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## Sustainability in the global wine industry: Concepts and cases

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### Abstract

We relate sustainability to the wine industry and recognize that for practitioners in the wine industry, priority number one is leaving the land in better shape for the next generation. We show an overview of sustainable wine business practices around the world and five illustrative decision-focused case studies about sustainable wineries. Among those case studies, one presented “live” at the conference: the winemaker and Director of Marketing and Communications for one of the wineries, Puerta del Viento (Spain), described their experiences in starting a sustainable wine venture in the Bierzo region.

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### 1. Concepts

The global wine industry, which is comprised primarily of small-medium enterprises (SME), has survived numerous environmental jolts in during its long evolution in the Old World (Europe) and relatively shorter existence in the New World (Australia, New Zealand, South Africa, South America, and the United States). Wine businesses today confront survival threats from the natural world such as rising energy prices, water scarcity, mounting concerns about chemical exposure, and climate change (Guthey and Whiteman, 2009; Hertsgaard, 2010). Mitigating these threats involves many different actors and institutions in the winery owner or manager’s decision to formalize a business case for sustainability. Stakeholder pressures can drive adoption of sustainable practices, which, in turn, can result in product innovation, pollution prevention, and stewardship of natural resources (Berns *et al.*, 2009; Carrillo-Hemosilla *et al.*, 2010).

As the scope and intractability of an environmental problem rise, so do opportunities for innovation of sustainable processes and products in the pursuit of a sustainable competitive advantage (Porter and Van Der Linde, 1995). Such process and product innovations may be positively related to business performance (Nguyen and Slater,

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2010; York and Venkataraman, 2010). Prior researchers have found that business age, size, and ownership (public v. private) are related to investments in sustainable systems (Elsayed, 2006; Melnyk et al., 2003; York and Venkataraman, 2010). Because of the huge sunk cost associated with these investments, incumbent businesses may resist adoption due to fears of cannibalizing existing product lines and instead elect to pursue only those activities considered absolutely necessary for regulatory compliance (Gabzydlova et al., 2009; Hughey et al., 2005; Manktelow et al., 2002). Younger, entrepreneurial agricultural businesses, conversely, show a propensity to invest in innovations that supplant existing structures, some creating new standards for sustainable processes and products (Carrillo-Hermosilla et al., 2010; Gilinsky et al., 2008).

Successful enterprises search for a “sweet spot” where harmful environmental and social impacts are minimized, and an adequate rate of return is realized. (Nguyen and Slater, 2010). A successful business is conscious of the social and environmental impacts of its supply chain, operations, products and services, and acts responsibly to minimize any negative impacts and remain in business (Phypher and MacLean, 2009). This can involve a range of strategies, such as reducing pollutants and waste, making processes and products more efficient, or even working to ensure the company does not deplete its own supply chain. An example of the latter is found in Chapter 2 of *Green to Gold* (Esty and Winston, 2006). Unilever changed its fish-buying strategy to ensure it purchases 100% of its supply from sustainable fisheries in order to protect the supply chain and not act to deplete the ocean of fish. A sustainable business must be “born green,” streamlined to run lean, profitable and constantly re-defining itself as green innovation continues, but always with a profitable bottom line.

In this paper we relate sustainability to the wine industry and recognize that for practitioners in the wine industry, priority number one is leaving the land in better shape for the next generation. For instance, most farmers want their children and grandchildren to enjoy the land rather than working the land to get the most amount of money out of it and then discarding it. The latter is definitely not sustainable business. Among the stakeholders in the wine industry are: workers in the vineyards who could be exposed to chemical fertilizers and pesticides over long periods of time, people who live down the street from a winery, or the homes that receive the water from the river where a winery releases its used water. A wine business approaches sustainability by incorporating the following “triple-bottom line” strategy elements in its diagnosis of the situation at hand, the creation of company policies, and coherent actions:

1. Social Stewardship-Fostering a shift in the social attitude of the company to do what is “right” for the environment and its inhabitants.
2. Environmental Stewardship-Implementing practices and policies that have a positive environmental impact (e.g. EMS, energy conservation, reduced carbon footprint).
3. Financial Stewardship-Aligning the above mentioned concepts with an overarching framework that financially capitalizes on the positive benefits realized (e.g., better margins, reduced operating costs) (Savitz and Weber, 2006)

The learning objectives of this paper are to:

- Broaden understanding of success in the wine industry to include the concept of sustainability.
- Prompt researchers to develop and defend metrics for benchmarking wine business sustainability.
- Challenge researchers to analyze and compare various wine businesses to other businesses using sustainability benchmarks.
- Using case studies, provide students with practice in using managerial tools (e.g. value chain, financial, environmental scanning, and resources/capabilities analyses) to evaluate a ‘sustainable’ strategy in the wine industry.
- Induce students researchers, and practitioners alike to develop and defend recommendations to justify new investments supporting sustainability.

Sustainability may be generally defined as using business practices that are environmentally friendly, socially equitable in terms of treating employee and community fairly, and economically viable. In the wine industry this means that sustainable vineyards attempt to use organic products, but if necessary will resort to agro-chemicals to protect the crop. It also includes reducing the use of water and energy in both vineyard and cellar, which can mean an upfront investment that may take years to recoup. While to date a large percentage of wine consumers do not

seem to be demanding eco-labeled wines, many members of the global wine industry have decided to be proactive in pursuing sustainability strategies, anyway. Why? Some do this because of philosophical beliefs in preserving the environment and gifting the business to future generations, whereas others focus on wine quality and business benefits.

Thus, growth should be a subsidiary goal to sustainability—i.e., adopted when it is necessary for survival or is tied tightly to realistic objectives for profitability over time. For example, growth is essential to survival when a company must achieve the minimum level of scale or scope necessary to compete effectively as an industry goes through shakeout or changes in leadership—a situation that arises only under specialized circumstances. Growth may be integral to profitability when the wine business is striving to achieve an advantaged competitive position, or when it is taking advantage of particular changes in industry structure. In each of these cases, the challenge is to link growth to the primary objectives of survival and profitability so that the executive team responsible for implementing the strategy knows how to assess accurately whether growth generates a return over time that exceeds its costs. Another aspect to this discussion involves the differences between private and public companies. Public companies appear to “demand” growth and punish non-growth, while private companies — which comprise 99 percent of the global wine industry — are not necessarily hamstrung by the need for or absence of growth.

## 2. Global wine industry overview

While wine is a global business, wine as a product continues to be differentiated by its origin (Orth et al., 2007). An estimated 64% of the export market share is concentrated in the hands of ‘Old World’ countries (e.g. Italy, France, Spain, Portugal and Germany), while amongst the ‘New World’ producers (e.g. Argentina, Australia, Chile, New Zealand, South Africa, and the United States), United States wine businesses own an estimated five percent share of the world market (USDA, 2007). Growth in global demand is mainly being driven by a shift in consumers’ preferences and lifestyles in some established consumer markets, such as the United States and United Kingdom, or by new consumers in emerging markets, such as Brazil, China, India, or Russia. Consumption in traditional ‘Old World’ wine producing nations, such as Italy or France, has been decreasing in the first decade of the 21st century.

After a period of unprecedented and sustained growth from 2002-2007, many wine producers around the world sought an edge via implementation of EMS and proclamations of sustainability. These steps were taken in order to differentiate their brands and also to reduce costs in the immediate aftermath of an unprecedented 2008–2009 industry downturn (Atkin et al. 2012). Many wineries during this period contended with financial difficulties due to market saturation. Almost all wine producers experienced downward pressure on prices and margins. Some industry observers opined that wine producers faced a newly ‘hyper-competitive’ trading environment, with attenuated profits (McMillan, 2012). The rate of new brand introductions slowed in 2009 and 2010, in a period when wine wholesalers and distributors were struggling to sell off a backlog of wine inventory and thus less receptive to taking on new wines to sell (Penn, 2011). The premium wine-producing regions of the United States, Italy, and Spain, among others, were not immune to these trends.

By 2007, there were 95,000 hectares (ha) of organic vineyards around the globe, representing approximately 2.3% of all vineyards under cultivation. The vast majority of organic vineyards were in Europe: 85,000 ha of vineyards, 2.5% of all vineyards under cultivation in that continent, were organic. Outside of Europe, the United States and Chile were the only two countries that had converted a significant percentage of vineyards to sustainable farming practices — biodynamic or organic (Willer and Kilcher, 2010).

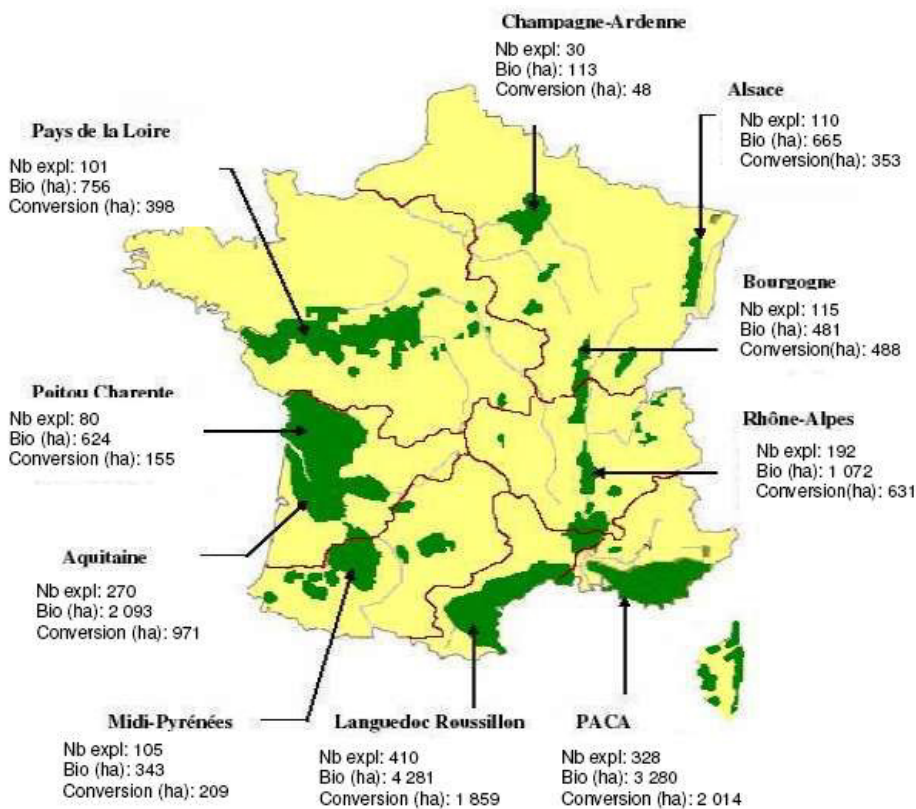
### 2.1 Argentina

According to the most recent government statistics, Argentina has only 3,000 hectares of organic vineyards (PROARGEX, 2009). It has been estimated that roughly US\$1.6 million worth of this product was exported in 2008 (Friel, et al., 2014). Experts argued that exports of organic product would grow by 40% from 2008 to 2009 (PROARGEX, 2009). Argentina boasted 35 wineries that had been certified as organic by 2009, as well as an additional seven wineries in the process of being certified at that time. The main importers of organic wine from Argentina were the EU, Canada and the U.S., while China and Japan were becoming increasingly important markets for Argentinian organic wines.

## 2.2 France

The French National Agency BIO for the Development and Promotion of Biological Agriculture report (2013) indicated that in almost twenty years, from 1995 to 2013, the surface under bio vineyards in France has grown more than five times, from 4,854 hectares to 29,510 ha (Bouzdine-Chameeva and Krzywoszynska, 2014). Since 2006 the conversion of vineyards to organic or bio vineyards has been accelerating in France, and the annual rate of conversion varies between 20-25% per year, while the entire conversion process takes at least three years. This growth is even more striking in the light of the shrinking total surface of vineyards in France. Regardless of the recent growth, organic grapes represent only about 4 percent of all French vineyards. The major French wine-growing regions particularly involved in this process include the Mediterranean regions of Languedoc-Roussillon and Provence-Alpes-Côte d'Azur, followed by Bordeaux in the Aquitaine region. See Figure 1.

**Figure 1: The surfaces under bio wine production in France in 2012**



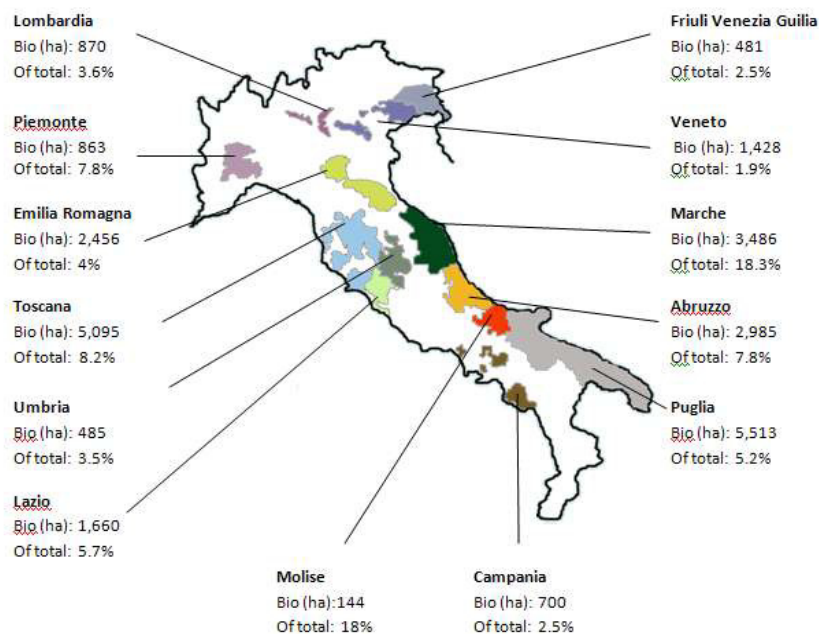
Source: Agence BIO, 2013

Many small vineyards in France, and in Bordeaux in particular, are managed with methods similar to organic techniques following local traditions and minimising the use of chemicals. Since 1990 the term "viticulture raisonnée or reasonable vine growing, has been used more and more widely to stress vine cultivation with minimum chemical input, and only in extreme situations. The major importers of French natural wines by volume are the USA, the Scandinavian countries and Japan.

### 2.3 Italy

Italy became the largest producer of organic agricultural produce in the EU-25, accounting for nearly 18 percent of total organic crops (Bouzdine-Chameeva and Krzywoszynska, 2014). Well before formal organic conversion and certification in the 21st century, Italian vineyards were managed with methods similar to organic techniques. Personal health concerns figured strongly as a reason to turn to organic wine production. There were no established sales channels for organic wines at that time, and hardly any consumer demand. Producers developed their sales networks by attending organic products trade fairs in Northern Europe, where the market continues to be much more developed than that in Italy. By 2008, there were 48,480 ha under organic viticulture, of which 39,819 were winemaking vines. There has been an increase of more than 34 percent in the amount of land covered by organically grown vines between 2008 and 2012. Regionally, 50 percent of the organic vineyard surface is concentrated in the South of Italy, 34 percent in the Central regions and 16 percent in the North. See Figure 2.

**Figure 2: The surfaces under bio wine production in the main vine growing regions of mainland Italy in 2012 (data SINAB 2012 and MIPAF 2012).**



Source: Agence BIO, 2013

International organic trade fairs such as BioFach in Nuremberg and Millesime Bio in France continue to be some of the most important events on the organic wine calendar, allowing for the development of new market relationships both for producers and retailers.

### 2.4 New Zealand

The promotion of New Zealand wines reflects the importance of the natural environment to New Zealand Winegrowers and their members (Forbes and De Silva, 2015). The New Zealand wine industry has had a significant focus on environmental sustainability in recent years, led by the New Zealand Winegrowers. Sustainable Winegrowing New Zealand (SWNZ) was a formal environmental management system (EMS) that was introduced in 1997, firstly to certify vineyards and more recently for winery operations. SWNZ was based on a scorecard approach, using benchmarks to continually improve the sustainability of both vineyards and wineries. The program

was designed to provide quality assurance, address consumer concerns, protect New Zealand’s wine export markets, and provide a best practice model for producers. Although adoption of any environmental management system (EMS) is voluntary, New Zealand Winegrowers encouraged its members to adopt SWNZ or some other certified program such as ISO 14001, organic or biodynamic standards. Since 2010, participation in certain events or entry into awards has been restricted to those who have produced wines under a recognized environmental sustainability program, thus putting members under pressure to ‘voluntarily’ adopt an EMS. This has resulted in over 90 percent of the national vineyard area now being produced under SWNZ certification. In addition, seven percent of the total vineyard area was by 2014 classed as certified organic, and this was expected to grow to 20 percent by 2020.

### 2.5 Spain

Spain claims to be the leading country engaged in organic viticulture, owing to its 57,000 hectares of land in production of organic grapes, which in turn represents five percent of the total grape production nationally. Spanish organic grape producers added 3,000 hectares alone in 2010 (Stolz and Moschitz, 2013). From 2007-2012, eco-farmed grapes have grown by 230 percent in volume with the region of Castilla-La Mancha leading the way (Cuilhé and Martínez, 2013). A “green revolution in winemaking” began in the 1970s, when Josep Ma Albet Noya converted the region of Penedès (Barcelona) to sustainable farming. Alvaro Palacios, Telmo Rodriguez, and Peter Sisseck, Bodegas Torres, and other distinguished wine producers later helped to promote the evolution of biodynamic farming in Spain (Martinez, 2013).

### 2.6 United States

To many players in the United States wine industry, investments in sustainability could be seen as ways to reduce costs and meet the ‘triple bottom line’ (Brodt and Thruppp, 2009). As of early 2011, some 1,237 California vineyard and 329 winery owners voluntarily participated in the Sustainable Winegrowing Program (SWP), despite widespread perceptions that sustainable farming practices increased the cost of production and lowered crop yields (Gilinsky, 2012). According to the Napa Valley Vintners Association Napa Valley boasted 404 premium wineries in 2011, of which 60 were classified as ‘Green’ or ‘Sustainable’ in some fashion (Gilinsky, 2012). Indicating the salience of disseminating best practices on sustainability and EMS to the regional wine industry, on 15 January 2014, the Sonoma County Winegrowers unveiled a three-phased plan to become the nation’s first 100 percent sustainable wine growing region by 2019 (Busewitz, 2014).

## 3. A review of the literature on sustainable wine businesses

A sustainable strategic position, according to Porter (1980), requires managers to choose between trade-offs (Porter, 1980). The conventional wisdom circa 1990 held that investments in improved environmental performance would reduce profits due to increased costs, reduced quality or increased lead-time. Porter started a shift in producers’ attitudes towards environmental responsibility maintaining that pollution was simply waste that diminished value and indicated problems in production processes and products (Porter, 1991), thus eliminating pollution waste would actually improve competitiveness.

There has been a steady movement of wine businesses toward sustainable farming and business practices, whether organic, biodynamic, or a combination; and these environmental strategies can work toward a differentiation of their brand at retail or serve to optimizing the economic return on investments with cost reductions (Steinthal and Hinman, 2007). Researchers have sought to empirically prove theories advanced by Porter (1980, 1985) and Barney (1997) to determine if there are linkages between perceptions of the need for sustainability strategies and a clear business case for implementation of those strategies (Barney, 1997). See **Table 1** for a summary of prior research applicable to this study and the perceived benefits of a sustainability strategy.

**Table 1. Abridged summary of prior research into perceived benefits of a sustainability strategy.**

PERCEIVED BENEFITS OF A SUSTAINABILITY STRATEGY	Author(s)
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<p><b>Cost reductions</b></p> <p>Relative price: eco-efficient materials, re-use by-products, high process yields  Relative share: radical process innovations to disrupt mature markets  Barriers to entry: lowest price and lowest impact on environment</p> <p><b>Manifestations of competitive advantage</b></p> <p>Scale economies, learning curve, differential low-cost access, waste minimization, technological innovation, structure, employee retention and compensation</p>	<p>Porter (1991)  Barney (1997)  Sroufe (2000)  Orsato (2006)</p>
<p><b>Differentiation</b></p> <p>Consumer perception: clear benefit or environmental value  Product/service uniqueness: difficulty of replication or imitation by rivals  Consumer confidence: reputation, loyalty/retention, life cycle value</p> <p><b>Manifestations of competitive advantage</b></p> <p>Product features such as organic or biodynamic, clear linkages between environmental management and business functions, early entry timing, location, product mix, inter-firm linkages, improved service, image</p>	<p>Wood (1991)  Porter &amp; Van der Linde (1995)  Barney (1997)  Waddock et al. (2002)  Reinhardt (1998)  Orsato (2006)</p>

Source: prepared by authors for this paper.

In strategic management, according to the resource based view (RBV) theory, sustainability practices can serve as part of a firm's capabilities that contribute to performance (Wenerfelt, 1984; Barney, 1997; Peteraf, 2003). The RBV starts with the assumption that the desired outcome of managerial effort is the establishment of a sustainable competitive advantage. The basic elements of an effective EMS are described in ISO 14001 standards, and as such, ISO 14001 certification can be thought of as an intangible resource that improves the quality of management in order to provide operational efficiencies (Delmas, 2001).

Prior studies of wine businesses and sustainability have been primarily descriptive and have focused on the internal, external, and strategic factors leading to implementation of environmental management systems or EMS (Hughey and O'Connell, 2005; Marshall et al., 2005; Fearn, 2009; Gabzdylova et al., 2009; Raffensberger and Catska, 2009; Marshall et al., 2010; and Dodds, et al., 2013). Some studies have examined eco-labeling or eco-branding product differentiation strategies to ascertain if those attributes enable a wine brand to stand out in a crowded fight for "mouth share" (Brugarolas et al., 2005). Related research into wine businesses and sustainability has focused on the factors leading to adoption of EMS (Atkin et al., 2010), as well as impacts of country of origin on consumer perceptions, evaluation of wines, or brand image (Chaney, 2002; Guidry et al., 2009).

There have been relatively few comparative global studies on sustainability strategy in the wine industry (Marshall, 2010; Grimstead, 2011; Gilinsky et al., 2015). Research has yet to uncover whether or not firms' pronouncements on sustainability match their actions, and if so, to what extent country location impacts these strategic decisions.

Prior research into EMS tools, such as ISO 14001, have found that they have the ability to provide economic benefits to certified firms in terms of competitive advantage as well as improving environmental performance (Corbett and Kirsch, 2001; Bansal, 2009). Direct financial benefits might include a reduction in regulatory fines and increased operational efficiencies. Certification can also indicate that the company has a sound environmental system in place to placate external stakeholders such as customers, investors, and regulatory agencies.

An expanded version of RBV theory is the natural resource based view, one that includes a firm's environmental practices. Prior studies based on the natural resource based view construct involved large United States manufacturing firms. These studies link enhanced environmental practices with improved economic, operational, and environmental performance based on managerial perceptions of sustainability that can be achieved, perceptions of the advantages to be derived from implementing sustainability, and the impact of location on managerial choice (Melnik et al., 2003; Rao and Holt, 2005; Sroufe, 2003). We now examine each of these concepts in turn.

### 3.1 Perceptions of sustainability

Grimstead (2011) posited that the global wine glut leads to a focus on cost reduction and initiatives to achieve competitive advantage of environmentally certified wines. There is evidence that capabilities for process innovation and implementation, central to deployment of EMS, are complementary assets that moderate the relationship between best practices and cost advantage, a significant factor in determining firm performance (Christmann, 2001). Prior to the advent of new technologies (i.e., recycling, energy efficiency and self-sufficiency, Internet), it was difficult for SMEs to pursue cost advantages. Within the past 15 years smaller companies such as Cirque du Soleil, Trader Joe's, and [ yellowtail ]® wine, have introduced high quality differentiated products for lower prices through innovative use of new technologies, whilst sustaining a cost advantage over rivals (Chan and Mauborgne, 2005).

### 3.2 Perceived advantages of implementing sustainability

Implementing a sustainability strategy also can enable a company to create a unique or differentiated product, one which customers perceive as innovative or of higher quality in some way that is important to them, and which in turn allows the company to charge a premium price for its product or service (Hill and Jones, 2010). Previous results, mostly relating to large firms, suggest that some larger firms have difficulty in obtaining competitive advantages through environmental proactivity (Russo and Fouts, 1997; Sharma and Vredenburg, 1998).

For the smaller, more agile firm, however, doing so can generate a set of capabilities that facilitate certain innovations in product development (Gilinsky et al., 2008). Proactive environmental management can provide wineries with a competitive advantage via differentiation of their products (if the company's products are produced without lasting harm or environmentally-friendly) and by increasing the firm's reputation as a good corporate citizen. A consumer's trust in the winery and brand equity for the winery may increase when wineries adopt proactive environmental policies (Nowak and Washburn, 2002). Consumers may consider as unique or innovative those products that are sustainably produced and environmentally munificent.

### 3.3 Location impacts

Distinguishing their product based on the geographic origin of the grapes provides wineries opportunities for product and quality differentiation and resulting additional revenue (Thode and Maskulka, 1998). Researchers investigating wine producers from Spain that were facing survival and global competition posited that managers of wine businesses in that country should employ differentiation strategies through marketing the country origin as well as its organic production (Bernabeu et al., 2008).

We now turn to the case studies presented.

## 4. The cases

Research relating to sustainability strategies adopted by the wine industry has shown mixed results in prior cross-country studies. Researchers in California and New Zealand found that external pressures had no impact on differences in the level of success wineries and vineyards achieve in implementing environmental practices. Researchers in Australia and France found significant differences between the two countries. Australian wineries rated themselves higher in growth strategy and perceived innovation environment than French wineries (Jordan et al., 2007). More highly successful wineries in California and New Zealand perceive internal pressures to be greater than less successful wineries (Marshall et al., 2010). Development of an EMS may be more likely to generate proactive, beyond-compliance initiatives on the part of New Zealand wineries, as opposed to reactive responses to new regulations or stronger enforcement of existing regulations (dodds et al., 2013).

One mechanism to increase such awareness among winery owners across the globe could be sharing of best practices of EMS, i.e. those that have a likely impact on decreasing production costs and/or increasing wine quality. Future investigations are needed to ascertain any longitudinal impacts of sharing best practices on sustainability and cost reduction and/or quality improvement. Future investigations of market sensitivity to environmental or sustainability issues and producers' attitudes and practices in other wine-growing regions in the United States, Italy,



and Spain, as well as in countries, could prove fruitful. Timing of this investigation may have distorted perceptions of the importance of investment in EMS, as the wine industry had just weathered and was emerging from a global recession in 2008-2010. Although the costs of implementing sustainability strategies may well be immediate and measurable for a winery, the benefits may be long term and thus difficult to capture using a cross-sectional methodology, so longitudinal studies are clearly needed (Stegner, 2000).

The four case studies that follow, however, provide some longitudinal evidence that there are different regional approaches to becoming a sustainable wine business, not to mention a variety of decisions that need to be made to keep the business sustainable for the next generation of owners. Let's now hear the stories from the founders of these businesses. Space limitations, difficulties in obtaining permissions from winery owners, and the general unavailability of cases about sustainable wine businesses prevented us from including a current representative case from every region of the world. Moreover, we present two cases from Spain to compare an aspirational winery's approach to sustainability — "Puerta del Viento" — with a more established winery's approach — "Bodegas Pirineos."

The four case studies covered include:

#### *4.1 Bodegas Pirineos (Spain)*

Bodegas Pirineos Ltd, was founded in 1964. Its ownership was shared by Grupo Barbadillo (76%) and by the partners of the grapes cooperative (24%). The winery managers and owners were committed to promoting other objectives than profits (e.g. social responsibility, agriculture needs, environmental respect, sustainability, innovation). At the winery, efficiency has increased; the human resources are not only more motivated but most of them have also adopted sustainable principles outside the work environment; grape suppliers maintain their incomes; a number of international intermediaries consider Bodega Pirineos better than before; and relations with the rest of stakeholders and the society has also improved.

#### *4.2 Frog's Leap Winery in 2011: The Sustainability Agenda+ video (California)*

From 2000–2010, John Williams, co-founder and winemaker of Frog's Leap Winery in Rutherford, California made investments in dry farming, organic and biodynamic agriculture, geothermal and solar power, year-round employment and benefits for immigrant workers, and the industry's only LEED-certified tasting room. Wine production remained static over the decade, but cased goods inventory and company debt load increased. To generate cash flow, Frog's Leap innovated a "wine-by-the glass" program using kegs and initiated a "Fellowship of the Frog" wine club. In May 2011, Williams considered options to grow "while remaining small," become more sustainable, and assure Frog's Leap's transition to the next generation. The written case and video case were developed for use in tandem to provoke student debate over how success should be defined and measured.

#### *4.3 Lime Rock Wines (New Zealand)*

In 2000, Rosie Butler returned to New Zealand with her Australian husband Rodger Tynan. They settled on Rosie's home region of Hawkes Bay as the place for them to establish their wine business. Their aim from day one was to combine Rosie's winemaking education and experience with Rodger's Masters in Ecology to produce premium quality wines with a strong focus on sustainability. Based in the Hawkes Bay region, Lime Rock Wines was typical of most New Zealand wine businesses; it was a small, privately held company owning a vineyard of 10 ha and with annual wine sales of less than 200,000 litres. A range of varieties had been planted in the Lime Rock vineyard, primarily Pinot Noir, but also Sauvignon Blanc, Pinot Gris, Merlot, Gruner Veltliner, Cabernet Franc and Riesling. The company's wines were sold domestically at cellar door and website. Lime Rock also exported into the Australian, United Kingdom, United States and Asian markets. The biggest barriers to increasing the sustainable practices included (1) cost, (2) a lack of management time, (3) the amount of paperwork associated with compliance, and (4) the lack of sustainable input products that were available.

#### 4.4 Puerta del Viento (Spain)

*Puerta del Viento* Organic Wines (PdV) has made wine since 2009. The wine is made by Jorge Vega, a wine grower from the Bierzo, who produces handcrafted wines using organic farming. Vega had to answer many questions, make fermentations in different parts of the region, see to detailed analysis of our plots of land and deal with many more issues. Mencía and Godello Organic wines was the market niche of Puerta del Viento because in its appellation they are only five organic wineries and our varieties only grow in the Bierzo and in a smaller appellation near this region. But gaining consumer acceptance was proving to be difficult for Vega and his wines.

### 5. Conclusion

Sustainable wine businesses are being crafted around the world, fulfilling the industry's number one priority - leaving the land in better shape for the next generation. By examining four case studies of wineries in both the Old and New Worlds (available from the authors), students and scholars can learn how to develop and defend metrics for benchmarking wine business sustainability and justify new investments, as well as analyze and compare various wine businesses to other businesses using sustainability benchmarks. By implementing a 'sustainable' strategy in the wine industry, future generations can benefit from growth, long-term profitability, and continuing success of the wine industry for years to come.

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