

REVIEW

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Sustainability in the wine industry: key questions and research trends^a

Cristina Santini^{1*}, Alessio Cavicchi² and Leonardo Casini³

* Correspondence:

santini.cristina@gmail.com

¹Faculty of Agriculture, Università San Raffaele, Via Val Cannuta 247, Roma, Italy

Full list of author information is available at the end of the article

Abstract

Sustainability is playing a key role in the wine industry as shown by the attention paid at several levels by the academia, institutions and associations. Nevertheless, the principle itself of sustainability opens a wide debate and it significantly affects firms in all their activities.

Using a systematic literature review, this paper wants to highlight some of the questions that academics must face when they approach the issue of sustainability with a specific focus on the wine industry. In particular the paper aims to: highlight where research is going and what has already been done; define the contribution of background research in explaining the determinants of sustainable orientation in the wine industry; and understand the role of research (and academics' social responsibility) for the diffusion of a sustainable orientation within the wine industry. The purpose of this paper is to provide a detailed overview of the main research contributions to the issue of sustainability in the wine industry.

Keywords: Research trends; Sustainability; Systematic literature review

Review

Introduction

The wine industry is definitely engaged in sustainability. The emerging interest in sustainability is confirmed by a growing body of academic literature as well as by the rise of new academic journals and scientific communities. Also, the industry has shown an involvement in sustainability in general; people in the wine industry wonder about the effectiveness of sustainable practices and under what conditions it pays to be oriented towards sustainability. Talking about sustainability opens up a multitude of research issues, especially in wine, where being sustainable is often misunderstood with being organic or biodynamic. This paper investigates background research on sustainability in wine; it outlines what are the main challenges that scholars must face when they deal with this research issue. After having provided a description of research trends, the paper will highlight the determinants of a firm's orientation towards sustainability and the role that research has in promoting sustainability.

So many green nuances

The word "sustainability" has so many definitions that it holds a shadow of ambiguity (Warner 2007). Sustainability can be seen as a concept based on various principles (de Bruyn and van Drunen 2004): economic principles (maximising welfare and improving

efficiency), ecological principles (living within carrying capacities and conservation of resources) and equity-principles that concern intragenerational and intergenerational equity (the disparity of wealth among different regions of the world or among generations).

(Ohmart 2008) gives an idea of how complex it is to be sustainable in agriculture: “sustainability involves everything you do on the farm, including economics, environmental impacts of everything done on the farm and all aspects of human resources, including not only you and your family but your employees and the surrounding community” (Ohmart 2008): 7.

Nevertheless, there is no univocal sustainable behaviour and some companies should be considered more sustainable than others. (Isaak 2002) distinguishes between *green* and *green-green businesses*; *green – green businesses* are green oriented since their start up, whilst *green businesses* become green after that managers- who are not inspired by ethical issues - have intuited the benefits (in terms of marketing, corporate image positive feedbacks or cost savings) that being “sustainable” might create for the company.

In a recent study, Szolnoki (2013) points to the idea that wineries have of sustainability: misunderstandings and differences in the approach between countries and wineries emerge.

Some countries are “greener” than others according to the degree of companies’ sustainable behaviour. Globally spoken, California holds a leading position among the most sustainable agricultural producing countries: Warner (2007) describes the efforts spent by the Californian wine grape industry for reaching and educating growers about quality issues and sustainability; the availability of place-based networks of production has facilitated social learning among grape growers. (Warner 2007) says: “More than any other group of California growers, winegrape growers are operationally defining sustainability as agricultural enterprise viability, environmental quality and product quality” (p.143). In Northern California there are about 40 industry organizations advocating sustainability in addition to several associations that support organic viticulture at a national level (see among others: Washington State Association of Wine grape Growers; Oregon Wine Advisory Board; New York Wine & Grape Foundation; Penn State Cooperation Extension; Wine Council of Ontario). A case worth to be mentioned is the one of Lodi region in California (Ohmart 2008) that effectively shows how a local economic system could respond to the call for sustainability: after having released a workbook programme that encompasses all the sustainable practices in winemaking, results have been monitored in order to assess how principles have been implemented and to examine action plans carried by companies and associations. The great success of the Lodi programme relies on the active involvement of growers that is the result of a successful combination of workshops, a proactive behaviour of associations and effective communication flows.

Starting from the behaviour adopted by wineries, some scholars (Casini et al. 2010) have proposed a model that would help to classify wineries’ orientation in terms of sustainability. In the model, “*devoted*” wineries have a strong orientation towards sustainability that is emphasised in customer communication; those companies must invest in customers and employees training and education; furthermore devoted wineries must ensure an alignment between their corporate and managerial visions. Another category of wineries, the so called “*unexploiters*”, stands half the way between devoted and

“*laggards*” wineries, or those who would never adopt sustainable practices. Unexploiters usually decide to adopt sustainable practices, but do not inform other people (clients, first of all) about their decision. Consequently the benefits that might be gained through a sustainable orientation are limited. At the opposite of unexploiters stand *opportunists*, wineries that do not have a particular interest in sustainability, but tend to heavily highlight the few sustainable practices introduced.

As it can be guessed, companies can choose among various alternatives: it is not only a matter of being green or not, but they can also choose among a multitude of “green nuances”.

We conceive sustainability as a behaviour adopted to respond to stimuli, whether they are external or internal to the firm. This perspective introduces three elements into the discussion: firstly, the presence and the type of stimuli or drivers; secondly, the degree of responsiveness that characterises the organization; and thirdly, a firm’s motivations.

In other words, we can say that orientation towards sustainability depends on how the following questions can be answered: Who cares about sustainability issues? How much do I and my organization care about sustainability? Why should we care about sustainability?

This paper aims to systemically analyse the main academic contributions to the issue of sustainability in the wine industry in order to outline insights that can depict strategic, managerial, consumer and organizational implications, and to highlight what are the main challenges that scholars must face when they get into this research issue. After having provided a description of where the research is going, the paper will explain the determinants of a orientation towards sustainability among firms and it will outline the role of research in promoting sustainability.

Key drivers of sustainability

An analysis of the drivers of sustainability is, in our opinion, the first step to understand the relationship between firms and sustainability. This section introduces the issue of drivers of sustainability, by highlighting the findings emerging from background research (the role of institutions and associations, the role of top management and entrepreneurs, etc.) and the role played by drivers in defining wineries’ orientation towards sustainability. We assume that an exploration of the incidence of perceived stimuli on companies’ choices represents a way for explaining firm’s behaviour; by conceiving sustainability as a behaviour adopted by firms in responding to selected stimuli, we focus on the impact that forces (external or internal to the firm) have on a firm’s strategy; being sustainable represents one of the strategic choices that firms can make. The presence of drivers affecting a firm’s orientation towards sustainability partially explains the differences in the overall degree of sustainability at a firm or at a country level. It is almost impossible to define a general ranking for estimating a country’s overall orientation towards sustainability: the numerous indexes available simply confirm the differences among countries, but it is extremely hard to classify them, because of the differences in index composition and in the trait of sustainability under observation. A focus on the key drivers of sustainability offers a balanced solution to this problem. Both academics and practitioners increasingly emphasize the issue of drivers. The

company Accenture has elaborated a list of six key drivers of sustainability, that “are not only reshaping the way businesses and governments operate, but also redefining the value they deliver” (from corporate website). The list includes: consumer demand for sustainable products and services; stakeholder influence; resource depletion; employee engagement; capital market scrutiny; regulatory requirements.

Also background research (Dillon and Fischer 1992; Lawrence and Morell 1995; Winn 1995; Bansal and Roth 2000; Davidson and Worrell 2001; Marshall et al. 2005; Gabzdylova et al. 2009) has highlighted the role of drivers – whether they are conceived as internal/external or internal/institutional - to describe a firm’s adoption of a sustainable behaviour.

Internal drivers are all those drivers that take place within the firm: they are ethical motives inspiring top management and entrepreneurs as well as strategic intentions based on the recognition of an advantage that might arise from sustainability. External drivers, instead, take place in the firm’s external environment.

Institutions, associations, regulators and market demand

External drivers happen outside of the firm and include pressures arising from institutions, customers, communities, associations, environmental groups, activists, regulators and competitors.

Background research has highlighted the role played by industry associations in creating “sustainable awareness” among grapegrowers and wineries (Broome and Warner 2008; Silverman et al. 2005; Warner 2007).

A key factor of success in spreading sustainable practices is local players’ networking capacity. In some specific areas, such as California, agro-ecological partnerships have fostered the adoption of sustainable agricultural practices (Swezey and Broome 2000; Dlott 2004) and they have proactively spread a green orientation among wineries (Broome and Warner 2008).

Environmental concerns have progressively found a diffusion among wineries and became strongly related to corporate image. New Zealand is heavily investing in environmental issues: “The New Zealand wine industry aims to be the first in the world to be 100% sustainable. The Sustainable Winegrowers New Zealand (SWNZ) programme introduced in 1995 is a framework of industry standards set up to achieve this by vintage 2012” (from the website: <http://www.newzealand.com>).

Also corporate activism should be considered, as shown by the efforts spent by individual companies for promoting practices that would reduce gas emission and waste. The case of The Wine Group, in the US, highlights the consideration that large companies give to environmental issues: in 2008 The Wine Group has launched a website (www.betterwinesbetterworld.com) to document how “Bag in Box” can help in reducing emissions and waste (<http://www.winebusiness.com>). Both the New World and the Old World face similar environmental challenges but they strongly differ in terms of fertiliser usage, that is significantly lower in Europe (<http://www.eea.europa.eu>).

The development of specific programmes for sustainable winegrowing has fostered the adoption of “ground to bottle” practices for producing grapes and wine (Broome and Warner 2008). This is highlighted by the willingness that institutions and organizations show in providing long term financial support to sustainability programmes and training activities: (Warner 2007) underlines the need for continuous investments in reinforcing a commitment to sustainability.

Institutions and regulators have a prime role in enhancing wineries' interest towards sustainability through funding the adoption of specific practices and education programmes (Swinbank 2009).

A orientation towards sustainability among competitors can foster a me-too mechanism with the result of spreading sustainable practices in the competitive environment: after that Mondavi has introduced the flange-type bottle with a C-cap on the market (Murphy 2000), other wineries in the market have shared - consciously or unconsciously - the same principles that have inspired Mondavi before the product launch.

Consumers' involvement in sustainability is also reshaping wineries' interest toward this issue, as described by (Bisson et al. 2002): "As consumers become more aware of the vulnerability of our global environment, the demand for sound agricultural production practices is increasing. In the future, the perception of the producer as a conscientious environmental steward will be an important influence on the consumer's purchasing decision. This is due in part to the fact that the typical wine consumer is well educated and affluent" (p.698). Consumers' pressure has created a market for wines inspired by environmental issues, such as organic or biodynamic wines (Forbes et al. 2009): in some countries, such as the UK, organic wine moved from a niche to a mainstream position (Sharples 2000).

Entrepreneurs and top management

Most of the research has focused on explaining the role of external drivers in enhancing a sustainability orientation within firms, but less research has been done about internal drivers.

A consistent body of research can be found in the general management and business strategy literature, that analyses the role of people involved within the organization in promoting a sustainability orientation: various issues have been investigated such as the role of top management's values in determining sustainability orientation (Berry and Rondinelli 1998; Quazi 2003), entrepreneurial commitment to sustainability (Shaltegger 2002) or management practices and principles reshaped by a sustainability orientation (Atkin et al. 2012; Warner 2007).

In some cases, niche research fields have emerged by providing a "sustainability" perspective to diffused and internationally adopted research approaches: this is the case of Ecopreneurship (ecological entrepreneurship) or the Natural Resource Based View, a version of the Resource Based View of the Firm approach mainly based on environmental issues.

Ecopreneurship is a term that has been introduced in early 1990s (Bennett 1991; Berle 1991; Blue 1990) and that renames a growing body of literature that investigates most of the critical questions in entrepreneurship from an ecological and environmental perspective. The works by Walley and Taylor (2002), Shaltegger (2002) and Schaper (2002) provide a comprehensive overview of this research field. From this research the prominent role that personality traits can have on the degree of a sustainability orientation within firms emerges: for instance, Regouin (2003) has highlighted that reasons behind a firm's conversion to organic farming depend on personal traits such as curiosity, flexibility, risk propensity and creativity in exploring innovative marketing approaches.

Although there is a growing body of academic literature that is exploring the "internal" drivers towards sustainability, only a few studies have been done on wine.

Sustainability and strategy

(Bonn and Fisher 2011) say that sustainability is often a missing ingredient in strategy: there is a great debate on corporate social responsibility, corporate environmentalism, sustainable practices adoption, green marketing, green corporate image, etc., but the issue of sustainability is not considered as priority in strategy making.

Research in wine has focused on the relationship between a sustainability orientation and competitive advantage.

It has been shown how being organic contributes to an effective differentiation (Bernabeu et al. 2008): Delmas et al. (2008) explore the case of a winery in California (the Ceago winery, owned by Fetzer), that has chosen to produce organic wine to differentiate its product from the mass; (Pugh and Fletcher 2002) examine how a wine multinational corporation (the BRL Hardy) focuses on a specific and different market segment through one of its controlled brands (Banrock Station) that supplies organic wine to the market.

A study published by Atkin, Gilinsky and Netwon in 2012 provides useful insights for understanding if incorporating an Environmental Management System (EMS) into business models positively or negatively affects wineries' performance. From the research the relevance that EMS has in pursuing a differentiation strategy for some of the wineries who employ EMS has emerged. The literature shows that little attention has been paid to the benefits that implementing EMS might have for wineries (Forbes and De Silva 2012).

The role of research

Next to the wine industry, also research in the wine business is going green. Research in the field of sustainability in wine has been fostered by the growing interest of the industry and by the active role of institutions - that funds specific research programmes - associations or individual companies. Supporting research has resulted in a renewed interest in sustainability with the final result of promoting further research. When observing some cases - such as the Washington State Wine Industry - we can say that university research has fostered the development of the wine industry (Stewart 2009). (Ohmart 2008) suggests that a successful diffusion of sustainable practices among grapegrowers depends on two factors: rigorous science and its effective delivery to grapegrowers, two issues that partially explain the differences in terms of penetration and diffusion of sustainable practices in viticulture.

In their analysis of the history of winemaking in California, Guthey and Whiteman (2009) say that funded university research has contributed to shape Californian wine production thanks to the useful inputs provided for developing winemaking practices and understanding human environment relationships.

The field of sustainability in the wine industry appears as a breeding ground for the development of academics and university collaborations: (Lee 2000) provides a general framework that can be used for describing the benefits arising from the relationship between academics and industry. In general it can be said that collaboration between research institutions and the industry (1) may be helpful in solving technical problems, (2) may facilitate the access to useful findings; and (3) may make the implementation of innovation easier. It is not surprising that industry heavily supports research in some

countries: we can cite among others the cases of the Wine and Food Institute in California cofounded by the Robert Mondavi Winery and the Anheuser-Busch Foundation and Ronald and Diane Miller of Silverado Vineyards (www.winespectator.com). Another case worth to be mentioned is the Australian Wine Research Institute, that has actively promoted research in the field of wine in general and has had a relevant role in spreading a sustainable culture among wineries. Research has been stimulated in new world countries and not only in California or Australia, as the case of Vinnova from Chile shows. Great efforts have been spent for codifying research insights and facilitating knowledge dissemination and accessibility: some countries, such as New Zealand and Chile, have developed Codes of Sustainability, to promote the adoption of sustainable practices among wineries.

Conducting research on sustainability has some social implications and researchers who are working in this field have a social responsibility: with their work, researchers can foster the adoption of sustainable practices among wineries at different levels and they can indirectly contribute to the growth of the overall welfare of people living in a certain area.

Research orientations: a selective systematic literature review

Methodology

Where is research going and what has been done? In order to answer this specific question we have carried out a systematic literature review by analysing academic databases and some wine academic journals. In particular we have performed a keywords based research in the following academic search engines: ISI Web of KnowledgeSM, Scopus SciVerse® and EBSCO (that contains Econlit, Business Source Premiere and Greenfile databases).

In our research we did not want to use generic “scientific” search engines (i.e., Google Scholars or Mendeley) and to perform a search on specific academic databases that are widely diffused among scholars.

The keywords used, combined with the word “wine” are: *green, organic, sustainable, sustainability, biodynamic, ecopreneurship, environment*. We have also selected some academic journals specialised in wine, and we have checked the presence of articles that examine the issue of sustainability in wine; the journals selected are: the International Journal of Wine Business Research; the Australian journal of Grape and Wine Research; the Journal of Wine Research, *Enometrika* and the Journal of Wine Economics. We have decided not to focus on analyses of practices: there is a wide literature on environmental and organic practices in the wine industry, but it mainly focuses on winemaking and agronomic aspects and we are interested in management, strategic and marketing. Background research has provided us useful inputs for performing our systematic literature review; in particular the works by (Lobb 2005) and (Thieme 2007) have been helpful for designing our methodology. The work by (Hart 1998) has been extremely useful for understanding how to analyse results. After having verified their contents, the articles have been included in a database that has been created for sorting and analysing results. We have then classified the articles collected into four main categories that have been built on the basis of major JEL classifications.

Topics, geographic area and research techniques employed

The main four categories corresponding to our classification of the main research bodies are (Table 1): (1) strategy; (2) entrepreneurial and top management behaviour; (3) consumer behaviour; and (4) supply chain management and certification. It is important to observe the differences emerging from the geographic area of research in which research has been carried out.

The category “strategy” includes all those articles that deal with the issues of business strategy and sustainability. It is a matter of fact that research on strategy is mainly performed in the New World Countries: Chile, New Zealand, US, Australia and Argentina lead the way to understand the links between wine and sustainability in a strategic orientation. Research techniques employed are often qualitative and case study research is frequently performed. One of the reasons could be the necessity to explore the main drivers of pressure towards sustainability taking into account the motivations and opinions of different wineries’ stakeholders. In fact, according to Flint (2009), in order to conduct such exploratory research, an appropriate methodology such as grounded theory is necessary that has been used to reveal how social actors interpret and act within their environments. In other papers, the aim is to enlighten an entire sector at national or regional level and for this reason a multidisciplinary case study approach is employed (Guthey and Whiteman 2009; Cederberg et al. 2009). The topics investigated in this category are diverse, but two trends stand out: at a country level the analysis is carried out to understand the boundaries of emerging organic wine industry and the implications to promote place branding activities; at firm level the interest is for internal and external pressures towards sustainable and environmental practices.

Even more concentrated is the research investigating “entrepreneurial and top management” drivers for the adoption or improvement of environmental behaviour: Marshall, Cordano and Silverman use the Theory of Planned Behaviour and the Theory of Reasoned Action mainly in US (California) and New Zealand wineries. Results are not univocal because the weight of internal and external pressures, attitudes and subjective norms can vary among cases and the papers give evidence of interactions among considered variables.

Contrary to the other research fields, the consumer behaviour field is investigated worldwide. Europe seems to be focusing more on consumers’ perception of - and willingness to pay for - organic wine, while the New World research is oriented to a more complex issue such as the environmental friendly label or a more general topic as green production practices. This is the category where quantitative analysis and statistical techniques are more used and developed.

Finally, research in the field of supply chain management and certification aims to give an overview of various attempts to implement codes of sustainable winegrowing practices and to reduce the impact of environment based activities on carbon emission; these studies are carried out both in the New and Old World. It is worth to emphasize the various methods employed to analyse impacts and efficiency of practices on the environment; not a single technique or tool seems to have been recognized worldwide as a standard for such measurement and thus more research is needed.

A brief final note is about the kind of journal and the year of publication: only 5 of the papers collected have been published before 2005. This highlights how “young” this field of study is. Particularly, the field of strategy seems to be the newest one.

Table 1 Topics, geographical coverage and techniques used in selected literature

Topics	Author(s)	Geographical coverage	Study tipology	Technique	Sustainability aspects
Strategy	Atkin et al. (2012)	US	Quantitative	Survey	Links between environmental strategy and performance
	Forbes and De Silva (2012)	New Zealand	Quantitative	survey	Environmental Management System
	Cederberg et al. (2009)	Chile	Qualitative	Case study at country level	Potentiality of industry organic wine
	Flint and Golicic (2009)	New Zealand	Qualitative	In-depth Interviews (Grounded Theory)	Drivers of wine industry sustainability
	Guthey and Whiteman (2009)	US (California)	Qualitative	Case study	Firm-ecology relationships
	Gabzdyllova et al. (2009)	New Zealand	Mixed	Interviews	Internal and external drivers of sustainability
	Pullman et al. (2010)	US	Mixed	Interviews	Sustainability practices
	Bonn and Fisher (2011)	Australia	Qualitative	Case study	Sustainability as a business strategy
	Sinha and Akoorie (2010)	New Zealand	Quantitative	Multivariate Analysis	Environmental practices
	Sampedro et al. (2010)	Spain	Qualitative	Interviews	Environment as a business strategy
	Warner (2007)	California	Qualitative	Interviews and Focus Groups	Links between sustainability and place-based branding
	Preston (2008)	France and Australia	Qualitative	Case study	Change in supply chain practices
	Novaes Zilber et al. (2010)	Argentina	Qualitative	Case study	Potentiality of industry organic wine
Poitras and Getz (2006)	Canada	Qualitative	Case study	Host community perspective	
Entrepreneurial and Top Management Behaviour	Marshall et al. (2010)	US and New Zealand	Quantitative	Multivariate Analysis	Motivations for improving environmental performance
	Marshall et al. (2005)	US	Qualitative	Focus groups and Interviews	Environmental behavior drivers
	Cordano et al. (2010)	US	Quantitative	Multivariate Analysis	Drivers of adoption of voluntary EMP
	Silverman et al. (2005)	US	Quantitative	Multivariate Analysis	Drivers to improve environmental performance
Consumer Behaviour	Brugarolas et al. (2010)	Spain	Quantitative	Contingent Valuation	Organic wine
	Forbes et al. (2009)	New Zealand	Quantitative	Descriptive Analysis	Green production practices in vineyards
	Mann et al. (2012)	EU-Switzerland	Quantitative	Survey based on interviews	Determinants organic wine consumption
	Bernabeu et al. (2007)	Spain	Quantitative	Conjoint Analysis	Organic wine
	Thogersen (2002)	Denmark	Quantitative	Multivariate Analysis	Organic wine
	Krystallis et al. (2006)	Greece	Quantitative	Factor Analysis	Organic wine

Table 1 Topics, geographical coverage and techniques used in selected literature
 (Continued)

	Loureiro (2003)	US (Colorado)	Quantitative	Probit Model	Environmental friendly label
	Blondel and Javaheri (2004)	France	Quantitative	Experimental procedure	Organic wine
	Fotopoulos et al. (2003)	Greece	Mixed	Means-end chain analysis	Organic wine
	Barber (2010)	USA	Quantitative	Multivariate Analysis	Environmental friendly labels
	Barber et al. (2010)	USA	Quantitative	Multivariate Analysis (Factor, Discriminant)	Environmental friendly labels
	Bernabeu et al. (2008)	Spain	Quantitative	Multivariate Analysis	Organic wine
Supply chain management and certification	Desta (2008)	California	Quantitative	Cross sectional survey	Code of sustainable winegrowing practices
	Ohmart (2008)	California	Mixed	Context analysis based on secondary data	Code of sustainable winegrowing practices
	McManus (2008)	Australia	Qualitative	Case study	Environmental sustainability
	Ardente et al. (2006)	Italy	Qualitative	Case study	Estimation of direct and indirect env impact with POEMS methodology and simplified LCA
	Colman and Paster (2009)	Global	Qualitative	LCA Analysis	Impact on environment based on a carbon calculator model
	Marchettini et al. (2003)	Italy	Qualitative	Emergy analysis	Ecological performance of wine production
	Cholette and Venkat (2009)	US	Quantitative	LCA analysis	Employ CargoScope tool to analyze the carbon and energy profiles of wine distribution

An analysis of journals reveals a multidisciplinary interest in sustainability and wine: journals such as *Renewable Agriculture and Food Systems*, *Journal of Cleaner Production*, *E:Co Emergence: Complexity and Organization*, *International Journal of Sustainable Development & World Ecology* devote specific attention to the various facets of sustainability; on the other side the *Journal of Wine Research* and the *International Journal of Wine Business Research* have a wine sector focus. Then we can find another kind of reviews with a general focus on the agri-food sector (*British Food Journal*, *Food Quality and Preference* and *Acta Agriculturae Scandinavica Section B-Soil And Plant Science*, *Journal of Rural Studies*) or new journals with specific topics on firms and sustainability such as *Business Strategy and the Environment*.

Conclusions

We have seen how a tight relationship between academics and industry can provide benefits to the wine industry and can improve its overall orientation towards

sustainability: research can help winegrowers in the adoption of sustainable practices and can provide answers to some managerial issues.

Scholars suggest to focus research on a few critical aspects, such as the reconfiguring and understanding of economic performance and the creation of the conditions for incremental adjustment and multidisciplinary learning to happen (Guthey and Whiteman 2009).

Research has a social responsibility in the development of a sustainability orientation in the wine business: once spread, research results can motivate wineries to adopt a sustainable behaviour and create a sustainability awareness among industry and consumers.

The main challenge is “to change perceptions and mind-sets, among actors and across all sectors of society, from the over-riding goal of increasing productive capacity to one of increasing adaptive capacity, from the view of humanity as independent of nature to one of human and nature as coevolving in a dynamic fashion with the biosphere” (Folke, 2002, in Guthey and Whiteman, 2009); research plays a key role in the achievement of this goal, and by helping managers and people during the learning process and the adaptation of the organization to the evolving social conditions.

Some scholars perceive the role played by the role of drivers in the defining a sustainability orientation as critical: “We encourage further intra-industry, as well as inter-industry, research in order to better understand when internal and external drivers are most critical, and perhaps at times, less critical, in ushering in environmental stewardship” (Marshall et al. 2005).

One of the key emerging research questions to focus on is: “under what conditions sustainability happens”. The wine industry is particularly suitable for research on sustainability, as it has been shown by the analysis of the literature we have performed.

Anyway, although sustainability issues are affecting the wine industry all over the world, research does not show how to keep the path of such a diffusion and it is much more intensive in some countries rather than others, as it has emerged from the analysis provided. It can be said that research is more concentrated and focused on sustainability in those countries where the pressure of drivers is stronger.

The originality of our paper relies in being the first classification about research on sustainability and wine. Our paper aimed to identify the main methodologies and research techniques used, as well as the main problems observed by scholars. Further investigations to highlight any relationship between university research and the pressure of key drivers should be carried out.

Endnote

^aAn earlier version of this paper was presented at the 6th AWBR International Conference, Bordeaux, 9–10 June 2011.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

CS carried out the systematic review on wine and set the database. CS analyzed together with AC the dataset. In particular CS wrote the paragraphs entitled “Entrepreneurs and top management” and “Sustainability and strategy”, “Research orientations: a selective systematic literature review”. AC carried out the general review on sustainability and together with CS has performed the dataset analysis. AC contributed to write, more specifically the paragraph entitled “Institutions, associations, regulators and market demand”: AC also contributed specifically to the development of the

following paragraphs: "The role of Research" LC contributed together with the other authors to conclusions, discussion and introduction. All authors read and approved the final manuscript.

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Author details

¹Faculty of Agriculture, Università San Raffaele, Via Val Cannuta 247, Roma, Italy. ²Department of Education, Cultural Heritage and Tourism, University of Macerata, P.le Bertelli, 1, 62100, Macerata, Italy. ³GESAAF Department, University of Florence, Piazz.le Cascine 18, Firenze, Italy.

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References

- Better Wine., <http://www.betterwinesbetterworld.com>. Accessed 10 September 2012
- New Zealand Industry Sustainability., <http://www.newzealand.com>
- Wine Business., <http://www.winebusiness.com>
- EEA., <http://www.eea.europa.eu>
- Ardente F, Beccali G, Cellura M, Marvuglia A (2006) POEMS: A case study of an Italian wine-producing firm. *Environ Manage* 38(3):350–364
- Atkin T, Gilinsky A, Newton SK (2012) Environmental strategy: does it lead to competitive advantage in the US wine industry? *Int J Wine Bus Res* 24(2):115–133
- Bansal P, Roth K (2000) Why companies go green: a model of ecological responsiveness. *Academy of management journal* 43(4):717–736
- Barber N (2010) "Green" wine packaging: targeting environmental consumers. *Int J Wine Bus Res* 22(4):423–444
- Barber N, Taylor DC, Deale CS (2010) Wine Tourism, Environmental Concerns, and Purchase Intention. *J Trav Tour Manage* 27(2):146–165
- Bennett SJ (1991) *Ecopreneuring: The Complete Guide to Small Business Opportunities from the Environmental Revolution*. Wiley, New York
- Berle G (1991) *The Green Entrepreneur: Business Opportunities that Can Save the Earth and Make You Money*. Liberty Hall Press, Blue Ridge Summit, PA
- Bernabéu R, Martínez-Carrasco L, Brugarolas M, Díaz M (2007) Differentiation strategies of quality red wine in Castilla-la Mancha (Spain); Estrategias de diferenciación del vino tinto de calidad en Castilla-la Mancha (España). *Agrociencia* 41(5):583–595
- Bernabeu R, Brugarolas M, Martínez-Carrasco L, Díaz M (2008) Wine origin and organic elaboration, differentiating strategies in traditional producing countries. *Brit Food J* 110(2):174–188
- Berry MA, Rondinelli DA (1998) Proactive environmental management: a new industrial revolution. *Acad Manage Exe* 12(2):38–50
- Bisson L, Waterhouse AL, Ebeler SE, Walker A, Lapsley JT (2002) The present and future of the international wine industry. *Nature* 418(8):696–699
- Blondel S, Javaheri M (2004) Valuing organic farming: an experimental study of the consumer. In: *Proceedings of the XVTH International Symposium on Horticultural Economics and Management, 2004*
- Blue J (1990) *Ecopreneuring: Managing For Results*. Scott Foresman, London
- Bonn I, Fisher J (2011) Sustainability: The missing ingredient in strategy. *J Bus Strat* 32(1):5–14
- Broome J, Warner K (2008) Agro-environmental partnerships facilitate sustainable wine-grape production and assessment. *Calif Agr* 62:133–141
- Brugarolas M, Martínez-Carrasco L, Bernabeu R, Martínez-Poveda A (2010) A contingent valuation analysis to determine profitability of establishing local organic wine markets in Spain. *Ren Agr Food Syst* 25:35–44
- Bruyn SD, Drunen MV (2004) *Sustainability and Indicators in Amazonia: conceptual framework for use in Amazonia*. Report number: W-99/37. Institute for Environmental Studies
- Casini L, Corsi A, Cavicchi A, Santini C (2010) Hopelessly devoted to sustainability: marketing challenges to face in the wine business. In: *Proceedings of the 119th EAAE Seminar 'Sustainability in the Food Sector: Rethinking the Relationship between the Agro-Food System and the Natural, Social, Economic and Institutional Environments*. , Capri, Italy, June, 30th –July, 2nd, 2010
- Cederberg P, Gustafsson JG, Martensson A (2009) Potential for organic Chilean wine. *Acta Agr Scan - B - Soil and Plant Science* 59(1):19–32
- Cholette S, Venkat K (2009) The energy and carbon intensity of wine distribution: A study of logistical options for delivering wine to consumers. *J CI Prod* 17(16):1401–1413
- Colman T, Paster P (2009) Red, White, and 'Green': The Cost of Greenhouse Gas Emissions in the Global Wine Trade. *J Wine Res* 20(1):15–26
- Cordano M, Marshall RS, Silverman M (2010) How do Small and Medium Enterprises Go "Green"? A Study of Environmental Management Programs in the US Wine Industry. *J Bus Eth* 92(3):463–478
- Davidson WN, Worrell DL (2001) Regulatory pressure and environmental management infrastructure and practices. *Bus Soc* 40:315–342
- Delmas MA, Doctori-Blas V, Shuster K (2008) Ceago vinegardens: How green is your wine? Environmental differentiation strategy through Eco-labels, AAWE Working Paper n. 14
- Desta A (2008) Conventional versus Environmentally-Sensitive Wines: The Status of Wine Production Strategies in California North Coast Counties. *J Bus Pub Aff* 2(1):1–17

- Dillon P, Fischer K (1992) Environmental Management in Corporations: Methods and Motivations. Center for Environmental Management, Tufts University, Boston (MA)
- Dlott J (2004) California Wine Community Sustainability Report. California Sustainable Winegrowing Alliance, San Francisco
- Flint DJ, Golobic SL (2009) Searching for competitive advantage through sustainability: A qualitative study in the New Zealand wine industry. *Int J Phy Dist Log Manage* 39(10):841–860
- Forbes SL, De Silva T (2012) Analysis of environmental management systems in New Zealand wineries. *Int J Wine Bus Res* 24(2):98–114
- Forbes SL, Cohen DA, Cullen R, Wratten SD, Fountain J (2009) Consumer attitudes regarding environmentally sustainable wine: An exploratory study of the New Zealand marketplace. *J Clea Prod* 17(13):1195–1199
- Fotopoulos C, Krystallis A, Ness M (2003) Wine produced by organic grapes in Greece: using means end chains analysis to reveal organic buyers' purchasing motives in comparison to the non-buyers. *Food Qual Prefer* 24(7):549–566
- Gabzdylowa B, Raffensperger JF, Castka P (2009) Sustainability in the New Zealand wine industry: drivers, stakeholders and practices. *J Clea Prod* 17:992–998
- Guthey GT, Whiteman G (2009) Social and ecological transitions: Winemaking in California. *E:CO Emer: Compl Org* 11(3):37–48
- Hart C (1998) Doing a literature review. Sage Publication, London
- Isaak R (2002) The making of the ecopreneur. *Greener Management International* 2002, **38**:81–91
- Krystallis A, Fotopoulos C, Zotos Y (2006) Organic consumers' profile and their willingness to pay (WTP) for selected organic food products in Greece. *J Int Cons Market* 19(1):81–106
- Lawrence AT, Morell D (1995) Leading-edge environmental management: motivation, opportunity, resources and processes. *Res Corp Soc Perf Pol, Supp* 1:99–126
- Lee YS (2000) The Sustainability of University-Industry Research Collaboration: An Empirical Assessment. *J Tech Trans* 25(2):111–133
- Lobb A (2005) Consumer trust, risk and food safety: A review', *Food Economic. Acta Agr Scand Section C* 2(1):3–12
- Loureiro ML (2003) Rethinking New Wines: Implications of Local and Environmentally Friendly Labels. *Food Pol* 28:5–6
- Mann S, Ferjani A, Reissig L (2012) What matters to consumers of organic wine? *Brit Food J* 114(2):272–284
- Marchettini N, Panzieri M, Niccolucci V, Bastianoni S, Borsa S (2003) Sustainability indicators for environmental performance and sustainability assessment of the productions of four fine Italian wines. *Int J Sust Dev World Eco* 10(3):275–282
- Marshall RS, Cordano M, Silverman M (2005) Exploring individual and institutional drivers of proactive environmentalism in the US wine industry. *Bus Str Env* 14:92–109
- Marshall RS, Akoorie MEM, Hamann R, Sinha P (2010) Environmental practices in the wine industry: An empirical application of the theory of reasoned action and stakeholder theory in the United States and New Zealand. *J World Bus* 45(4):405–414
- McManus P (2008) Mines, wines and thoroughbreds: Towards regional sustainability in the upper hunter, Australia. *Reg Stud* 42(9):1275–1290
- Murphy J (2000) Understanding creative marketing, Practical Winery., Available at: <http://www.practicalwinery.com/julaug00p42.htm>
- Novaes Zilber S, Friel D, Nascimento LF M d (2010) Organic wine production: the case of Bodega Colomé in Argentina. *Int J Wine Bus Res* 22(2):164–177
- Ohmart C (2008) Innovative outreach increases adoption of sustainable winegrowing practices in Lodi region. *Cal Agric* 62(4):142–147
- Poitras L, Getz D (2006) Sustainable Wine Tourism: The Host Community Perspective. *J Sust Tour* 14(5):425–448
- Preston D (2008) Viticulture and Winemaking in Contemporary Rural Change: Experience from Southern France and Eastern Australia. *J Wine Res* 19(3):159–173
- Pugh M, Fletcher R (2002) Green international wine marketing. *Austr Market J* 10(3):76–85
- Pullman ME, Maloni MJ, Dillard J (2010) Sustainability Practices in Food Supply Chains: How is Wine Different? *J Wine Res* 21(1):35–56
- Quazi AM (2003) Identifying the determinants of corporate managers' perceived social obligations. *Manag Decis* 41(9):822–831
- Regouin E (2003) To convert or not to convert to organic farming. In: *Organic agriculture–Sustainability, markets and policies. Proceedings of an OECD workshop, September 2002, Washington, DC*, pp 227–235
- Sampedro EL, Sánchez MBG, López JCY, González ER (2010) The environment as a critical success factor in the wine industry: Implications for management control systems. *J Wine Res* 21(2):179–195
- Schaltegger S (2002) A Framework for Ecopreneurship Leading Bioneers and Environmental Managers to Ecopreneurship. *Greener Management International* 38:45–58
- Schaper M (2002) Introduction: the essence of ecopreneurship. *Greener Management International* 2002(38):26–30
- Sharples L (2000) Organic wines – the UK market: a shift from 'niche market' to 'mainstream' position? *Int J Wine Market* 12(1):30–41
- Silverman M, Marshall RS, Cordano M (2005) The greening of the California wine industry: Implications for regulators and industry associations. *J Wine Res* 16(2):151–169
- Sinha P, Akoorie MEM (2010) Sustainable Environmental Practices in the New Zealand Wine Industry: An Analysis of Perceived Institutional Pressures and the Role of Exports. *J Asia-Pac Bus* 11(1):50–74
- Stewart C (2009) The science of wine: Washington State University scientists and the development of the Washington wine industry, 1937–1992. Doctoral Thesis, Washington State University
- Swezey SL, Broome JC (2000) Growth Predicted in Biologically Integrated and Organic Farming Systems in California. *Cal Agric* 54(4):26–35
- Swinbank A (2009) Sustainable Bioenergy Production and Trade. Issue Paper No. 17, ICTSD Programme on Agricultural Trade and Sustainable Development. University of Reading
- Szolnoki G (2013) A cross-national comparison of sustainability in the wine industry. *J Clean Prod* 53:243–251, Available online 5 April 2013

- Thieme J (2007) The World's Top Innovation Management Scholars and Their Social Capital. *J Prod Inn Manage* 24:214–229
- Thøgersen J (2002) Direct experience and the strength of the personal norm - Behavior relationship. *Psych Market* 19(10):881–893
- Walley EE, Taylor DW (2002) Opportunists, Champions, Mavericks...? *Greener Management International* 2002(38):31–43
- Warner KD (2007) The quality of sustainability: Agroecological partnerships and the geographic branding of California winegrapes. *J Rural Stud* 23:142–155
- Winn MI (1995) Corporate leadership and policies for the natural environment. *sustaining the natural environment: Empirical studies on the interface between nature and organizations*. In: *Research in Corporate Social Performance and Policy* ed. J.E. Post. JAI Press, Greenwich, London, pp 127–161

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