Communication

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Using sustainable development actions to promote the relevance of mountain wines in export markets

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Abstract: Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987). For the business community, sustainability is more than mere window-dressing. By adopting sustainable practices, companies can gain a competitive edge, increase their market share, and boost shareholder value (IISD, 2013). The wine industry has incorporated sustainability into its business strategy for a long time. In the USA, several industry organizations promoted its adoption by both grape growers and winemakers. In mountain wine regions, sustainability becomes more important as these regions generally struggle with reduced competitiveness due to inherent difficulties such as accessibility, remoteness, sparseness of business and population, topography and pedoclimatology (EUROMONTANA 2005). Therefore, any improvement in sustainability is a key factor for the viability of mountain wine producers. Sogrape Vinhos farms 480 ha of mountain vineyards in DWR securing the quality base of grapes for its SANDEMAN Port and CASA FERREIRINHA Douro wines. The company continuously adopted sustainable practices across the whole value chain, from grape to glass. This paper illustrates how a simple, but comprehensive, sustainability assessment, as proposed by a US-based award, can be used to monitor and improve sustainable development practices for a wine business set in an adverse environment, while raising awareness in a key market for wines produced in a mountain vineyard area such as the DWR.

Keywords: viticulture, mountains, sustainability, competitiveness, resilience

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1 Introduction

Sustainable development has become a major management concept since the so-called Brundtland Commission first drafted its concepts, objectives and expected outcomes at a global level (UN WCED 1987). Furthermore, the United Nations subsequently adopted that approach as a strategy for the global development of mankind without resource depletion - Millennium Development Goals (UN Millennium Project 2005) – resulting in the concept trickling down to the national, regional, and community level, becoming a major framework used today by all types of organizations with a view to the medium- and long-term.

Today, most business sectors view sustainable development as a way of ensuring continuous growth (of turnover, profit and results) even if that means not maximizing growth to the same degree as would happen if sustainability was ignored. By adopting sustainable practices, companies expect to extend their competitive edge, market share growth and shareholder value (International Institute for Sustainable Development 2016) in the longer term, ensuring good business health despite challenges or even contrarian forces.

Incorporating principles from economics, environmentalism and social sciences, sustainable development offers a framework for development planning that seeks to maximize economic value using the least possible resources, while integrating the social community upon which it depends as a vital stakeholder. Dubbed the «triple bottom line» approach (Elkington 1997), sustainable development circularizes processes by avoiding as much as possible the extraction of new resources from nature and by trying as much as possible to reuse end-of-cycle by-products and recycle waste for the same or other production processes.

The global wine industry has long recognized the benefits of such an approach. Like any other farm-based production, being dependent on natural resources (plants, water, soil, sunlight) for its production and on manual processes for a great deal of its activity, wine producers have traditionally sought to balance their needs

with the conservation of the natural environment that surrounds them and the communities that provide them with much needed skilled labor. Nevertheless, the post-WWII drive for efficiency and continuous growth at any cost also extended to this industry. Intensive production was achieved by increasing the usage of fertilizers and machinery, selecting high-yielding genotypes of grapevines, using phytochemicals to wipe out competing weeds, destructive pests and diseases, allocating water to increase production value, etc. By the 1970's, the same imbalances observed in other crops began to be visible in many winegrowing areas: soil depletion and compaction, genetic erosion, biodiversity loss, emergence of resistant and more virulent pests, decrease in water availability and quality translating into a loss of economic resilience after just a few decades (Carson 1962). Some groups advocating a more environmentally-friendly viticulture started to propose a different approach (organic or biologic farming) (Willer and Zanoli 2000) but, because they were too focused on countering the damage done by the uncontrolled economic exploitation of resources, they more often than not advocated radical environmental approaches that lacked economic viability. Resistance against this environment-centered approach soon grew among grape growers and wine producers, making organic viticulture something of a niche (Iselborn et al. 2016). More recently, however, novel approaches providing a balance between economic viability and environmental protection have been deployed and are gaining strong political support (Mariani and Vastola 2015). These approaches (Integrated Pest Management - IPM, Integrated Production – IP, proposed by the International Organization for Biological Control) furthermore complement their proposal with overarching social principles (training and education, worker safety and hygiene, etc.) that make the work force an essential part of its application (Boller and Malavolta 1999). In the USA, famous for its long-lasting debate between climate-change whistleblowers and deniers (Farrell 2016), several industry-based organizations have been promoting the adoption of sustainable practices by both grape growers and winemakers (California Sustainable Winegrowing Alliance in 2004; Robert Mondavi Institute in 2012) for over 10 years. Once farmers obtained funding to support the initial adoption of this approach, the same practices became the wine industry's main starting point for sustainable development. This resulted in certification schemes being introduced in most wine producing countries, effectively allowing producers to evaluate and improve their sustainability.

Among wine regions, those set in mountainous territories arguably offer the most challenging environments for wine production. Because these regions provide reduced profitability and competitiveness due to inherent difficulties such as accessibility, remoteness, sparseness of business and population, topography and pedoclimatology (EUROMONTANA 2005), producers must deal with higher costs of production and lower yields per surface unit, both factors putting pressure on business margins (Tudisca S. 2011). Yet, some mountainous wine regions provide some of the most characteristic and high-quality wines in the world (Rheingau, Wachau, Valle d'Aosta, Priorat, Bierzo, Douro, Madeira, Tupungato), and have an important consumer base driving wine sales at the global scale (Rebelo J. 2013). Producers set in these regions, therefore have to navigate a delicate balance between sales, price points and production costs, often having to deal with severe blows to their profitability from new or increased production challenges (like climate change) or market volatilities (like changing consumer trends) (Cots-Folch et al. 2006; Rebelo and Muhr 2012).

In the Douro Wine Region (DWR), two wine appellations co-exist: Port, which is wine made by adding alcoholic spirit to fermenting grape must, and Douro, which is regular white or red wine. The style and taste of these wines depends on the natural conditions of the mountainous territory where vineyards are cultivated and grapes grown: a rugged relief along the Douro river valley, with deep gorges and narrow valley bends, very steep inclines and a hard, shallow, schist soil baking under unforgiving summer temperatures. Yields are traditionally low and growers have learned to tackle both abiotic and biotic challenges the best way possible using available resources. The Port wine appellation is the oldest in the world, having been created in 1756 to ensure economic stability for businesses and farmers. The fact that a thriving export business (€361 million in 2016 - (IVDP 2017)) still exists there after more than 250 years, testifies to the sustainability of wine production in this region, despite the challenges it has faced during the centuries: remoteness, sparse population, distance to export markets, exotic pests and diseases, variety adaptation, etc. More recently, the region also succumbed to the drive for higher production efficiency, trialling and adopting a range of farming innovations that promised to increase margins: fertilizers, phytochemicals, irrigation, plantation of single variety and single-genotype vineyard blocks, mechanization, etc. However, it soon became clear that the imbalances which occured with most of these techniques posed severe threats to the economics of a region used to considering and planning for the long-term.

In 1982, a group of leading wine producers invested in creating an association with the goal of investigating

the best technical options that offered sustainable advantages (ADVID – Associação para o Desenvolvimento da Viticultura Duriense). This association has been a major driving force for the adoption of IPM, IP and organic farming strategies in the region. It has developed pioneering work in water allocation management (Pôças et al. 2015), biocontrol of pests, the use of natural diversity in support of landscape management and the reduction of chemical inputs in vineyards (Carlos et al. 2013). Yet, its most relevant contribution has been continuous training and education for all actors in the region (workers, farmers, viticulturists, winemakers, enologists, managers), which has effectively maintained the region at the technical forefront of wine production. The DWR was the first wine region in Portugal (and one of the first in the world) to have a detailed 1 km^2 resolution map for climate change forecasts until 2080 (Jones 2012).

Sogrape Vinhos is the leader of the Portuguese wine sector, producing wine, among other regions, in the DWR, where it farms 450 ha of prime mountain vineyards. Grapes coming from those vineyards are used in the production of two of its most emblematic wine labels: SANDEMAN Port and CASA FERREIRINHA Douro wines. Concerned with the continued challenges that production faces in DWR, it is one of the most committed supporters of ADVID and has been one of the earliest adopters of most innovations proposed by the association. Integrated Production practices are deployed and certified in its entire vineyard area, and other sustainability practices have been included in its practice for several years, from vineyard management, through to wine production and all the way to end-of-life activities in the market.

In 2015, these practices were recognized by the only international award for sustainability in the wine business in the world: the International Award of Excellence in Sustainable Winegrowing of the Botanical Research Institute of Texas (BRIT). Both SANDEMAN and CASA FERREIRINHA wines, produced on the rugged mountain slopes of the DWR, were awarded gold medals for the sustainability practices employed in their production and for the quality of the final wines. The criteria for the award include innovative, sustainable practices and the applicant's impacts on air, water, and land in winegrowing and winemaking, as well as socially responsible business practices. BRIT evaluates applicants using a "place-based" evaluation system to determine the ranking of awardees.

Being based in Texas, USA, BRIT offers an important accolade, boosting visibility of its awardees in what is today one of the most important wine markets in the world. In fact, the USA are the largest importer of packaged wines in the world, garnering an import value of more than US$4 billion in 2015 and a Compound Annual Growth Rate (CAGR) of approximately 4% between 2010 and 2015 (Unione Italiana Vini 2016). Additionally, the USA have recently overtaken France as the country with the highest total consumption of wine, becoming world leader with 31 million hectoliters consumed in 2015 (OIV 2016). Representing less than 10 L per inhabitant, there is still much room for growth of consumption in this country, making it arguably one of the most promising markets for wine in the years to come.

In the USA, it has been demonstrated that consumers' intentions to purchase wine are affected by their trust in the business and its product (Bonn et al. 2015). US-based awards, such as the one used in this work, may build trust in US consumers for wines produced outside the USA.

In this paper, we focus on the sustainability practices that were presented in the award application, and discuss the importance of communicating sustainability practices for improving awareness, relevance and profitability of challenging viticulture environments, such as mountain wine regions, for key wine markets such as the USA. This case-study should provide insights for other businesses set in similarly challenging environments to use information and communication on their actions to overcome hurdles as key selling points that have potential to improve their bottom line.

2 Material and methods

Criteria-based self-assessment has been shown to promote achievement when it is used as a formative assessment applied to work in progress (Andrade and Valtcheva 2009). The BRIT award rules of participation take a controlled approach to self-assessment in a «trust but verify» basis (Acharyia 2016) as it asks the applicant to submit their self-assessment for several sustainability criteria, supported by documented objective evidence and, eventually, assessing market success by judging the quality of the wine resulting from sustainable production.

The target of the assessment were two wines with vertical production inside the company in the DWR. These two wines applied to BRIT for award recognition. In this way, 18 high-level self-assessment questions focused on the three tenets of sustainability: environmental, social, and economic aspects, addressed by a multidisciplinary in-house team including elements from viticulture, quality and environment, enology, sales and marketing and human resources departments. The team was supervised by two senior management officers. In total, 10 people of the company's organization were involved in this team.

The 18 questions were grouped as follows:

Environmentally Sound Sustainability in Viticulture (Winegrowing):

1. Seed Selection, Preservation, Diversity
2. Agricultural Protocols for Water Savings
3. Agricultural Protocols for Soil Conservation
4. Agricultural Protocols for Energy Savings
5. Agricultural Protocols for Integrated Pest Management (IPM)

Environmentally Sound Sustainability in Viniculture (Winemaking):

6. Winemaking Protocols for Water Savings
7. Winemaking Protocols for Soil Conservation
8. Winemaking Protocols for Energy Savings
9. Winemaking and Facility Protocols for Integrated Pest Management (IPM)
10. Packaging Protocols for Waste Reduction
11. Program for Reducing Carbon Emissions (CO2e)

Ecopreneural Programs / Social Responsibility:

12. Sustainable Customer Service Practices
13. Plan for Continual Improvement
14. Corporate Social Responsibility Program
15. Green Facility Programs and/or Certifications other than Winemaking
16. Closing the Loop Programs, Including Post-Consumer Take-Back Programs
17. Support of Research and Education to Enhance Your Community's Environment
18. Leadership in Communication of Sustainable Best Practices

All 18 questions were evaluated in a scale of 0 (no procedure in place) to 10 (demonstrated sustainability best practices in place). Evaluation was conducted in January 2016 considering procedures in place until the year of 2015 and documented results obtained from measured indicators.

For each question, a self-evaluation was conducted by one team element, typically the one whose function addressed the area of the question. The team would then discuss and agree on the final evaluation score taking into consideration the industry's best practices, reference values and indicators and the perception of improvement room.

3 Results and Discussion

Table 1 displays the summary self-evaluation score for each question, the average obtained for each of the three areas and the final overall score.

Table 1: Evaluation of scores for each analyzed criteria and average values for their respective areas. Scale of 0 (no procedure in place) to 10 (demonstrated sustainability best practices in place). Final score is the average of all values

Question n.	Subject	Score (out of 10)
Environmentally Sound Sustainability in Viticulture (Winegrowing)		**8.6**
1	Seed Selection, Preservation, Diversity	10
2	Agricultural Protocols for Water Savings	10
3	Agricultural Protocols for Soil Conservation	8
4	Agricultural Protocols for Energy Savings	5
5	Agricultural Protocols for Integrated Pest Management (IPM)	10
Environmentally Sound Sustainability in Viniculture (Winemaking)		**6.0**
6	Winemaking Protocols for Water Savings	5
7	Winemaking Protocols for Soil Conservation	9
8	Winemaking Protocols for Energy Savings	5
9	Winemaking and Facility Protocols for Integrated Pest Management (IPM)	10
10	Packaging Protocols for Waste Reduction	7
11	Program for Reducing Carbon Emissions (CO2e)	0
Ecopreneural Programs / Social Responsibility		**8.9**
12	Sustainable Customer Service Practices	9
13	Plan for Continual Improvement	7
14	Corporate Social Responsibility Program	8
15	Green Facility Programs and/or Certifications other than Winemaking	10
16	Closing the Loop Programs, Including Post-Consumer Take-Back Programs	10
17	Support of R&D and Education to Enhance Your Community's Environment	8
18	Leadership in Communication of Sustainable Best Practices	10
FINAL SCORE		**7.83**

Overall, the result was quite positive, the final average score numbering 7.83 points out of 10 possible, a good result for the first time such an assessment was conducted in-house.

For seven questions (39%), the maximum score was obtained, testifying to the implementation of best practice sustainability. The questions dealt mostly with genetic conservation of the grapevine, water conservation, integrated pest management, certifications and client relations.

For one question only (5.6%), reduction of carbon emissions, no strategies had been initiated. The reason for this was a lack of reference standards specific for the wine industry. The International Organization for Vine and Wine has been working on this standard for several years, and only produced a working standard in 2016, for the first time allowing an emissions analysis that considers the specifics of the wine industry instead of application of references from secondary sources, often ill-applicable to the wine sector. All other questions were evaluated to be equal or above 5, indicating they have procedures in place, but still with room for improvement.

Environmentally Sound Sustainability in Viticulture (Winegrowing)

In this area, the average score was 8.6, quite a high value testifying to the commitment the company shows to sustainable farming. Maximum scores were assigned to seed selection preservation and diversity, water savings and integrated pest management. The lowest scoring question referred to energy savings (5) where the company recognizes the existence of room for improvement and has already started a full investigation to identify ways to perform better. For each question in this area, assessments were as follows.

1. Seed Selection, Preservation, Diversity: there has always been a deep commitment to native Iberian varieties. National conservation efforts were supported by hosting clonal trials, with comparison and multiplication fields in the company's vineyards. The company is a founding board member of PORVID - Portuguese Association for Grapevine Diversity, a joint public-private effort to conserve, study, evaluate and deploy to growers the unique biodiversity of Iberian varieties. PORVID went from 25% of a total of 250 native varieties conserved in 2008, to 84% in 2015. The company agreed to plant and study experimental vineyards for PORVID's study of novel polyclonal selections of Tinta Roriz (Tempranillo) to improve wine quality, this variety accounting for an important share of Portugal's vineyards.
2. Agricultural Protocols for Water Savings: All vineyards have been mostly dry-farmed. Being in the heart of the Douro Valley, and making good use of site aspect and inclination, irrigation is not necessary to achieve the highest quality grapes for wines, except in extreme climates. About 18% of the total area was equipped with irrigation and there, only drip irrigation during the night was used. All packages containing chemical products were washed 3 times before recycling; after packages were washed, water was reused to dilute spraying chemicals. All farming equipment was washed with pressurized water for waste reduction.
3. Agricultural Protocols for Soil Conservation: Cover crops were used to avoid soil erosion and compaction. No herbicides were used between vine rows for more than 10 years and a 50% reduction in tractor mowing passes was achieved. A 10-ha research plot was set up to decide on the best adapted leguminous and grass species. All fuel and waste deposits were protected against spillage and equipped to separate hydrocarbons. The widespread adoption of Phytobac and Heliosec systems for the treatment of spraying effluents was initiated: 63.4 ha of land were equipped in 2015 and 71.35 ha were planned for the following years. These systems reduced heavily soil and aquifer contamination.
4. Agricultural Protocols for Energy Savings: The renewable energy share (hydro, wind, solar and others) of total energy used went from 49.7% in 2010 to 72.4% in 2014. All farming facilities implemented low-consumption light bulbs. All new lighting was installed or replaced by structures consuming 50% energy or less than previous ones. In appropriate places, high-reflective tubular skylights were installed for solar illumination of dark places. A full investigation of all buildings and equipment to further increase energy efficiency started in 2015.
5. Agricultural Protocols for Integrated Pest Management (IPM): All the company's Douro vineyards were certified sustainable under IOBC's Integrated Production (IP) scheme, IP being a higher-level voluntary standard than IPM, which it includes and complements with more holistic guidelines (Boller and Malavolta 1999). IPM became mandatory under Portuguese Law from 2014. Sustainable practices were verified against IOBC guidelines by a third-party independent company operating under an agreement with the Portuguese State and following EU regulations. IP principles cover ecological, ethical and social aspects of agricultural production as well as food quality and safety. It is one of the

highest international food production standards and unique in the way comprehensive sustainability ambitions were coupled with effective and practicable approaches on the farm.

Environmentally Sound Sustainability in Viniculture (Winemaking)

This was the lowest scoring of all three areas, with an average score of 6.0, recognizing that there is a lot that can be done to improve sustainability in the industrial transformation process of grapes into wine. The maximum score was only assigned to integrated pest management. The lowest scoring question referred to the reduction of carbon emissions (0), for which the company had no plan. Also scoring mid-range were water and energy savings (both with a score of 5). For each question in this area, assessments were as follows.

1. Winemaking Protocols for Water Savings: All winery cleaning equipment used high-pressure water to reduce consumption. The average consumption over the 2010-13 period was 3.14 L/0.75L wine. All facilities initiated a full-scale water consumption analysis covering all processes, buildings and equipment to identify optimization opportunities.
2. Winemaking Protocols for Soil Conservation: The wineries had waste water treatment plants. Fermented marcs (2011-2014: 219 ton/yr) and lees (2011-2014: 838 hL/yr) were reused as a new material by client companies. Grape stalks were composted and later reincorporated into soil as organic matter. Kieselguhr filters[1] were phased out and replaced in 2015 by a residue-free crossflow filter to stop sending diatomaceous waste to landfill.
3. Winemaking Protocols for Energy Savings: The renewable energy share (hydro, wind, solar and others) of all used electrical power went from 49.7% in 2010 to 72.4% in 2014. In appropriate places, tubular high-reflection skylights were installed for solar illumination of dark places. The average energy consumption averaged 0.16 kWh/0.75 L wine. In 2015, all facilities were subject to a full-scale energy consumption analysis of all buildings and equipment, to identify optimization opportunities.
4. Winemaking and Facility Protocols for Integrated Pest Management (IPM): Since January 1st 2014, all growers supplying grapes to the company had to start managing their vineyards under IPM guidelines certified by third-party companies accredited by the Portuguese State. Additionally, the company required written declarations for using only legally-approved, GMO-free grape varieties, keeping pesticide residue levels below toxic thresholds for humans and complying with international maximum residue limits for pesticides. All production facilities had HACCP plans (Corlett Jr. and Pierson 1992) and were certified under ISO 9001 (International Standards Office, Geneva, Switzerland). Additionally, finishing and bottling facilities were IFS (International Featured Standards, Berlin, Germany) and BRC (BRC Global Standards, London, UK) certified. The quality and safety of wines, including pesticide levels, were controlled in the company laboratory using state-of-the-art technology.
5. Packaging Protocols for Waste Reduction: The company initiated a project to adopt lightweight bottles for entry- and mid-level wines. Green glass bottles incorporated a fraction of recycled glass (51% green glass and 19% white glass). Also, shipping cartons for bottles were of reduced weight and partially made of recycled paper (35%).
6. Program for Reducing Carbon Emissions (CO2e): No program was started pending the conclusion of wine-specific guidelines by the International Organization for Vine and Wine.

Ecopreneural Programs / Social Responsibility

This was the highest scoring of all three areas, with an average score of 8.9, confirming the importance the company gives to the market, customers, consumers and the wider community around the downstream value chain. Maximum scores were given to green facility programs / certifications, closing the loop programs and leadership in communicating sustainable best practices. The lowest scoring question referred to continual improvement plans (7). For each question in this area, assessments were as follows.

1. Sustainable Customer Service Practices: There was a Client Service Team. Every second year the company assessed its clients' satisfaction through questionnaires and implemented improvements from identified opportunities. Service performance indicators were regularly shared with the team. The team met daily to analyze the previous day's performance through specific key-performance indicators and planned for the coming days by adjusting work plans and initiated corrective/improvement measures. The team interacted with clients using their own collaborative models (web-platforms, portals, websites, etc.) thus respecting their culture and strategies.

1 Filters using highly-pollutant diatomaceous earth as filtration medium

2. Plan for Continual Improvement: Environmental goals were set for 2015 and 2016 (increase energy and water use efficiency; completely terminate use of hydrochlorofluorocarbons - presently no use in industrial equipment, only some air conditioning equipment; identify and implement environmental quick wins; train the workforce in environmental issues).
3. Corporate Social Responsibility Program: The company was the main driver of the «Wine in Moderation» program in Portugal. This Europe-wide program aimed at promoting responsible wine consumption, rejecting unhealthy usage. Information was continuously provided to staff, continuously improving employees' skills, health and well-being. The company offered an in-house restaurant serving a choice of five dishes and promoted a healthy diet. Medical and nurse offices were available. An annual training program, health insurance and a pension plan for retirement were provided to employees. Employee satisfaction was assessed bi-annually. Gender-based equal-opportunity was promoted: staff comprised 43% women and 57% men.
4. Green Facility Programs and/or Certifications other than Winemaking: the company voluntarily ran a System of Environmental Management, certified under the ISO 14001 (International Standards Office, Geneva, Switzerland) standard.
5. Closing the Loop Programs, Including Post-Consumer Take-Back Programs: the company was deeply committed to reducing landfill waste by recycling a rapidly increasing amount of its waste. In Portugal, glass waste was recycled through participation in the Ponto Verde program. Internationally, many clients used similar glass recycling programs. Palettes were returned to the suppliers for reuse. Waste management protocols were agreed on with Sogilub for used oil recycling and with Valorfito for used farming chemical packages. Between 2004 and 2014, recycling of waste went from 62% to 92% of total waste production. In September 2015, a new record was set at 97%.
6. Support of Research and Education to Enhance Your Community's Environment: A dedicated R&D department coordinated research activity. There was continuous investment in R&D, developing and joining projects at the national and international level. The company joined the board of ADVID - Association for the Development of Douro Viticulture, a non-profit organization dedicated to research and training for growers of the Douro Valley, was deeply committed to sustainability research and promotion through IPM/IP programs and a collaborator of the University of California Cooperative Extension (among others). They actively partnered with schools at various levels of teaching to prepare the industry's future work force, and disseminated research results widely through participation in seminars and conferences at both national and international levels.
7. Leadership in Communication of Sustainable Best Practices: In 2008, the company assumed an active role in Social Aspects of Alcohol by publishing a Charter entitled "Enjoying wine in healthy moderation" outlining the principles of self-regulation in all marketing and sales activities to reduce the impact of alcohol-related harm. In the same year, it committed to lead the communication of "WINE IN MODERATION", the European project promoting moderation and responsibility, assuming the role of Ambassador Company in 2011. Since 2010, they have been a founding stakeholder of the Alcohol and Health Forum of Portugal with three active commitments.

Finally, wines from the company were assessed by BRIT's judging committee for the quality of their taste. The drive for more sustainable practices needs to be steered in a way that not only decreases environmental and social impacts, but also provides sound profitability sustaining the economic viability of the company. A recent study suggested that the realization of a wine's positive premiums for environmental attributes is realized only if consumers' sensory expectations are satisfied (Schmit et al. 2013). By judging the sensory quality of wines produced with the declared sustainability procedures in place, BRIT combined the three tenets of sustainability (environmental, economic and social) in the same evaluation.

The overall consideration of the 18 questions and evaluation of wines resulted in Sogrape Vinhos being awarded a gold medal by the 2016 International Award of Excellence in Sustainable Winegrowing for its SANDEMAN PORT and CASA FERREIRINHA DOURO wines, both produced in the mountain area of DWR.

Obtaining this accolade was an important factor for the competitiveness of those wines in the USA market, a market presenting a steady growth of imports for quality wine and a widening base of wine consumers. The awareness thus provided became an important visibility boost supporting the profitability of those two wines produced under the challenging conditions of a mountain viticulture area.

This first self-assessment work became the baseline against which sustainability-improving practices were

devised. Later assessments will be compared to this baseline for the evaluation of progress achieved. The final goal is to attain the maximum (diamond) medal of the BRIT award. The in-house multidisciplinary team, and the way it was managed, proved to be a fast and reliable method to conduct the self-assessment and produce the supporting evidence. Conversely, the people in the team became more aware of the sustainability performance of the organization and of their respective departments' contribution to the overall result. An unexpected result was the realization by the people involved that these sustainability evaluations provided more than just an opportunity for communication and marketing, but in fact a useful identification of value-adding practices translating into higher profitability. This, in turn, allowed them to better justify investments in improving sustainability.

4 Conclusion

Mountain regions offer challenging conditions for profitable winegrowing. In these regions, strategic sustainability practices become not just a communication issue, but rather important actions to ensure continual resource availability, sustained profitability and future growth.

The International Award of Excellence in Sustainable Winegrowing of the Botanical Research Institute of Texas is the only international prize addressing sustainability in wine production. It provides a balanced assessment of both deployed sustainability practices and sensory quality of commercial wines, using a life-cycle approach. Obtaining a high-level evaluation, such as the gold medal, from this US-based award, may thus contribute to building trust in US consumers in mountain wines, especially those coming from other countries. For Sogrape Vinhos, this award allowed strengthening of the trust of the American wine consumer in its SANDEMAN Port and CASA FERREIRINHA Douro wines.

As many mountain wine producers survive on the threshold of economic viability, the combination of both effects from sustainability practices (sustainable production and trust-building in the world's most important wine market) may offer increased resilience for their business and support for the mountain territories where they deploy their economic activity.

List of abbreviations

ADVID – Associação para o Desenvolvimento da Viticultura Duriense
BRIT – Botanical Research Institute of Texas
CO2e – Carbon equivalent
DWR – Douro Wine Region
IOBC – International Organization for Biological Control
IP – Integrated Production
IPM – Integrated Pest Management
PORVID – Portuguese Association for Grapevine Diversity

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