allowed by their agricultural ministries, yet approved chemicals differ across nations.

Biodynamic certification, originating with the Austrian scientist and philosopher Rudolf Steiner, seeks to apply the principles of organic wine while also creating a holistic and healthy ecosystem (Steiner and Creeger, 1993). Biodynamic farms focus on crop rotation, plant diversity, composting, homeopathic fertilizers, animal life and seasonal and planetary cycles (Delmas, 2010). The belief is that humans are in between the natural and cosmic elements and this should guide daily agricultural practices (Castellini *et al.*, 2017). Therefore, biodynamic vineyards and wineries seek to preserve the power of the grape so that this energy can be passed to the consumer (Demeter International, 2019). If the requirements are achieved there is a special decal that wineries can include on their label to indicate certification. Within this research, investigators have analyzed the growth, yield and fruit quality under organic and biodynamic management. Interestingly, it was found that there was less yield when compared to traditional viticulture (Doring *et al.*, 2015).

Natural wine, also known as raw wine, is wine made with minimal intervention and there is currently no certification (Pickard, 2018). These wines have no additives, nor do they undergo any additional processing after harvest. The winemaker is simply facilitating the grape juice along the natural path of fermentation into wine (Asimov, 2010). They will use only natural yeasts for fermentation, reject the use of oak for maturation and will not add sulfites for preservation. There is little or no chemical or technological intervention and, as much of the work is by hand, these wines tend to be made in small batches. The wine is generally un-fined and unfiltered. The goal of these natural wines is to reflect the specific terroir, vineyard and cellar for that specific vintage/year. Because of this, they often cannot be replicated exactly, given the changing natural conditions. Research on natural wine is limited, there is a lot of confusion and even wine experts disagree on what exactly constitutes natural wine (Thacker, 2016). However, consumers will choose natural wines if

they suffer from wine headaches, often associated with the addition of sulfites (Costanigro *et al.*, 2014).

Fair trade is a social movement, with a certification, that focuses on environmental, societal and economic standards. The certification includes a label, which was started in 1988 by the Dutch development agency, Solidaridad. The movement sought to develop a labeling system using standards, audits and certifications to help disadvantaged workers or producers get better access to the global supply chain, particularly those from the global south (Staricco, 2017). At first, in 1997, the label initiative and certification were overseen by the fairtrade labeling organization (FLO) in Bonn, Germany. Then, as of 2004, the setting and maintaining of standards was overseen by FLO international. Today, fair trade ensures that certified wines are produced with safe labor conditions, use environmentally friendly practices and that farmers are paid a base price for their crops (Beirne, 2008). Evidence suggests that the certification has developed real change in the labor market and has allowed for historically disadvantaged farm workers to enter the global wine industry (Moseley, 2008; Niklas *et al.*, 2017).

Sustainable wine can be defined as a certified wine that achieves a balance of social, environmental and economic goals (Moscovici and Reed, 2018). Existing research on sustainable wine is broad and includes topics on sustainable wine tourism (Villanueva and Moscovici, 2016; Poitras and Getz, 2006), sustainable viticulture practices (Moscovici and Gottlieb, 2018) and global sustainability certifications (Ugaglia *et al.*, 2016). Sustainability has also been categorized as the three-dimensional performance measurement system for the wine industry (Valenzuela and Maturana, 2016). Certifications for sustainability are typically rooted in a business model that allows firms to enhance their practices by compromising between economics, environment and societal well-being (Elkington, 1998).

2.2 Literature on environmental wine consumption, willingness to pay and consumer preferences

For these five certifications, there is limited information about what consumers think of the products and how much more they are willing to pay. If the consumers do not understand the certifications, this discourages them from paying a price differential (D'Amico *et al.*, 2016). Greater consumer knowledge about certifications could enable producers to increase the price they charge for these products (Vecchio, 2013). The most common method in the literature, to assess WTP, is the contingency valuation methodology. Many studies have documented this technique for assessing wine premiums (Holohan and Remaud, 2014; Sellers-Rubio and Nicolau-Gonzalbez, 2016; Mihailescu and Hecht, 2015; and Pomarici and Vecchio, 2014).

Much of the research on WTP has been conducted at the regional level and the methods and results are often inconsistent. While one study found that consumer awareness in North America, for certifications, was low (Schaufele and Hamm, 2017), other studies in Spain (Sellers, 2016) and New Zealand (Forbes *et al.*, 2009) found that consumers are willing to pay a premium for eco-certified wine. For organic wines, there is a propensity to pay a premium price (Remaud *et al.*, 2008; Bazoche *et al.*, 2008) and some consumers would be willing to tolerate higher prices for fair trade certified wine (Niklas *et al.*, 2017). In Italy, researchers found that a sample of consumers had a positive WTP for natural wines (Galati *et al.*, 2019).

Some studies have documented the correlation between gender, age and income with WTP a premium for eco certified wines. Women and older respondents would most likely pay a premium for sustainable wines (Vecchio, 2013). Another study found that millennials are willing to pay a premium for natural wines (Galati *et al.*, 2019). The research on millennials is extremely important because they tend to be a unique market that is not fully

understood. With respect to wine, they are less likely to go into a store to ask for help, are more likely to ask family and friends for advise, do not rely on geographic area necessarily and are much more likely to look at the label design and information (Atkin and Thach, 2012).

With respect to age and income, findings show higher incomes and younger consumers have a positive relationship with buying organic wine (Tsakiridou *et al.*, 2006). Olsen *et al.* (2012), in an interesting study, found that consumers who had hedonistic and environmental protection values and beliefs would have a higher propensity to purchase organic wines. In addition, women (Squires *et al.*, 2001), those with higher education (Krystallis *et al.*, 2006), those with families (Chryssohoidis and Krystalliss, 2005) or specifically women, with children at home, have a higher propensity to buy organic (Laroche *et al.*, 2001). Our study will test these variables for each certification. However, this research does not analyze the questions and debates surrounding perceived quality of eco certified wines.

2.3 Hypotheses

Based on the literature, we believe that consumers will have a positive response to eco certifications and certain subgroups will have a higher WTP for the certified wines. The existing literature finds that certain regions and segments of the population have a higher WTP for one or more of the five eco certified wines discussed in this paper (Galati *et al.*, 2019; Niklas *et al.*, 2017; Sellers, 2016; Forbes *et al.*, 2009).

Specifically, studies have shown an impact of age. Even though the younger generations show an interest in eco certified products, they often do not have the financial ability to pay for the premiums (Magnusson *et al.*, 2001). Millennials (or the youngest generation currently of drinking age) have a propensity to buy eco certified wines (Galati *et al.*, 2019; Tsakiridou *et al.*, 2006) and it is important to note that Gen Z is starting and will continue to enter drinking age, in the USA (21 years), with a strong purchasing power (Thach *et al.*, 2020). Therefore, we hypothesize that:

H1. Millennials (or those able to buy wine in the USA, but under the age of 34), will have a higher WTP for eco certified wines.

The literature also highlights gender as a factor in purchasing certified wines (Vecchio, 2013; Squires *et al.*, 2001; Laroche *et al.*, 2001), therefore we hypothesize:

H2. Women will have a higher WTP for eco certified wines.

Furthermore, we believe that income is a factor that cannot be ignored if consumers are asked to pay a premium. Often, older populations will have higher incomes and an interest in paying a premium (Vecchio, 2013; Cicia *et al.*, 2002). We, therefore hypothesize:

H3. Those with higher incomes would be willing to pay more for eco certified wines.

In addition to these, our research also hypothesizes four additional factors. First, there is a strong connection between food labeling and the consumers' attitude toward purchasing (Hoogland *et al.*, 2007). Consumers prefer labeling that includes information about production and origin (Ingrassia *et al.*, 2017) and want to see and know about the certification (Mueller *et al.*, 2010). Furthermore, labeling has been found to improve general understanding for consumers to make good choices (Banterle *et al.*, 2013). Therefore, we hypothesize that:

H4. The likelihood to purchase eco certified wines would increase for all users if the label discussed these certifications or a certification decal were included on the bottle.

Also, as attitude and emotion are often the primary drivers for the purchase of organic foods (Atkin and Thach, 2012; Aertsens *et al.*, 2009) we hypothesize:

H5. Consumers would be willing to pay a premium for certified wines if they generally buy eco-certified foods.

Next, we question the issue surrounding purchase occasion. As demand for wine is not as easily influenced by price and that status is important during gift giving (Boncinelli *et al.*, 2019), we hypothesize:

H6. Certified wines will be chosen more frequently if they are purchased for special occasions.

Finally, as education (Krystallis *et al.*, 2006) and wine knowledge has been found to positively impact the decision-making process to purchase and consume certain wines (Famularo *et al.*, 2010), we hypothesize:

H7. Those that are very knowledgeable about wine and certifications would more likely pay more for eco certified wines.

The literature review successfully answers *RQ1*: what are the major certifications and how are they defined, with respect to wine?

3. Research methodology

To test our seven hypotheses, we created an online survey. The questions were developed in consultation with a literature review on wine behavior and consumption (our first goal), by examining existing wine industry surveys (i.e. Wine Enthusiast Magazine, International Wine Organization, State of the Wine Industry Report (McMillan, 2019), Wine Opinions, Wine Business and The Wine Institute), through consultation with the research team and with input from numerous grape growers and wine producers in the northeastern US. The survey took between 5–10 min to complete, targeted wine drinkers and all responses were recorded between May and November 2018.

The survey was segmented into multiple sections. The first set of questions asked respondents about their background and habits with respect to wine consumption. This included questions about purchasing behavior: the number of bottles purchased per month, the average spent on a bottle, number of times in the year they visit a winery and primary and secondary reasons they drink wine. We also listed 23 wine varietals and asked respondents to choose their favorite. Furthermore, we inquired where they buy wine, important considerations when buying wine and others. The second set of questions collected perspectives and opinions about the multiple wine certifications discussed in this paper. These questions asked consumers if they buy certified food and how often, their knowledge of the wine certifications, their purchasing behavior with respect to the certifications and how much more they would be willing to pay for the certified bottles, if any. They were also asked to rank the importance of certifications and their likeliness to buy if there was a certification label on the bottle. We did not include the characteristics of each certification in the survey to avoid influencing the answers with our definitions and did not ask about perceptions of quality and certifications. Finally, we asked questions to ensure we

had a range of participants. We inquired about gender, age, education, household income, marital status and if there are minors living at home.

The survey was disseminated via an embedded link using the Qualtrics survey platform. The survey was completely anonymous. All questions were mandatory, and responses were only counted if a survey was fully completed. To ensure a balanced distribution, we provided instructions that asked respondents to answer the survey only if they drank wine. Also, with the survey, we specifically did not target professionals in the wine industry – this includes academics, researchers or producers. We aimed to capture a sample population of wine drinkers in the USA.

While we collected 502 responses in the USA, only 456 surveys were complete and usable for this analysis. To capture the data, we attempted a multi-pronged approach over time (Table 1). First, the link was distributed through newsletters and email lists of wine grower groups. Second, the link was embedded on newsletters, social media and email lists for multiple wineries in the New York Finger Lakes Region and in the New Jersey Growers region. These are often sent to previous customers. Third, the survey was distributed to professional contacts and via social media connections.

We next analyzed the data using a variety of statistical tools and across multiple variables. First, we use a Pearson's χ^2 test to see if any of the observed differences happened by chance. We next conducted a one-way analysis of variance to determine whether samples came from the same distribution. In addition, a binary logistic regression was used to predict the likelihood of WTP based on certification. We specifically ran the Pearson's χ^2 test and Kruskal-Wallis H test for all of the certifications (Tables 4 and 5). However, given the similarities, we have included detailed results of the binary logistic regression only for organic wines (Table 6) and sustainable wines (Table 7) in the USA. The organic certification was chosen because respondents were most familiar with it. The sustainability certificate is theoretically the most rigorous, of the five and is trending nationally across all business sectors.

4. Results

We successfully surveyed 456 wine drinkers in the USA with complete information. Our respondents were mostly female (64 %), educated (98 % with some college education), with high household income, married (69 %) and without children living at home (66 %). They regularly purchase wine every month (6 bottles average), visit wineries each year (~4 visits) and spend on average almost $16 per bottle of wine (Table 2). Furthermore, when we asked the primary reason these consumers drink wine, we found that it was most likely for the taste (33 %), to relax (20%) or to socialize with friends (20 %). To purchase their wines, they

Target audience	Example of specific groups	Phase #	Percent of responses
Wine certification/ growers groups	New Jersey Wine Growers Association Long Island Sustainable Winegrowing	Phase 1	Approx. 33%
Winery distribution lists	Hermann J. Wiemer Vineyard Hosmer Winery Frontenac Winery	Phase 2	Approx. 33%
Social groups and social media	LinkedIn network Social Media (Facebook, WhatsApp and Instagram)	Phase 3	Approx. 33%

Table 1.
Survey distribution

Table 2. Respondent descriptive statistics

Question	(n = 456)
Female respondents	64%
Male respondents	36%
Aged 18–24 years old	3%
Aged 25–34 years old	21%
Aged 35–44 years old	33%
Aged 45–54 years old	14%
Aged 55–64 years old	14%
Aged 65–74 years old	13%
Aged 75 years or older	2%
High school/GED only	2%
Some college or associates degree	11%
Bachelors' degree	40%
Masters' degree, professional	38%
Doctorate	9%
Household income less than $20,000	5%
Household income $20,000 to $34,999	4%
Household income $35,000 to $49,999	6%
Household income $50,000 to $64,999	7%
Household income $65,000 to $79,999	10%
Household income $80,000 to $94,999	9%
Household income $95,000 to $109,999	11%
Household income $110,000 to $124,999	6%
Household income $125,000 to $139,999	6%
Household income $140,000 to $164,999	11%
Household income $165,000 or more	25%
Single (never married), separated or widowed	25%
Married or in domestic partnership	69%
Divorced	6%
At least one person under 18 living at home	34%
No children living at home	66%
Number of bottles purchased (monthly average)	6
Price paid per bottle (average)	$15.85
Number of visits to a winery (annual average)	4.2

mostly went to a wine store (65%). There, the top selected wines are Cabernet Sauvignon (20%) and Pinot Noir (13%). Our respondents also are likely to buy certified foods (90%).

Of all of the certifications in our study, respondents are most familiar with the organic wine certification (34%) and have purchased certified wines before (31%). While the majority would buy certified wines for regular consumption (66%), they also would consider this purchase for a special event or occasion (18%). More than half (51%) indicated that they would increase their likelihood of buying certified wine if it was labeled such (Table 3). The simple statistics in Tables 2 and 3 successfully answers *RQ2*: how can consumer knowledge of these certifications be quantified?

While the survey was completely anonymous, we were able to geolocate the internet protocol address of everyone to determine the latitude and longitude of where they logged in to their computers (*Figure 1)*. As predicted, given the distribution of our survey in Table 1, most respondents were in the northeastern US. This area encompasses the mostly urbanized northeast Megalopolis (Gottmann, 1964) between Boston and Washington, DC. It includes the largest city in the country (New York city), fully encompasses the most densely populated state in the nation (New Jersey) (Moscovici *et al.*, 2019) and includes an area of

Question	Answer	Percent of respondents
Primary reason to drink wine	Like the taste	33%
Primary reason to drink wine	Helps me relax	20%
Primary reason to drink wine	Socialize with friends	20%
Primary reason to drink wine	Goes well with Food	17%
Primary reason to drink wine	Socialize with family	5%
Primary reason to drink wine	For romance	2%
Primary reason to drink wine	Other	1%
Primary reason to drink wine	Health reasons, to help me sleep, to analyze and compare	<1%
Favorite wine varietal – top five	Cabernet sauvignon	20%
Favorite wine varietal – top five	Pinot noir	13%
Favorite wine varietal – top five	Riesling	8%
Favorite wine varietal – top five	Malbec	8%
Favorite wine varietal – top five	Pinot grigio	7%
Where you most often buy wine	Wine store	65%
Where you most often buy wine	Other retail store	14%
Where you most often buy wine	Wineries	13%
Where you most often buy wine	Internet	3%
Where you most often buy wine	Other	3%
Where you most often buy wine	Restaurant	2%
How much do you know about wine	I have very little knowledge	7%
How much do you know about wine	I know the basics between red and white wines	28%
How much do you know about wine	I can navigate a restaurant wine list	24%
How much do you know about wine	I can pair wine and food and know culture and history	24%
How much do you know about wine	I can choose wine without assistance	14%
How much do you know about wine	I am an expert	3%
Do you buy certified foods	Yes	90%
Do you buy certified foods	No	10%
Which wine certifications have you heard of (select all that apply)[a]	Organic	34%
Which wine certifications have you heard of	Fair trade	22%
Which wine certifications have you heard of	Sustainable	20%
Which wine certifications have you heard of	Natural	14%
Which wine certifications have you heard of	Biodynamic	10%
Have you purchased a wine that was certified	Biodynamic	9%
Have you purchased a wine that was certified	Fair trade	12%
Have you purchased a wine that was certified	Organic	31%
Have you purchased a wine that was certified	Natural	9%
Have you purchased a wine that was certified	Sustainable	13%
Have you purchased a wine that was certified	None	5%
Have you purchased a wine that was certified	Unsure	21%
When do you most often buy certified wines	Regular consumption	66%
When do you most often buy certified wines	Special event or occasion	18%
When do you most often buy certified wines	Other	10%
When do you most often buy certified wines	In restaurants	6%
Likelihood of buying certified wine if labeled	Much less likely to buy + less likely to buy	1%
Likelihood of buying certified wine if labeled	No change	34%
Likelihood of buying certified wine if labeled	More likely to buy + much more likely to buy	51%
Likelihood of buying certified wine if labeled	Not sure	14%

Note: [a]We had 456 completed surveys, yet respondents were able to select this question for all they have heard of. N= 1,175 responses and the data shows the percent of all responses

Table 3.
Results simple statistics

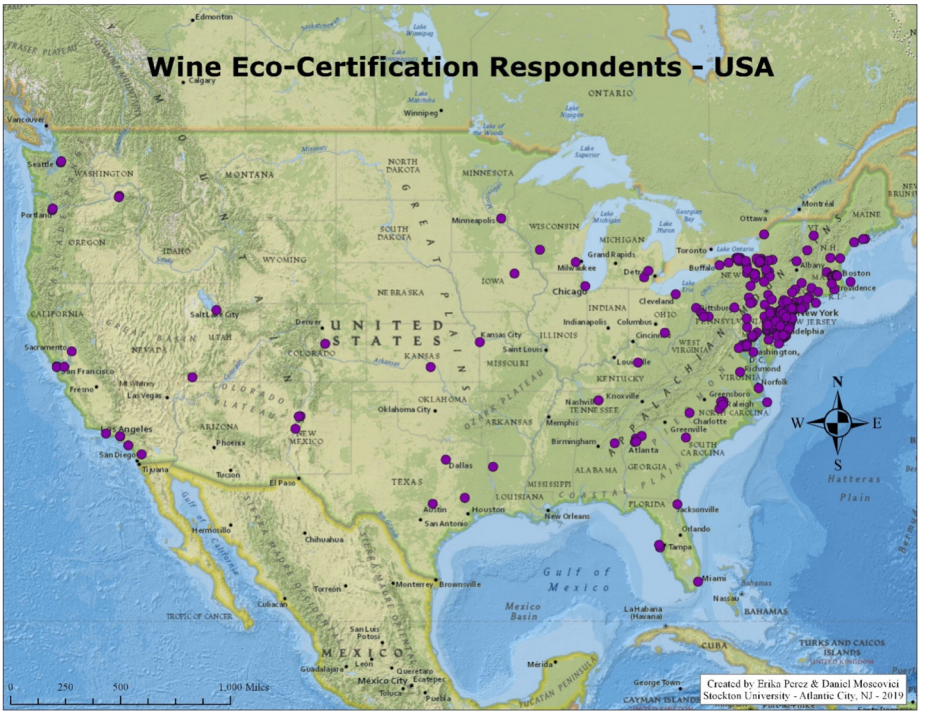

Figure 1.
Geolocation of US survey respondents

high population and gross domestic product compared to the rest of the country. While there are many respondents from around the nation, there is a cluster in the northeast. This likely will skew the data, as 74% of respondents were from the states of New Jersey, New York, Pennsylvania or Connecticut.

The Pearson's χ^2 test results estimate whether the WTP for different types of wines vary based on some selected variables (Table 4) and directly addresses *RQ3*: what are consumers' WTP for five different environmental wine certifications (organic, biodynamic, natural, fair trade and sustainable)? For a better understanding of the relationship between WTP for eco-certified wines and the key explanatory variables (in this study), we will explain results, which are significant at both 90% and 95% confidence interval (CI). The table also shows values in percentage within specific categories and the WTP for different types of wine. According to the estimated results, women were significantly more likely to pay higher for fair trade (73 vs 66.9, p <0.10) and organic (78.8 vs 67.5, p < 0.05) wines, respectively, compared to men. Individuals aged between 18–34 years had a positive WTP for all types of certified wines and more than those who are 35 years or older. On the other hand, married respondents indicated a lower WTP. Finally, the positive WTP for certified wines were significantly higher when people bought these wines for special occasions in comparison to regular consumption.

Table 5 presents the Kruskal-Wallis H test results and directly addresses *RQ3*: what are consumers' WTP for five different environmental wine certifications (organic, biodynamic, natural, fair trade and sustainable)? This test shows the "mean rank" values, which can be used to compare the effects because of variations within each group variable. It is evident

Table 4. Pearson's χ^2 test with modified explanatory variables

Variables	Biodynamic	Fair trade	Organic	Natural	Sustainable
Gender	$\chi 2 = 0.66(0.341)$	$\chi 2 = 1.95\ (0.09)^{**}$	$\chi 2 = 7.25\ (0.00)^{*}$	$\chi 2 = 1.86(1.03)$	$\chi 2 = 2.04\ (0.09)^{**}$
Female	49.10%	73.00%	78.80%	60.80%	75.40%
Male	45.20%	66.90%	67.50%	54.20%	69.30%
Age	$\chi 2 = 5.80\ (0.01)^{*}$	$\chi 2 = 8.85\ (0.00)^{*}$	$\chi 2 = 10.72(0.00)^{*}$	$\chi 2 = 11.28(0.00)^{*}$	$\chi 2 = 11.44(0.00)^{*}$
35+	44.50%	67.20%	71.00%	54.00%	69.30%
18–34	57.70%	82.00%	86.50%	72.10%	85.60%
Education	$\chi 2 = 0.23\ (0.35)$	$\chi 2 = 1.28\ (0.15)$	$\chi 2 = 3.61(0.03)^{*}$	$\chi 2 = 0.00(0.53)$	$\chi 2 = 0.22\ (0.35)$
Bachelors or lower	46.60%	68.50%	71.00%	58.40%	72.30%
Masters or higher	48.90%	73.30%	78.70%	58.40%	74.20%
Marital status	$\chi 2 = 8.29\ (0.00)^{*}$	$\chi 2 = 11.78\ (0.00)^{*}$	$\chi 2 = 10.41\ (0.00)^{*}$	$\chi 2 = 6.13\ (0.00)^{*}$	$\chi 2 = 7.55\ (0.00)^{*}$
Otherwise	57.70%	81.70%	84.50%	66.90%	81.70%
Married	43.20%	65.90%	70.30%	54.60%	69.40%
Likely to buy certified wine	$\chi 2 = 19.40\ (0.00)^{*}$	$\chi 2 = 37.71\ (0.00)^{*}$	$\chi 2 = 58.66\ (0.00)^{*}$	$\chi 2 = 17.69(0.00)^{*}$	$\chi 2 = 43.39\ (0.00)^{*}$
Less likely or no	37.20%	57.40%	58.70%	48.40%	59.20%
More likely	57.60%	83.50%	89.80%	67.80%	86.40%
Wine knowledge	$\chi 2 = 2.04(0.09)^{**}$	$\chi 2 = 2.95(0.06)^{**}$	$\chi 2 = 1.09(0.18)$	$\chi 2 = 1.53\ (0.13)$	$\chi 2 = 0.02(0.49)$
Average or none	46.10%	72.50%	75.70%	59.70%	73.30%
Expert	54.80%	63.10%	70.20%	52.40%	72.60%
Reason for buying wine	$X^2 = 5.01\ (0.83)$	$X^2 = 11.05\ (0.27)$	$X^2 = 13.75\ (0.13)$	$X^2 = 6.99\ (0.64)$	$X^2 = 7.15\ (0.62)$
For health reasons	33.30%		100.00%	100.00%	100.00%
For romance	48.70%	66.70%	66.70%	66.70%	66.70%
Goes well with food	47.70%	65.80%	69.70%	55.30%	71.10%
I like the taste	41.50%	70.90%	74.20%	62.90%	74.20%
It helps me relax	42.90%	69.10%	74.50%	55.30%	71.30%
Other	42.90%	57.10%	42.90%	28.60%	57.10%
To analyze and compare	33.30%	42.90%	42.90%	42.90%	42.90%
To help me sleep	52.40%	66.70%	66.70%	33.30%	66.70%
To socialize with family	53.80%	85.70%	81.00%	57.10%	71.40%
When do you buy wine	$\chi 2 = 18.93(0.00)^{*}$	$\chi 2 = 24.87(0.00)^{*}$	$\chi 2 = 42.58\ (0.00)^{*}$	$\chi 2 = 28.94(0.02)^{*}$	$\chi 2 = 15.24(0.01)^{*}$
1 (unsure or missing data)	37.30%	60.60%	60.60%	48.70%	64.80%
For regular consumptions	51.70%	79.30%	86.20%	69.50%	79.90%
In restaurants	47.10%	52.90%	64.70%	41.20%	64.70%
Other	63.00%	70.40%	74.10%	37.00%	74.10%
Special event or occasion	66.70%	87.50%	93.80%	75.00%	85.40%

Notes: Percentage of positive willingness to pay. *P*-values in the parenthesis. Sig. means statistically significant difference. **and *denote *p*-values significant at 90% and 95% confidence interval, respectively

Table 5.
Kruskal-Wallis H test

Variables	*N*	Biodynamic	Fair trade	Organic	Natural	Sustainable
Wine knowledge		$\chi 2 = 7.04$ (0.22)	$\chi 2 = 9.69$ (0.08)**	$\chi 2 = 7.18$(0.21)	$\chi 2 = 3.55$(0.62)	$\chi 2 = 10.85$(0.05)**
I can choose wine	67	254.09	235.19	233.54	224.16	237.54
I can navigate wine list	103	229.68	227.61	228.02	225.46	227.57
I can pair wine and food	109	234.20	252.10	245.71	228.75	249.71
An expert	17	215.00	195.50	187.00	202.00	245.00
Little knowledge	31	246.35	215.97	222.27	219.85	196.66
I know the basics	132	212.65	218.72	224.13	243.52	217.69
Likely to buy if labeled		$\chi 2 = 74.50$(0.00)*	$\chi 2 = 64.13$(0.00)*	$\chi 2 = 73.98$(0.00)*	$\chi 2 = 64.02$(0.00)*	$\chi 2 = 66.59$(0.00)*
Less likely to buy	2	350.00	60.50	52.00	94.00	56.00
More likely to buy	190	246.12	253.76	262.17	240.16	256.51
Much less likely to buy	2	235.25	175.25	52.00	94.00	170.75
Much more likely to buy	46	280.15	260.07	271.52	263.63	260.55
No change	158	216.37	211.56	201.61	220.37	207.06
Not sure	61	173.17	188.42	183.68	206.87	191.44
Gender		$\chi 2 = 0.67$(0.41)	$\chi 2 = 0.13$(0.72)	$\chi 2 = 4.14$(0.04)*	$\chi 2 = 1.58$(0.21)	$\chi 2 = 0.07$ (0.78)
Female	293	233.29	231.25	236.85	234.99	229.10
Male	166	224.19	227.79	217.90	221.19	231.58
Age		$\chi 2 = 14.26$(0.03)*	$\chi 2 = 9.07$(0.17)	$\chi 2 = 11.78$(0.06)**	$\chi 2 = 15.82$ (0.44)	$\chi 2 = 11.46$ (0.07)**
18–24 years old	16	263.94	261.31	238.47	237.44	256.81
25–34 years old	95	250.95	236.85	238.02	246.19	246.85
35–44 years old	151	229.93	236.80	231.34	227.75	224.71
45–54 years old	65	229.95	233.51	239.13	231.70	232.54
55–64 years old	64	228.08	214.70	224.13	215.92	210.20
65–74 years old	61	203.27	214.75	221.30	229.44	236.59
75 years or older	7	120.50	158.86	117.57	159.57	154.36
Education level		$\chi 2 = 5.43$(0.49)	$\chi 2 = 9.40$(0.15)	$\chi 2 = 9.22$ (0.16)	$\chi 2 = 6.77$(0.34)	$\chi 2 = 4.32$(0.63)
Associate degree	21	207.93	202.57	183.14	247.00	219.93
Bachelors' degree	182	235.25	238.30	233.58	235.23	231.28
Doctorate	43	237.92	241.97	238.80	206.08	253.48
High school/GED	8	235.25	175.25	195.44	180.06	199.44

(*continued*)

Table 5.

Variables	*N*	Biodynamic	Fair trade	Organic	Natural	Sustainable
Masters' degree	154	233.76	231.88	233.81	223.65	225.89
Professional degree	24	216.13	213.50	243.25	247.00	237.69
Some college or no degree	27	188.50	196.50	205.00	255.50	217.50
Income level		$\chi2 = 9.14$ (0.52)	$\chi2 = 13.27$(0.21)	$\chi2 = 11.78$(0.30)	$\chi2 = 19.76$(0.03)*	$\chi2 = 26.15$(0.00)*
Less than $20,000	24	216.13	251.75	233.69	227.88	247.25
$20,000 to $34,999	16	235.25	261.31	209.78	223.09	228.13
$35,000 to $49,999	28	268.04	224.43	256.91	266.13	219.93
$50,000 to $64,999	33	252.64	255.23	239.77	267.86	271.59
$65,000 to $79,999	45	217.40	218.60	220.30	201.10	234.50
$80,000 to $94,999	41	226.85	222.83	242.32	233.94	218.33
$95,000 to $109,999	49	246.96	229.11	239.35	262.61	252.71
$110,000 to $124,999	27	239.50	273.00	264.50	247.00	277.00
$125,000 to $139,999	29	199.64	234.60	218.19	188.97	182.62
$140,000 to $164,999	52	222.01	219.38	210.88	217.58	214.88
$165,000 or more	115	224.27	216.16	221.63	219.73	217.65
Marital status		$\chi2 = 11.14$ (0.02)*	$\chi2 = 17.45$(0.02)*	$\chi2 = 4.87$(0.30)	$\chi2 = 4.27$(0.37)	$\chi2 = 5.29$(0.25)
Divorced	27	222.50	256.00	239.00	264.00	251.50
Married or with partner	317	219.68	221.95	224.31	224.32	226.86
Separated	4	235.25	232.63	281.50	208.75	170.75
Single (never married)	104	259.52	254.69	243.99	237.44	239.16
Widowed	7	284.43	126.07	215.93	257.93	187.14
Buy certified product		$\chi2 = 19.09$(0.00)*	$\chi2 = 29.76$(0.00)*	$\chi2 = 61.11$(0.00)*	$\chi2 = 8.27$(0.00)*	$\chi2 = 37.40$(0.00)*
No	223	205.92	203.55	194.02	214.41	201.11
Yes	236	252.75	254.99	264.00	244.73	257.30

Notes: mean rank values. *P*-value in the parenthesis. $N = 454$. **and *denote *p*-values significant at 90% and 95% confidence interval, respectively

from the results that age, likelihood of buying eco-certified labeled goods, marital status and income level have an influence on the WTP for certified wines. Interestingly, wine knowledge shows mixed results. Respondents with expert wine knowledge showed higher WTP for sustainable wine but a lower WTP for fair trade wine as compared to those with average or no wine knowledge (significant at 90% CI). In addition, individuals who commonly purchase goods labeled with eco certification have a higher WTP for certified wines (significant at 90% CI). Respondents with income $65,000 or less showed higher WTP for natural and sustainable wine compared to those with an income level higher than $125,000.

Table 6 illustrates the binary logistic regression results with the dependent variable WTP for certified organic wine (WTP $\geq$1 = 1 while, not sure or none = 0). It is evident that individuals who pay a higher average price for wine are less willing to pay more for organic wine. Moreover, men are significantly less likely to pay more for organic wine than women. Finally, individuals who commonly buy eco-certified goods and those who are buying wine for a special occasion have a higher likelihood of having a positive WTP for organic wine.

Table 7 illustrates the binary logistic regression results with the dependent variable WTP for sustainable certified wine (WTP $\geq$1 = 1 while, not sure or none = 0). According to the findings, people who are paying a higher average price for wine are less likely to have a positive WTP for sustainable wine. However, respondents buying wine for a special occasion have a higher likelihood of paying more for a sustainable certified wine.

Tables 4–7 directly addresses *RQ3*: what are consumers' WTP for five different environmental wine certifications (organic, biodynamic, natural, fair trade and sustainable) and is the basis for answering our seven hypotheses. These are discussed in the next section and in Table 8.

5. Discussion

In the USA, wine sales make up 17% of all alcohol sales, equating to a 56-billion-dollar industry (UKTI [UK Trade and Investment], 2015). There is a significant financial opportunity to capture market share with eco certified wines. Our research attempts to help producers and marketers understand human behavior in eco certifications and wine production; especially with the marketing of wine based on the purchasing behaviors of consumers. Our study documents some interesting results with respect to consumer preferences. While other studies show that consumers will choose Merlot, Chardonnay and Cabernet Sauvignon as their top three wine purchases, respectively (Conway, 2018), our data demonstrates the top wines to be Cabernet Sauvignon, Pinot Noir and Riesling, in order. Of course, this could be related to our results being regionally dominated in the northeast US. Our research further identifies important differences for consumer preferences for eco-certified wine. Consumers will make different choices, with respect to eco-certified wines based on their income, age, gender, marital status, previous purchase patterns, knowledge of wine, average purchase price, occasion of purchase and labeling of the eco-certification. These findings are summarized in Table 8. Understanding these distinctions will help producers consider whether to commit the time and capital to get certified. It will also contribute to an understanding of human behavior as applied to marketing wine products in the USA.

Our results do have a strong regionality to the northeastern portion of the USA, specifically New Jersey, New York, PA and Connecticut. With a large geography, the USA can be divided into different sub-regions and it could be expected that each region could respond differently to wine certifications, interest in varietals and even purchasing of wine versus other alcohol. While the respondents were primarily located in the northeastern

Variables	B	S.E.	Wald	Sig.	Exp (B)	95% C.I. for Exp (B) Lower	Upper
*Average price**	−0.037	0.016	5.591	0.018	0.964	0.935	0.994
Number of bottles purchased	−0.024	0.023	1.075	0.300	0.977	0.934	1.021
Gender (female)							
Male*	−0.715	0.281	6.497	0.011	0.489	0.282	0.848
Age (18–34 ref)							
35+	−0.598	0.405	2.180	0.140	0.550	0.249	1.216
Education level							
High school/GED			4.172	0.653			
Doctorate	1.022	1.080	0.897	0.344	2.780	0.335	23.071
Masters' degree	0.649	0.987	0.433	0.510	1.914	0.277	13.238
Bachelors' degree	0.421	0.979	0.184	0.668	1.523	0.223	10.380
Professional degree	1.221	1.160	1.109	0.292	3.392	0.349	32.948
Associate degree	−0.045	1.103	0.002	0.967	0.956	0.110	8.297
Some college, no degree	0.522	1.066	0.240	0.624	1.686	0.208	13.633
Income level							
$165,000 or more (ref)			8.793	0.552			
Less than $20,000**	−1.257	0.698	3.244	0.072	0.285	0.073	1.117
$20,000 to $34,999	−0.241	0.840	0.082	0.775	0.786	0.151	4.080
$35,000 to $49,999	−1.056	0.664	2.527	0.112	0.348	0.095	1.279
$50,000 to $64,999	−0.045	0.652	0.005	0.945	0.956	0.267	3.427
$65,000 to $79,999	−0.654	0.523	1.563	0.211	0.520	0.187	1.449
$80,000 to $94,999	0.185	0.570	0.105	0.745	1.203	0.394	3.680
$95,000 to $109,999	0.215	0.532	0.164	0.685	1.240	0.438	3.516
$110,000 to $124,999	−0.712	0.537	1.757	0.185	0.491	0.171	1.406
$125,000 to $139,999	−0.007	0.532	0.000	0.990	0.993	0.350	2.820
$140,000 to $164,999	0.024	0.450	0.003	0.957	1.025	0.424	2.474
Marital status (married ref)							
All other status	0.565	0.376	2.261	0.133	1.760	0.842	3.677
Wine knowledge (expert ref)							
Average to no knowledge	−0.321	0.352	0.829	0.363	0.726	0.364	1.447
Freq. of buying sust. goods (always often)							
Never or sometimes	0.145	0.308	0.223	0.637	1.157	0.632	2.116
Likely to by cert. goods (more and much more)							
Less like or not sure*	−1.722	0.308	31.327	0.000	0.179	0.098	0.327
When do you buy cert. wine							
(all other)			24.034	0.000			
Regular consumption*	1.276	0.306	17.362	0.000	3.581	1.965	6.527
Special occasion*	2.057	0.659	9.734	0.002	7.820	2.148	28.466
Constant	2.773	1.262	4.826	0.028	16.000		

Notes: **and *denote *p*-values significant at 90% and 95% confidence interval, respectively

Table 6.
Binary logistic regression willingness to pay for organic wine (yes =1 and no = 0)

region, the data and results are very important given this region has the highest population and average wealth in the nation. We do recognize that the study could see different results if respondents were primarily from the west (Washington or California). While this study does not perform an analysis by region, we identify this as an important question for future research.

Variables	B	S.E.	Wald	Sig.	Exp (B)	95% C.I. for Exp(B) Lower	Upper
*Average price***	−0.042	0.016	6.906	0.009	0.959	0.929	0.989
Number of bottles purchased	−0.005	0.021	0.047	0.829	0.995	0.954	1.038
Gender (female)							
Male	−0.355	0.260	1.865	0.172	0.701	0.422	1.167
Age (18–34 ref)							
35+	−0.516	0.368	1.958	0.162	0.597	0.290	1.229
Education level							
High school/GED			3.861	0.695			
Doctorate	0.714	0.978	0.533	0.465	2.042	0.300	13.895
Masters' degree	0.294	0.908	0.105	0.746	1.342	0.226	7.948
Bachelors' degree	0.474	0.903	0.276	0.599	1.607	0.274	9.426
Professional degree	1.258	1.079	1.359	0.244	3.518	0.425	29.142
Associate degree	0.034	1.023	0.001	0.973	1.035	0.139	7.677
Some college, no degree	0.152	0.975	0.024	0.876	1.164	0.172	7.874
Income level							
$165,000 or more (ref)			5.571	0.850			
Less than $20,000	−0.614	0.628	0.956	0.328	0.541	0.158	1.853
$20,000 to $34,999	0.171	0.760	0.051	0.822	1.187	0.268	5.266
$35,000 to $49,999	−0.444	0.600	0.547	0.459	0.642	0.198	2.079
$50,000 to $64,999	0.968	0.720	1.808	0.179	2.633	0.642	10.796
$65,000 to $79,999	−0.039	0.485	0.006	0.936	0.962	0.371	2.490
$80,000 to $94,999	−0.138	0.479	0.083	0.773	0.871	0.341	2.225
$95,000 to $109,999	0.319	0.479	0.442	0.506	1.375	0.538	3.519
$110,000 to $124,999	0.183	0.529	0.119	0.730	1.201	0.425	3.389
$125,000 to $139,999	−0.296	0.476	0.385	0.535	0.744	0.292	1.893
$140,000 to $164,999	−0.032	0.410	0.006	0.937	0.968	0.433	2.164
Marital status (married ref)							
All other status	0.272	0.339	0.645	0.422	1.313	0.676	2.551
Wine knowledge (expert ref)							
Average to no knowledge	−0.495	0.336	2.172	0.141	0.609	0.315	1.178
Freq. of buying sust. goods (always often)							
Never or sometimes	0.170	0.278	0.374	0.541	1.186	0.687	2.046
Likely to by cert. goods (more and much more)							
Less like or not sure*	−1.368	0.274	24.976	0.000	0.255	0.149	0.435
When do you buy cert. wine							
(all other)			6.970	0.031			
Regular consumption*	0.588	0.270	4.730	0.030	1.800	1.060	3.057
Special occasion**	0.907	0.475	3.650	0.056	2.476	0.977	6.275
Constant	2.585	1.168	4.895	0.027	13.26		

Notes: **and *denote *p*-values significant at 90% and 95% confidence interval, respectively

Table 7.
Binary logistic regression willingness to pay for sustainable wine (yes =1 and no = 0)

One of the most interesting relationships we discovered was the association between purchasing eco-certified wines and age and income, two variables, which are possibly interconnected. The results supported one of the hypotheses that the younger generation, those of legal drinking age to 34 years of age, are more likely to pay a higher price for a certified wine when compared to the other age groups (*H1*). This age group is the millennial

Hypothesis or research question	Summary of hypothesis or research question	Summary of findings
RQ1	What are certifications and definitions?	See literature review for summary of findings
RQ2	How can consumer knowledge of certification be quantified?	See results section Tables 2 and 3
RQ3	What are consumers' willingness to pay for eco cert wines?	See results section Tables 4–7, discussion section and summary of findings below (*H1–H7*)
H1	Under age 34 = higher WTP	Results as predicted: those of legal drinking age to 34 years of age, are more likely to pay a higher price for a certified wine when compared to the other age groups
H2	Women = higher WTP	Results as predicted: Women were significantly more likely to pay a higher price for fair trade or organic wines
H3	Higher incomes = higher WTP	Results opposite of prediction: respondents with higher income did not have higher willingness to pay for eco-friendly wines and those reporting an income of under $65,000 were willing to pay more for an eco-certified wine
H4	More labeling = higher WTP	Results as predicted: 51% per cent of our respondents indicated they would be more likely or much more likely to buy the wine if it was labeled with the certification
H5	Buying Eco cert foods = buying eco cert wines	Results as predicted: individuals who commonly purchase goods labeled with eco certification (foods, etc.) have a higher willingness to pay more for certified wines compared to those that do not
H6	Special occasion = buying more eco cert wines	Results as predicted: Other than for normal consumption consumers are more likely to buy wines for special occasion or gift
H7	Very knowledgeable about wine = higher WTP	Mixed results: there was a higher willingness to pay for sustainable wines but a lower willingness to pay for fair trade wine

Table 8. Summary of research questions, hypotheses and findings

generation that is heavily targeted by marketers. This explains the other finding that respondents with higher income did not have higher WTP for eco-friendly wines (*H3*). This is contrary to research demonstrating a barrier to purchasing certified wine by lower-income groups (Schaufele and Hamm, 2018). Our estimated results indicated that those reporting an income of under $65,000 were also willing to pay more for an eco-certified wine (*H3*). While this is not always the case, younger respondents are likely to have lower incomes as they begin their careers and even though they have lower incomes and less life experience, this generation is willing to spend more money to support a wine or winery that focuses on positive environmental and social practices. However, we recognize it could also be a higher sensitivity to eco certified products from already existing marketing to this subgroup.

With respect to gender, the results were as hypothesized. Women were significantly more likely to pay a higher price for fair trade or organic wines (*H2*). Similarly, men were significantly less likely to pay more for organic wines. Interestingly, married respondents had less WTP a premium for all eco-certified wines. It is possible that men buy more of the wine or there is more joint decision-making with these purchases, given that women are more likely to do the food shopping (Lake *et al.*, 2006). This could be related to another finding from this study – that individuals who commonly purchase goods labeled with eco

certification (foods, etc.) have a higher WTP more for certified wines compared to those that do not (*H5*). This was consistent for biodynamic, organic and sustainably certified wines. In general, as individuals purchase certified foods, they then are likely to also purchase certified wines. Marketing them together in retail outlets, if allowed, could help sales.

Our findings also indicate that producers should consider strong language on the label about their certification or processes and find ways to market the certified wines for special occasions. In total, 51% of our respondents indicated they would be more likely or much more likely to buy the wine if it was labeled with the certification (*H4*). Other studies have found similar results (Mueller *et al.*, 2010). Also, results indicate that most people buy certified wines in the USA for regular consumption. Our research supports other research showing there is a market for these wines for special occasions (*H6*) and gifts (Boncinelli *et al.*, 2019). This special event purchasing could bolster sales and increase visitation to the winery.

Nevertheless, there is a segment of the population where we noticed mixed results with respect to a higher WTP or where a certain segment was not willing to pay more (*H7*). Those who self-ranked themselves as having expert wine knowledge showed a higher WTP for sustainable wines but a lower WTP for fair trade wine (significant at 90% CI). It could be that the wine experts have become very knowledgeable about only certain types of wine they prefer (e.g. wines from a certain varietal and vintage or region of the world) and are not as knowledgeable about these certifications, many of which are new or still a bit confusing for the consumers. Or they may have had a bad experience in the past, when eco certifications were newer and are not willing to make a purchase again. In addition, those who generally pay more for wine were less willing to pay a premium for organic or sustainable wines. Those who believe they have high wine knowledge and those from the highest income bracket could be the hardest to persuade to purchase these eco-certified goods.

6. Conclusions, implications, limitations and future research

6.1 Conclusions and implications

This study had three research questions and tested seven hypotheses. All research questions were achieved and most of our a priori hypotheses were confirmed. The study documents certain human behavior toward eco-certified wines and can be useful for managerial decisions at the winery and for marketers at retail outlets. It should be interpreted as a signal to producers in their pursuit of developing and marketing eco certified wines based on consumer preferences.

We recommend producers and marketers of these products to target advertising, product placement and brand awareness for wines that are certified as organic, sustainable, fair trade, biodynamic or are classified as natural wines. Marketing to millennials, women, unmarried individuals, those already purchasing certified foods, those not spending excessive money for wine and individuals looking to celebrate a special occasion could lead to higher price points and possibly increased profitability. This is also an opportunity for grower associations, states, regions and nations to develop policies that encourage growing and producing eco certified grapes and wines.

6.2 Limitations and future research

However, we recognize the limitations of our study and recommend additional research in this area to better understand consumers and the implications of their purchasing behaviors for eco-certified wines. First, we believe additional data on respondents would help – especially about their ability to identify the differences between the many certifications.

This would also be interesting to test with their self-described wine knowledge, to see if expertize in wine also translates to being an expert on wine eco certifications. Also, more information about their purchasing behaviors, if they buy certified wines, would be useful.

The survey was completed over a six-month period (May to Nov 2018) and this time horizon possibly could have had an impact on the results as discussions of eco-certifications are commonly in the news and on social media. We recommend a similar survey to be conducted for the same geographic area, after a few years, to further study the effects of time, knowledge about eco certifications and consumer WTP for these wines.

Furthermore, as many of our respondents were geolocated to the northeastern US, we also recommend that the study be repeated with a primary focus on the west coast, southern US and other regions to see if regionalism is steering purchasing behavior or if our data is indeed a national representation. At a larger scale, additional research, on this topic, in other wine producing and consuming countries, would help producers and policymakers understand the impact of culture on these eco-certifications and would be important for strategic marketing.

We also believe that additional studies analyzing the perception of eco certified wines, consumer preference and WTP are needed in this research sector. In the future, it would be interesting to reproduce this study when Gen Z is of full drinking age as their impact will be significant (Thach *et al.*, 2020).

Finally, we recommend developing a survey for the producer perspective, with respect to eco-certification and wine. It would be important to see if the producer and consumer preferences and knowledge are aligned on this topic. We are curious if eco-certification will result in additional production costs and if the premiums for these products are matched with the consumer perceptions and WTP.

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