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ABSTRACT

Climate change is a worldwide phenomenon impacting many industries in various ways.

This paper focuses on how climate change hinders the ability of Bordeaux wineries to grow quality old-world grapes they have traditionally succeeded in growing. The paper presents the Appellation d'Origine Contrôlée (AOC), the standard it holds Bordeaux wineries to in regards to labeling vintages, and the struggles it creates for Bordeaux wine growers. Additionally, the positive and negative result of climate change on the wine industry worldwide and how it could affect specific country exportation is discussed.

Keywords*: climate change,* effects, affects, Bordeaux, wine

INTRODUCTION

Over the past few decades, climate change has become an adverse issue around the world. Climate change is affected by global warming, causing unusual weather events that effect the environment and its surroundings. In many countries, governments have implemented laws, policies, taxes, and incentives to help keep the planet green and reduce climate change. Climate change is a phenomenon that highly effects the business environment and the way companies conduct their business. The effect of climate change is different across the globe therefore; different regions have to adapt according to their business needs. The implications of climate change on Bordeaux wineries and how it compares to other wine regions worldwide will be searched and discussed.

Effect of Climate Change on the Business Environment

Over the past few decades, many organizations have negatively contributed to climate change and global warming. It has become clear that not all business practices are sustainable, proving the need for change. Although large corporations have a significant impact on climate change, small organizations have also done their fair share on depleting environmental resources. Recently, there has been a shift in all sizes of organizations attempting to be sustainable. Specifically, large corporations have been working to operate in a sustainable way by introducing corporate social responsibility policies into their operations. These businesses are trying to operate sustainably in a variety of ways including, renewable energy, recycling, waste reduction, and composting. In many ways changing policies and practices to react to climate change can affect business operations and the business model as a whole.

Adaptation to climate change can impact a company's corporate culture, everyday operations, and even the organizational structure of the organization. Many corporations are taking it upon themselves to react to climate change and make their efforts publicly visible. Organizations that are reacting to climate change, can begin to achieve green workspaces by turning off lights when they leave rooms, implementing programs to reuse wasted energy, or recycling their waste (Okereke, Wittneben, & Bowen, 2012). Many programs implemented by companies can be costly and take time to implement; however, the overall impact of their company's footprint on society can be drastically diminished. It is becoming important for investors to find green, eco-friendly companies to invest in although it may be costly to implement carbon reductions programs within an organization, they could see financial benefits by gaining shareholders and customers.

Many companies who incorporate sustainable practices into their everyday operations or have sustainable products, advertise themselves as being green. Products that claim to be sustainable often catch consumer's eyes, and tend to be a 'better choice' over brands that do not appear environmentally friendly. However, many companies claim to have sustainable products that actually do not prove to be sustainable; the advertisement of these products as being sustainable is called 'green washing'. Green washing is when a company misleads the consumer to believe its product is produced sustainably with environment and ethics in mind. Many consumers fall for the seven sins of green washing making it challenging for companies that are pure players, opportunists, and cautious advertisers to stand out, as they should. Within the wine industry, sustainable actions can come from growing techniques, harvesting methods, viticulture practices, packaging choice and transportation of the product. Being sustainable in the wine industry is becoming more and more relevant as climate change is beginning to impact wineries.

Although many businesses are buying into the ecofriendly business initiatives, it is not enough to tackle the continuous rising temperatures of climate change. A large effort from all businesses must be made for a drastic change and reversal of temperature increases. In some cases, "climate change adaptation is shifting the commercial and political landscape so that some industries, firms, and coalitions may be weakly incentivized to address the causes of climate change," (Okereke, et al., 2012, p. 23) thus, not all corporations are contributing to the battle against climate change. This concept applies to the wine industry as some wine regions are suffering because of climate change; other areas are 'winning' since they are able to grow old world quality grapes they traditionally may have never been able to before. This greatly affects the way in which companies conduct business within their region, country, and industry, along with how heavily they integrate climate change initiatives into their corporate culture and business model.

A recent trend has arisen of corporate leaders rising to the task of implementing climate change initiatives in their companies to tackle the problem (Okereke, et al., 2012). These leaders are long term oriented; looking at the future of their companies, they view potential loss climate change could cause and how they can work to combat it. That being said, company leaders of all industries must soon realize that:

> There is equally a great (or perhaps greater) cost in not taking action, committing the right amount of financial resources towards innovation, research and development, clean technology, capacity building, and achieving value reorientation looks ultimately a wise decision (Okereke, et al., 2012, p. 26).

Sooner or later, all executives and leaders in small and large companies will realize doing business sustainably and adapting practices to fight against climate change is beneficial for society as a whole.

EFFECTS OF CLIMATE CHANGE ON BORDEAUX WINERIES

Over the past 50 years, temperatures in Bordeaux have continued to rise, while precipitation levels have become inconsistent from year to year. The unpredictable weather has put a lot of pressure on vineyard owners, creating uncertainty of how their crops are going to turn out and how profitable their harvests will be. Climate change effects wine growers in multiple ways such as the supply of water available for their crops, the time of harvest and the quality of terroir. Terroir is "a French term that ascribes a wine's uniqueness to the soil, landscape, climate, and viticulture practices of the place where it's produced," (McQuaid, 2011, para. 12) held at a very high importance to wine growers worldwide. The quality of terroir is highly linked to the perceived excellence of wineries blends, which will be altered if current grape varieties are unable to grow in the changing terroir. Winery owners may have to deviate from their traditional wine growing techniques if the effects of climate change continue to increase.

Appellation d'Origine Contrôlée

The Appellation d'Origine Contrôlée (AOC) is a French certification "which governs the production of French wine and spirits that seek geographical indication" (Barnea, 2017, p. 607). The AOC has qualifications a wine must meet in regards to geographical location the grapes were grown, type of grapes used to make the blend, the quality of terroir the vineyard has, and the techniques used by the vineyard to grow and harvest the grapes. In order to achieve the AOC certification, wineries must attain to all the standards. The geographical location and the terroir the grapes were grown in are closely linked. Since the geographical regions are divided due to the differences in terroir, wineries aiming to gain the same geographical identification have similar terroir in their region. The similar terroir across one regional certification, such as Bordeaux, creates and displays quality and consistency for consumers.

The AOC certification is bound by law therefore, it is illegal to name a blend after a region if all the AOC criteria are not met. A few instances that can be illegal are viticulture practices, terroir, and the region the grapes are grown in (Barnea, 2017). Some viticulture practices that effect the AOC regulations are "grape varietal, ripeness and alcoholic strength, yields, vine spacing and pruning, and wine making techniques" (Barnea, 2017, pp. 607-608). It is important to note that due to climate change, these three regulations of the AOC are becoming more and more difficult for wineries to achieve. They are affecting the quality and consistency of blends, along with uncertainty for producers, whether their crops are going to survive to their fullest potential and be profitable.

If climate change continues to persist and temperatures continue to rise, it will threaten the ability for wineries to produce and label their wines under the AOC certification. For wineries that strive to continue meeting AOC regulations, they could potentially have dwindling product supply, making their vintages limited. Additionally, the lack of supply would force producers to sell their product at an increased rate if the demand is high due to limited quantity. The supply and demand will only be favourable for producers if the quality and taste of their vintages meet consumer expectations, increasing demand. If temperatures continue to rise, wineries will be taking a risk continuing growing traditional grapes, as the quantity and quality of harvests could be diminished from viticultural techniques or region of growth not changing under AOC regulations.

Raz Barnea (2017) proposes three changes to the AOC regulations that could positively affect wineries due to the growing changes of climate change. The first proposition would enable wineries to use new viticultural methods, the second proposition is to allow wineries the ability to grow non-traditional crops and use them in their AOC approved blends, and the third is to allow wineries to source grapes from outside the appellation region (Barnea, 2017). The AOC seems hesitant to change, due to long lasting traditions and the importance of terroir, affecting all three propositions in different ways. Although change to the AOC regulations will take time for deliberation, it is clear change must be made to aid wineries and their leaders' future success.

Using the three alternatives a decision matrix will be used to determine which option would be the most favourable for owners of Bordeaux wineries (Figure 1). The four main decision criteria are quality, traditional taste, ease of implementation, and degree of personal winery contribution. Traditional taste was ranked as the most important criteria because winery owners will suffer if the tastes of their wines change drastically and consumers find the blends unidentifiable. The next heavily weighted criteria was ease of implementation, as some alternatives could take longer to implement and a larger financial investment for winery. Quality was the next criteria, as consumers expect the same quality of vintage from year to year, being able to predict the quality of wine due to a wineries reputation. The quality would be altered by all three alternatives; however, growing crops in different regions with more favourable growing conditions would have the most impact. Lastly, the degree of personal winery contribution was considered. This criterion was considered because each winery likes to have control over their blends. If they are outsourcing and receiving grapes from wineries in different areas, they have less control over the outcome than if they were growing and harvesting the grapes themselves. The outcome of the decision matrix

using the four criteria with varying weights is winery owners would prefer the ability to use modern viticultural methods, to improve the impact of climate change on their harvests.

If the AOC were to implement one of the three alternatives proposed by Raz Barnea (2017) it would be the easiest to control and for wineries to implement. Although, Barnea (2017) does note the new viticultural techniques will only aid in battling climate change as long as they work. The pressure of finding techniques that improve viticulture and are favourable for crops would be up to managers and leaders working within each individual winery. This would increase competition between wineries to find the best techniques. Wineries could incur additional costs of experimentation to find the best-suited techniques for each type of grape, and type of terroir the vines are going planted in. The experimentation process would be forever adapting, due to the rapidly changing and unpredictability of climate change.

Château La Tour Carnet

Château La Tour Carnet is a wine estate in the Bordeaux region of France owned by Bernard Magrez, spanning 126 hectares large, and produces blends labeled under the Haut-Medoc appellation of the AOC (Jeff, 2017, para. 1). Château La Tour Carnet is a leading winery in the Bordeaux region, using innovative techniques to grow and bottle their wines, along with conducting research experiments related to climate change. Château La Tour Carnet has four main core competencies that aid in the successfulness of the winery: innovation, strategic orientation, problem solving and quality, in both the wines produced and the experience they provided for visiting guests, which will be explained further.

Château La Tour Carnet has spectacular terroir for growing grapes, "the rich mineral content found in the gravel, limestone and clay soil is good for the production of wine" (Bredahl, n.d., The Vineyard and Winery, para. 2). Due to climate change the terroir of Château La Tour Carnet is being altered, making it difficult to grow the grapes they have been growing for generations. The vineyard currently grows "50% Merlot, 45% Cabernet Sauvignon, 3% Cabernet Franc and 2% Petit Verdot," (Jeff, 2017, Château La Tour Carnet Vineyards, Terroir, Grapes, Winemaking, para. 1) the varieties that produce blends eligible for AOC certification. Magrez initiated an experiment on the property of Château La Tour Carnet, planting "52 varieties of vine on one of the vineyard's slopes," (Southam, 2016a, para. 6) to test how the different varieties grow in the terroir, what kind of blends can be made, and how they taste different. Hazel Southam (2016a, para. 6) stated the first crops planted were expected to be ready in the harvesting season of 2016, marking the commencement of climate change research at Château La Tour Carnet. Currently there is no further research indicating whether the crops were successfully harvested in the 2016 season.

If temperatures continue to rise and unpredictable weather resumes, Bordeaux wineries, including Château La Tour Carnet will be faced with worsening quality of traditional crops, and may be forced to begin growing new varieties of grapes, utilizing them in their current blends. The new variety of grapes would cause problems for winery owners, as their blends would no longer be AOC approved, not complying with AOC regulations of the region. Under current AOC regulations these blends would not be certified because the taste and quality of the wine would be changed, thus altering consumer perception of Bordeaux wines. For wineries such as Château La Tour Carnet, producing wines not eligible for AOC approval is problematic, as the AOC certification allows wineries to charge a premium rate for their blends, ultimately affecting each company's bottom line.

Cécile Daquin, Magrez's daughter oversees operations of Château La Tour Carnet, along with a few other château's owned by Magrez's as the general manager (Southam, 2016b, p. 50). Daquin has a strategic orientation to improve the company's bottom line by opening all of Magrez's château's and vineyards, including Château La Tour Carnet for the public to visit year round. She believes the future of Bordeaux depends on the willingness of vineyards to adapt their traditions, opening their doors, and allowing consumers to experience Bordeaux (Southam, 2016b, p. 50). Château La Tour Carnet rents rooms to the public, similar to a bed and breakfast allowing them the opportunity

to experience Bordeaux in a unique way. The bed and breakfast provides consumers with a quality experience of Bordeaux vineyards, aiding in the already high reputation of quality Bordeaux wines. Daquin has carried this idea across many of Magrez's Château's as previously mentioned and it has proven to be very successful, with great response from consumers. If all Château's in the Bordeaux area would consider adapting their practices to allow bed and breakfasts, it could be a great profit generating strategy to allow a buffer for years climate change drastically affects crops, the quality of wine, the quantity harvested and quantity of wine available for sale. Château La Tour Carnet and Magrez's innovation keep lending Bordeaux additional methods to tackle the threat of climate change, and aid wineries in continuing profitability and surviving in the industry.

France is the country that exports the largest quantity of wine in the world exporting $9.1 billion per year, a part of the beverage exportation, one of Frances top ten exports ("Wine," n.d., para. 2; Workman, 2017). The exportation of wine from France is growing at a rapid rate, with high demand from importing countries such as the United States of America, United Kingdom, and Canada. Climate change could cause France to slow down exportation with lowering supplies of quality wines, while the price exporting products sell for could vary. If the quality of the wine is lower, wineries could expect exporting wine at a lower cost; however, if there is not a large quantity of wine and demand is high, the selling price of wine would be higher. Over the past three years, in France, the price of basic red wine has dropped 31.7%, demonstrating the struggle of the French wine industry adapting to the demands of climate change and economic variables (European Commission, 2017b, p. 2). The European Union predicts the quantity of wine produced in 2017-2018 harvesting season will be lower than over the past three years (European Commission, 2017a, p. 2). With a lower quantity of wine produced and basic red wines being sold at a lower cost, along with the pressures climate change adds to the quality of vintage grapes, it is clear France will have troubles continuing the growth of wine exportation.

New technologies introduced into the winemaking industry can be hard to implement due to legal restrictions and high financial investment. As previously discussed, some winery owners such a Magrez of Château La Tour Carnet will incur costs to invest in new technologies approved by the AOC for long-term benefits. Wineries should take into consideration the waste they are creating and be socially responsible in the ways they reduce and eliminate this waste. The adoption and adaptation of technologies that Magrez has been able to implement in his vineyards in incredible and help pave the way for other vineyards. Some technologies that could help wine growers battle climate change are contraptions that help reuse water waste, collect rainwater, and technologies that produce clean energy such as solar panels, wind turbines, and geothermal heat (Mustacich, 2017). If wineries help reduce their environmental footprint they are inadvertently helping themselves and the battle against climate change in the wine industry. Technologies similar to the ones explained above that help lessen a wineries negative environmental impact are all technologies that would not affect AOC approval. They would help reduce costs of energy and water thus also helping decrease the wineries long-term expenses, while also decreasing the cost to the environment. That being said, it is important to note that the initial cost of implementing clean energy is very high; however, the long-term benefit of being green, and lowing expenses in the future is beneficial. Leaders of wineries in the Bordeaux region should begin following Magrez' path of finding new technologies and utilizing them to ensure they are still able to create a quality product, with a great taste, impacting the environmental as little as possible, while also following restrictions of the AOC.

In France, laws enforced by the government concerning appellations and labeling of wine, make it illegal for wineries to change varieties of grapes used in blends, restrict viticulture practices, and identify the region an appellation spans. As previously mentioned, the labeling of Bordeaux wines is very strict due to AOC regulations. Although climate change is making it difficult for wineries to product blends that have a consistent taste and are of the greatest quality, it is important for winery leaders to continue producing wines eligible for the AOC certification. As previously mentioned, it is illegal for a Bordeaux winery to label a wine as Bordeaux if it does not pass all the requirements of the AOC. Although, this does not mean wineries are legally not allowed to grow grapes not traditionally from the region or specified under AOC regulations, it means wineries are not legally allowed to label blends with non-traditional grapes as regional wines, for example a Bordeaux wine. The legality in

labeling and marketing a blend is important to consider for marketing manager in a Bordeaux winery, as it is crucial they are making correct marketing and advertising decisions that are not going to ruin their reputation with the AOC. For example, in the case of Château La Tour Carnet, they produce wines that do not meet AOC standards due to type of grapes used in the blends, thus they must ensure the labeling, marketing, and advertising are unique to the one blend, not jeopardizing the labeling of their AOC approved wines by grouping them into the same category as Bordeaux wines. Therefore, the legal aspect of wine production is a large constraint for leaders in the wine industry. The laws and AOC regulations seem to have no intention of changing soon, thus, leaders are going to have to make a decision of whether or not the status of a wine being AOC approved is strong enough to refrain from commencing blending grapes that historically are not produced in the appellation region.

Climate change can affect the environment in many ways. In regards to wineries, the major environmental related aspects are the weather patterns, soil quality, and events such as flooding, hurricanes, earthquakes, and droughts. As the environmental aspects of climate change on Bordeaux wineries are discussed further throughout the whole paper, this section will focus on the way environmental change affects marketing for leaders in Bordeaux wineries. The leading individuals in Bordeaux wineries have to prepare for the unexpected each season. Recently, leaders are being faced with weather varying each season, making for an unpredictable quality and taste of blends. The main problem this causes for leaders is the ability for a winery to market a product under the same blend name and label consistently from year to year, with similar taste. If a consumer enjoys a product of a specific winery from one year, they may expect the blend from the next year to be similar, if not identical, in taste and quality. The consistency expectations of consumers may be difficult to meet due to the changing environmental situation. Therefore, leaders must find ways to adapt to the changing environmental situation, and gain a stronger understanding of what can be done to help them reduce the risk of inconsistent blends from year to year.

Climate Change and the Pricing of Bordeaux Wines

Determining the price of a wine is complex and many factors must be considered such as vineyard status, grapes used to make the blend, the age of the wine, weather, and expert opinion (Ashenfelter, 2008; Cardebat, Figuet, & Paroissien, 2014). A wine is difficult to price when it is young, as many individuals do not enjoy the taste of young wines and prefer to drink older wines. Orley Ashenfelter (2008) explains wine loses its astringency as it ages, improving the taste. Regardless of the taste improving over time it is explained that “there is a market for both younger and older wines” (Ashenfelter, 2008, p. 174) due to consumer preference and budget.

The status of a vineyard such as Château La Tour Carnet aids in the pricing of their blends tremendously. One cannot believe that Château La Tour Carnet can sell a bottle of wine for 1,000 euros off the taste and quality alone (Southam, 2016a, para. 10). This is a great example of how brand reputation can be built so highly that consistent quality of a wine produced from an individual winery, can influence the price of their blends so drastically. In Château La Tour Carnets case it took generations of producing quality wine to reach the level of status they have today. Many other wineries in the Bordeaux region benefit from the same type of status Château La Tour Carnet has built for themselves, due to hard work and consistent representation of quality over the years. Therefore, to aid in pricing wine at the highest price possible, winery leaders must be conscious of the image their brand is reflecting and how their consumers are interpreting it.

The next aspect that effects the pricing of a wine is the age of the wine and how long it has been stored by the winery or other holders. Ashenfelter (2008) describes the old wines as being priced high because their holders need a payoff for the investment of storing the bottles for so long. In this case, the astringency will be lower in the bottles held therefore, having a better taste, thus being more enjoyable for the consumer. In the example of Château La Tour Carnets’ wine that sold for 1,000 euros, the price of the wine would have included the wines age, holding costs, quality and taste, and as mentioned before, the status of the winery.

Weather is another aspect that can affect the pricing of wines. The first two factors are not climate change related; however, were important to note as all aspects come together to create the pricing of a vintage. Weather is the most unpredictable element related to the pricing of a wine since if a season is hot, dry, cool or wet it will affect how the crop grows, how much of the crop survives, and the quality of the crop harvested. In the wine industry especially "global warming creates both winners and losers" (Ashenfelter, 2008, p. 179). In the case of Bordeaux it is likely wineries would be winners or losers together in the same season. Experts are able to predict approximately how good a wine will taste and how high the quality of harvest will be in a growing season. Ashenfelter (2008) notes that approximately 80% of a wines pricing is determined by the weather experienced within the growing season, while approximately 20% is based off the age of the wine. Climate change therefore, has a large impact on the profits of wineries all over the world, especially in Bordeaux under the severe weather conditions that make it challenging to growing quality Merlot grapes. A cost benefit analysis (Figure 2) has been performed to determine if wineries in the Bordeaux regions should continue growing grapes that are becoming not suited for the region due to climate change.

The last factor that can have an effect on the pricing of wine is expert opinion. A problem with relying on expert opinion in determining the price of a wine is that experts can be biased and not consider factors that could affect the quality of wine such as climate change (Cardebat, et al., 2014). Advertising the opinion of experts and the ranking of the blend can impact the price of the vintage and willingness of consumers to try the wine (Cardebat, et al., 2014, p. 284). Another problem with the price of wine being dependent on expert opinion is the variation in experts' tastes and preferences (Cardebat, et al., 2014). If multiple experts dislike a wine and one expert loves it, the score of the one expert will increase the wines average score, making it more appealing to consumers and vice versa. For Bordeaux wineries it is important that climate change does not continue to affect their crops negatively otherwise wineries will find it difficult pricing their wine high, due to the weather and possibly experts' opinion on the quality of the wine. High prices could cause consumers to change purchasing habits and allow for threat of new entrants into the old world wine industry.

EFFECT OF CLIMATE CHANGE ON WINERIES WORLD WIDE

Previously discussed is the way climate changes helps some regions benefit, while other regions suffer. As an example, the Okanagan Valley, one of Canada's most developed wine regions will be used. To gain a greater understanding Dwight Sick, the winemaker from Stag's Hollow winery was interviewed. Stag's Hollow is a winery located in the Okanagan Valley, Canada that has a unique terroir presented in Figure 3. Sick describes the Okanagan as being a "complex growing area with a vast amount of unique mini micro climates inside a single region" (personal communication, November 26, 2017). Sick continues to explain that even at Stag's Hollow vineyard the temperature in one area of the vineyard is normally 6 degrees Celsius higher or lower than the other area of the vineyard at any time of the year (personal communication, November 26, 2017). The unique terroir and change in temperature, forces and allows different grapes to be grown in the two areas, due to the different growing conditions. Climate change has again forced and allowed wineries in the Okanagan to plant new varieties of grapes they were previously unable to grow. Some of these grapes include Sauvignon Blanc, Pinot Noir, Cabernet Sauvignon, and Merlot (personal communication, November 26, 2017). The ability to plant untraditional grapes has been positive for the Okanagan valley, while other impacts of climate change have been negative such as "dramatic extremes to the weather," (personal communication, November 26, 2017) similarly to other regions worldwide.

Similarly to the Okanagan Valley, other regions in Canada are expected to overall benefit from climate change. Climate change is expected to allow the wine region in southern Québec to expand the varieties of grapes grown including Chardonnay and Pinot Noir (Hamilton, 2017, para. 4). The ability to grow old-world grapes will open new markets for the Québec wine industry, and could help boost Canadian wine sales. It is expected the wine-growing region in North America will grow, expanding the industry (Saltzman, 2016, How Canada may benefit,

para. 4). With areas suitable for vineyards, with quality terroir, Canada could have a chance to flourish in the wine industry.

It is clear that new world regions are some of the areas adapting to support many grapes currently grown in the Bordeaux region. John McQuaid (2017) believes Europe is the region that will be impacted most significantly due to climate change. This will allow regions around the world to begin producing blends that compete in markets they have never had the ability to be successful in before. Within the wine industry climate change affects winery consumers, owners, employees, and shareholders. Consumers purchasing habits may change, while owners and employees with have to change marketing and growing techniques.

Climate change is causing "production as a whole [to move] north (or south in the southern hemisphere) as opportunities open up in once-inhospitable areas" (McQuaid, 2011, para. 4). Again, the shift in climate is helping create winners and losers in the wine industry, giving new regions opportunities that were never present in the past. Assuming the terroir in these regions support old world grapes, it is safe to assume new regions and countries will have the ability enter the wine exportation industry as strong competitors in the next 5 years. This will allow wineries in these regions to plant new varieties of grapes, allow the vines to mature, and produce quality vintages.

Within the wine industry climate change creates both price risk and product risk (Engel, Enkvist, & Henderson, n.d.). The cost of agriculture activities is going to increase due to the decrease in clean water supplies and increased labour costs. This will create rising costs for production, water, and cost towards the environment and financial costs.

Furthermore, climate change will affect product risk when regions are unable to grow large quantities of grapes, and quality grapes specific to the appellation region, to produce their blends. Their blends will become unpopular to consumers, and the regions will have difficulty exporting their wines. Additionally, many wineries will "be forced to change their products, move, or go under" (McQuaid, 2011, para 4). There are many risks in the wine industry that cannot be mitigated due to climate change. Managers can reduce the risk now by introducing processes that will decrease the impact of climate change upon the winery once climate change begins to impact the region significantly, to prepare for the long term.

CONCLUSION

Companies and individuals must begin to introduce sustainable actions into their daily lives. To become more sustainable companies must introduce corporate social responsibility policies that relate directly to their business model. It should be a goal for all companies to become pure players, being at the forefront of sustainable actions, making decisions in socially responsible ways. Wineries in Bordeaux need to continue doing their part to tackle climate change, along with creating methods to combat problems climate change poses for the region. Managers must stay optimistic and adapt viticulture techniques as significantly as they can while still meeting AOC standards. Leaders in the wine industry must take initiative and conduct experiments just as Magrez, in order to find new ways to keep the wine industry alive in the old world. Industry leaders in wineries all over the world are being forced to have a global mindset due to climate change and the way it changes the environment.

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APPENDICES

Figure 1: Decision matrix on how to improve the effect of climate change on Bordeaux

Decision Criteria	Weight	Ability to Use New Viticultural Methods	Ability to Grow Untraditional Grapes for AOC Blends	Ability to Source Grapes From Outside of AOC region for AOC Blends
Quality	25%	3	3	4
Traditional Taste	35%	3	3	5
Ease of Implementation	30%	5	1	3
Degree of Personal Winery Contribution	10%	5	5	1
Total	100%	3.8 ★	2.6	3.75

Figure 2: Cost benefit analysis of continuing growing the merlot grape in Bordeaux

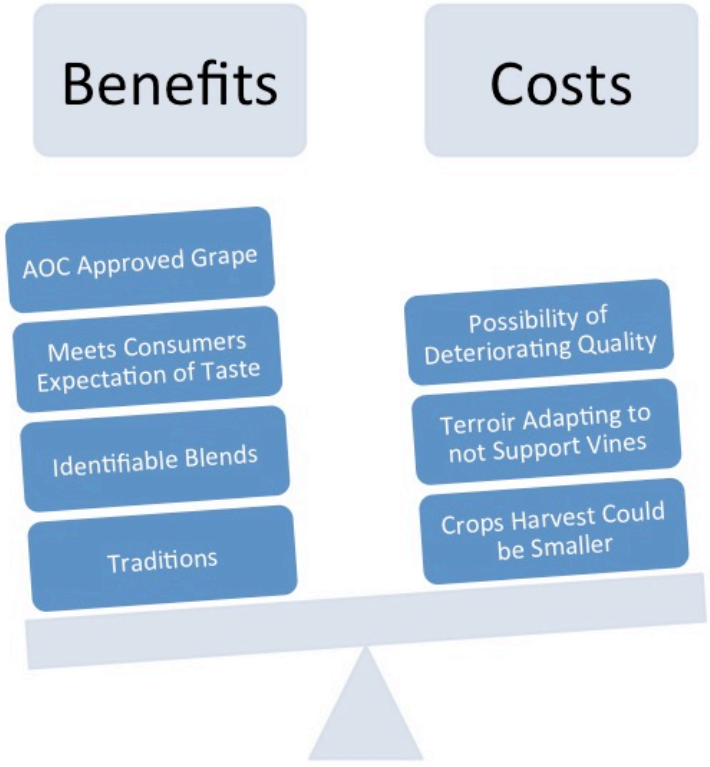

Figure 3: Stag's Hollow Winery

(Google Maps, n.d.)