

The rise of sustainability in Italian wineries: key dimensions and practices

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Summary: 1. Introduction - 2. Literature background - 2.1 Towards sustainability in wineries - 2.2 The dimensions of sustainability in wineries - 3. Methodology - 4. Results - 5. Discussion and Conclusions.

Abstract

Previous studies on sustainability support the idea that the introduction of specific projects and certifications on sustainability increase the quality of wine production while specific requirements enhance environmental biodiversity and efficiency considering several aspects, such as water consumption and fertilizer use. These studies are mainly based on case studies and focus in particular on the new world and the USA. Despite this increasing attention, little is still known on Italian wineries considering the country context. The present study sheds the light on the emerging attention on sustainability paid by the Italian wineries presenting their novel dimensions and practices. Empirical evidences are collected through an explorative field study carried out through 21 interviews. The results show a recent rise of sustainable practices in Italian wineries in which the main focus is on environmental issues. The study also presents a comprehensive picture of the sustainability-related peculiarities in the context as the Italian culture on wine.

Key words: sustainability, measurement, certification, Italy, wine

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1. Introduction

The sustainable wine production has recently attracted the attention from producers, seller and scholars. Starting with the wave on sustainable agriculture as such, now research on the wine sector as a specific subfield has increased and recent work in particular has considered the numerous aspects that define the meaning of sustainability in wineries. This is also demonstrated by the increasing number of publications in the field and spontaneous research and teaching programs focused on sustainability issues (Pomarici & Vecchio, 2019). This attention is steered to a large extent by the increasing consumers' request for more sustainable wines and products coming from green, biological and biodynamic productions (Tait et al., 2019; Flores, 2018). In the recent Wine intelligence report called Global S.O.L.A. (Sustainable, Organic, Lower-Alcohol, Alternative Wines, 2019) the agency analyses the opportunities of sustainable wines in 15 countries and stresses that with the growing sense of responsibility of consumers and producers to "do their part", it is good to see how both are beginning to perceive wine as an increasingly healthy, sustainable and ethical product. In addition, the report underlines the importance of the communication of these values continues to improve in order to help raise the awareness of the significant efforts made.

In accordance with Schäufole and Hamm (2017), the growing provision of environment-friendly products is the consequence of an increasing awareness of market requests and their strong belief in sustainable practices. Managers perceive sustainability as an innovation in wine production and has become a fundamental strategic lever to identify market areas with a growing demand for products with lower environmental impact (Schäufole et al., 2017). Understanding the new consumer needs, managers are the formers of organizational change—from the cultivation of grapes to the delivery of the bottle—comprehending that with sustainable production, the efficiency of their enterprise will also improve (Galbreath, Charles & Oczkowski, 2016; Grunert, Hieke & Wills, 2014).

For some years, Italy has followed in the footsteps of countries such as New Zealand, Australia and the state of California, that based part of their wine production on innovation for sustainability (Flores, 2018). A great part of Italian wineries are family-owned (Gallucci and D'Amato, 2013; Conz & Magnani, 2019) and they are naturally interested in success over the long-term, where sustainability strategies are perceived as one way to enhance their resilience in an increasing competitive marketplace (Gilinsky et al., 2015). In this sense, a pivotal role was played by monitoring results in terms of social, environmental and economic impacts given by programs and project on

sustainability. This increases the trust in a more sustainable production and avoids a mere search for a positive impression.

In the new world countries these practices are often a prerequisite for the creation of new businesses (Baird, Hall & Castka, 2018), whereas in Italy the implementation of sustainable practices is still mainly based on a few good practices embedded in a local context (Pucci, Casprini, Galati & Zanni, 2018). The growing general attention on sustainable practices has led to the rise of a number of voluntary certifications which, in the Italian wine world are over ten (Santini, Cavicchi & Casini, 2013), this in turn has generated a need to regulate these actions in a more formal way. The wineries have seen sustainable programs and certifications tools as a way to respond to wine consumers' demand. In fact, a first factor that increasingly leads these companies to certify themselves with sustainable brands and labels is the need to be recognizable by a consumer (Schäufele et al., 2017). For a certified company, being sustainable means being legitimized in its actions because it follows specific conditions defined by the certification and this constitutes a guarantee towards the consumer. A sustainable wine production also allows reducing the environmental impact of the processes, contributing to the social and economic well-being of the territory where the winery is rooted and of the workers involved in the production (Annunziata, Pucci, Frey & Zanni, 2018).

In support of the changes taking place in the world wine system, the OIV has expressed its interest in identifying sustainable viticulture as a priority area of action and as a first point of the five resolutive lines within its 2015-2019 strategic plan (OIV, 2015). The OIV also underlines the importance of identifying planning processes for the implementation of sustainable projects that need to provide a "self-assessment" or other assessment tools to identify results and improvements in environmental performance (OIV, 2004; 2008). These strategic lines are supported by a series of initiatives that the OIV periodically organizes to increase awareness on these aspects, such as training events on sustainability.

Previous literature shows that the countries of the new world continue to be among the first supporters of sustainability programs and certifications, meeting the increasing demand for products with limited environmental impact (Sautier, Legun, Rosin & Campbell, 2018; Baird et al., 2018; Warner, 2007). At a national level, we can identify the first governmental projects whose purpose is to steer viticulture towards sustainable production. This program, named V.i.v.a. Sustainable Wine, is managed by the Ministry of the Environment and the Protection of the Territory and the Sea and it is based on the monitoring of sustainable performance in a few macro-areas (Air, Water, Vineyard, Territory) (Santini et al., 2013).

Despite the fact that sustainability efforts in Italy are often a result of consumer demand rather than legislation, we have still seen a change in the wine industry. This gradual, and often voluntary change can be understood from different perspectives. A number of studies focus on how wineries have struggled implementing voluntary certification measures (Savelli et al, 2019 and Ohmart, 2008b), furthering this work on understanding the certification process there has been research looking to further our knowledge on the processes or even background stories to the why and how of the certification process (Knight et al., 2019; di Trana et al., 2019; Vrontis et al., 2016; Atkin, Gilinsky & Newton, 2012). Overriding, or encompassing this research we have research that focuses on specific case studies that will help answer best practises when it comes to certification as well as sustainable wine production (di Trana et al., 2019; Pucci et al., 2018; Cambra-Fierro & Ruiz-Benitez, 2011). Despite the increasing interest demonstrated by a growing number of studies on sustainability in wineries, scant is still known on the dimensions of sustainability in Italian wineries at a contextual level. According to the last data published by the OIV, Italy remains among the main producers and exporters of wine in the world (OIV, 2019) and the wine sector is one of the most productive industries of the country. As above mentioned, the Italian context is showing the rise of interest on the production of more sustainable wines (Santini et al., 2013; Pucci et al., 2018). Considering the identified gap in the sustainable wine literature, with an emphasis on the Italian context this study focuses on the following research question: *What are the main dimensions of sustainability in Italian wineries?*

More specifically, the present research aims to explore the sustainability dimensions considering the main practices and projects implemented in the Italian wine production. To reach this aim, an explorative field study has been carried out from 2017 to 2019 collecting primary data directly from wine producers. In doing this, semi-structured interviews were carried out with the key informants in wineries—such as entrepreneurs, winemakers, general managers, agronomists—and additional documents were collected directly by the wineries. In according to the aim of the study, only wineries involved in sustainable programs and certifications were selected permitting a higher understanding on a daring change that in Italy is still at its infancy (Bastianoni, Marchettini, Panzieri, & Tiezzi, 2001; Pucci et al., 2018).

The following section describes the sustainability dimensions in wineries according to the literature. The methodology section presents the main features of the field study carried out and data analysis. Results presents the main dimensions of sustainability identified through the research on the field and they are graphically presented in a comprehensive table. Finally,

discussion and conclusions provide the main implications of the study and possibilities for further research.

2. Literature background

2.1 Towards sustainability in wineries

According to the 2030 Agenda for Sustainable Development, the number of years of indiscriminate use of natural resources have led to environmental and social crisis. This in turns drives the need of moving from a short-term to a long-term view. As mentioned in the 2030 Agenda, a more sustainable consumption and production is just part of a wider challenging change that encompasses the entire planet. Facing this daring change, agriculture is seen as a pivotal sector that, through a more sustainable production, can strongly influence carbon emission as well as the way in which consumers should reach their buying decisions (Grunert et al., 2014). In addition, the agriculture sector is strongly influenced by the climate change, this issue can steer the production towards innovations for a more sustainable production (Galbreath et al., 2016).

The California Association of Winegrape Growers and the Wine Institute's considers the sustainable agriculture as the "growing and winemaking practices that are sensitive to the environment (environmentally sound), responsible to the needs and interests of society-at-large (socially equitable), and economically feasible to implement and maintain (economically feasible)" (Ohmart, 2008a, p. 143). Farmers are influenced by a number of actors and should consider claims from a wide number of stakeholders whose main interests are not necessary preservation of the environment. Tee, Boland and Medhurst, (2007) noted that the farmers are influenced by the interests of several subjects that could be involved in its activities from numerous points of view. According to Gabzdylova, Raffensperger and Castka (2009), wineries can approach sustainability in different ways and, as a consequence of stakeholders' request, can steer their strategies in different directions (Pucci et al., 2018; Tee et al., 2007).

Considering concerns towards sustainability in the wine sector, previous studies underline that the process is still ongoing and several barriers are partially hampering a further implementation of sustainable practices in this industry. The barriers to the change are first due to external and not manageable forces and second the outcome of management decisions or a personal interest of the entrepreneur (Tee et al., 2007). The latter subject plays a pivotal role as the former of the idea and the trigger of the process in her/his firm (Marshall, Cordano & Silverman, 2005). According to Schaltegger (2002), the

entrepreneur's approach toward sustainability derives from personal knowledge, experiences, and the belief that practices for sustainability positively influence the value creation. Increasingly, this value creation is based on the competitiveness of a winery, often achieved by cooperation with other market players, where information sharing and best practises are key elements in order to have a fruitful partnership (Civera et al., 2019; di Trana et al., 2019, Pierce, 2013)

As highlighted by Isaak (2002), wineries can approach sustainability in two different ways corresponding to a particular phase of their going concern. A first approach was seen as a 'green business', when wineries decide to enhance sustainable practices throughout the life span of the firm. In this case, the decision is not necessary moved by ethical need as the wineries invest in innovation for sustainability and the return of investment is expected by marketing campaigns and the mark-up return (Grunert et al., 2014). A second approach is the 'green-green business' in which the wineries shape their behaviour to be green from their foundation, as sustainable start-ups. This business aims to apply sustainability to processes and outputs enhancing sustainable transformation also in its host sector "towards a model of sustainable development" (Isaak, 2002, p. 82).

The wine industry embraces a variety of business ideas that we typically find in both large, medium, and small firms. The literature on sustainability approach underlines that usually large firms are willing to pay more attention to sustainable practices because of their availability of resources to invest in sustainable projects and innovation (di Trana et al., 2019; Lo, 2010). On the other hand, small business can be more focused in the definition of their actions towards sustainability and a family business can be a favorable environment for developing innovation (Vrontis et al., 2016) were the company will be strongly influenced by the norms and mindsets of the firms' owner(s) due to company size and flat hierarchies (Knight et al., 2019; Cordano et al., 2009). Similarly, this happens in family-owned wineries (Gallucci and D'Amato, 2013; Conz & Magnani, 2019), where the "wine represents a set of family values, symbols, and traditions rooted in the area in which the family is based, and more so if the family has a good reputation in the market" (Vrontis et al., 2016, p. 1883). The owners make available their private tangible and intangible resources and their entrepreneurial belief, which over time could become a key lever in order to enhance sustainable practices (Georgiou and Vrontis, 2012).

2.2 The dimensions of sustainability in wineries

Among the many aspects to be considered in the context of environmental impacts (see Christ & Burritt, 2013), the use of water appears to be among the most important as the agriculture sector is responsible for 69% of the global withdrawal of this resource (FAO, 2014). There are three fundamental aspects concerning its use: collection, actual use, and disposal. The quality of the water used in the production process is closely linked to the quality of the groundwater in the production area itself (Miglietta & Morrone, 2018; Pino et al., 2017). In this sense, it has become important to properly dispose of the water used during the wine production. This includes both an ability to avoid a high impact of pesticides in the production cycle as such, as well as residues of pesticides in the water resulting from the processing waste (Flores, 2018). From the vineyard to the cellar it is therefore necessary to develop sustainable attitudes towards the use of this resource and its disposal.

Another important area of attention related to environmental impacts in the wine production is the protection of biodiversity and the local territory (Figueiredo, Rodrigues, Vicente & Antunes, 2018). In recent years, to increase the preservation of species and the health of the population based in the wine production area, the use of chemical products has been replaced by natural methods (e.g., green manure, sexual confusion) (Fransen et al., 2018). Despite the great push for circular economy strategies, other environmental dimensions such as energy savings and waste disposal are still little explored (Pucci et al., 2018)

Regarding the social dimension of sustainability, the main practices that have been presented in previous studies are mainly based on the creation of benefits for workers and the local community. In addition, a particular attention is given to the protection and safety of workers through the use of PPE (Personal Protective Equipment) and also on periodical training on how to carry out a sustainable wine production (Annunziata et al., 2018). Few studies underlined the importance of the stakeholder relationship considering their capability to influence the winery in terms of quality and health of the wine production (Pucci et al., 2018; Tee et al., 2007). In this sense, business partnerships and networks are gradually increasing in number, which should ultimately improve economies of scales and enable more sustainable supply chains (Signori et al., 2015).

Considering the dimension of sustainability in wineries also means measuring them with the aim of understanding if any change of performance in the firm is a consequence of implemented sustainable behaviour or a positive effect from corporate imaging and reputation (Gabzdylova et al., 2009). As noted by Ohmart (2008a), the increasing interest in sustainability in

wine production is embedded in three main issues: 1) definition of the meaning of sustainability in the wine sector; 2) implementation from the vineyard to the bottle; 3) measuring the consequences of its implementation process. The assessment of sustainability in wine production can be applied on each single process that is part of the value chain from taking care of the plant to waste production and disposal (Moggi et al., 2015).

Notwithstanding numerous studies on sustainability implementation in wineries (Flores, 2018), there is no recognized definition of sustainability in this industry. To increase the development of sustainable practices in wineries, both private- (e.g., research institutes, pharma entities) and public-organizations (e.g., ministries, consortiums) propose certification and programs that embed a number of the aforementioned dimensions of sustainability. Despite the numerous initiatives no one can be considered as comprehensive of all the dimensions of sustainability in wineries and each of them presents pros and cons (Santini et al., 2013). Accordingly, Klohr, Fleuchaus and Theuvsen (2013), stated that no common standard can be considered as encompassing several aspects of sustainability in wineries. However, these authors' study on six implementation programs recommends a common understanding of the meaning of sustainability in practice and highlight the importance of developing these practices by considering the three dimensions of sustainability impacts (Elkington, 1997): economic, social and environmental.

A further aspect of certification is linked with the possibility to associate the concept of sustainability with the brand of the firm. As noted by previous studies, the brand identity embeds a set of values, beliefs and perceptions in consumers' minds and is a valuable lever that has been employed in the wine industry (Conz & Magnani, 2019). If the sustainability certification is clearly recognizable on the bottle label this has been shown to increase the brand reputation of the firm that is producing that wine and the consumer have an easier time to identify this brand as sustainable (Savelli et al, 2019).

Despite a number of studies that browsed the dimensions of sustainability at wineries and briefly summarized in this section, little is still know on the Italian wine production in its entirety. In fact, previous studies are mainly focused on the new world (see for example Forbes & De Silva, 2012), USA (Marshall et al., 2005; Ohmart, 2008a) or European countries such as Portugal (Martins et al., 2018) or Spain (Cambra-Fierro et al., 2011). These studies, just as the few published on the Italian context, are usually presenting case studies (Pucci et al., 2018; Ardente, Beccali, Cellura & Marvuglia, 2006) instead of a wide view on the entire country. This case by case focus has left a gap to explore possible patterns on a country wide scale.

3. Methodology

With the aim of identifying the dimensions and practices for the implementation of sustainability in Italian wineries the present research is based on an explorative field study. To reach the research aim the present study adopts a qualitative interpretative approach (Creswell, 2007) to observe actions and facts in their natural conditions (Patton, 2002). According to Brownell (1995), field studies may enhance construct validity by studying phenomena in their natural context, if researchers design rigorous case study protocols to improve reliability (Lillis, 1999).

The research is mainly based on semi-structures interviews with 21 key informants at wineries (e.g., winemaker, general manager, accountant, agronomist) who were involved from the introduction of a sustainable programme or certification in their organization. These informants were identified according to the purposive sampling described by Patton (2002). The participants' identity and characteristics are anonymized in order to preserve the confidentiality agreement. The 21 interviews, carried out from October 2017 to January 2019, were identified as the saturation level as "the point at which no new information or themes are observed in the data" (Guest, Bunce & Johnson, 2006, p. 59).

Only wineries involved in sustainability projects, programs and certifications were involved in the field study considering small, medium and large firms as well as family firms. The possible assumption of a winery being "involved" is based on the clear intention of the winery and its management to carry out sustainable practices according to a number of protocols, norms and practices. Interviews were managed according to an interview protocol organised into four main aspects: sustainability meaning for the informant, winery path toward sustainability and day-by-day actions, sustainability meaning for the winery, process of certification and/or project development. The semi-structured interview framework was partially adjusted according to the specific function of the interviewees (Miles, Huberman & Saldaña, 2014). The interviews were carried out face to face at the wineries with an average length of 45 minutes. In order to enable spontaneous answers from interviewees and a natural conversation, the interviews were based on open questions and carried out at the wineries. The majority of interviewees managed to answer all areas of the interview protocol without intervention by the interviewer, and the flow of the interviews was mainly based on a conversation (O'Dwyer, 2002). Interviews were recorded with the permission of the interviewees and transcribed verbatim.

Field notes, pictures, videos, internal documents collected by the wineries, and publicly information available on their websites or at the

certifications/programs were embedded in the hermeneutic unit with the aim of enhancing the data triangulation, increase the reliability of the analysis and the rigor of the field study (Patton, 2002). The coding phase was managed by using the qualitative data analysis software Atlas.ti, that was helpful for organizing data (Bryman & Bell, 2011). The first round of open coding defined the main issues under the three dimensions on sustainability (economic, social and environmental). Then all the coding labels were summarized in the main aspects under these three dimensions, according to the literature on the field and the aim of the research (Roulston, 2010). The final result was summarized in a comprehensive table (see Table 1).

4. Results

Despite the fact that there was saturation in much of the data collection, a common concept of sustainability in wineries was not reached. On the contrary, a number of different practices have been developed considering projects, programs and certification toward a more sustainable wine production. The complete summary of these results is presented in Table 1 and divided according to the two main possible areas of production of the interviewed wineries (vineyard, cellar) and the three dimensions of sustainability (environmental, sustainability social, economic).

A first result is referred to the application of sustainable principles in the management of the vineyard. By implementing sustainable programs, this attention was diffused to the entire production, increasing the application of sustainable principles to the other parts of the supply chain, as the cellar or the suppliers. The wineries implementing sustainable practices initially applied this protocol just on one type of wine, with the scope of spreading the implementation to the entire production. In addition, when a winery is involved in a partnership with other wineries, the interviewees underlined the importance of the sharing of knowledge from those wineries that have already implemented sustainable practices to wineries that are just starting this process of sustainable implementation. Another aspect presented is a gradual passage from the biological and integrated production to a sustainable and more complex viticulture.

Comparing the three dimensions of sustainability in wineries, Table 1 shows the prevalence of *environmental* aspects on the other sustainability dimensions. This is probably related on the high impact that viticulture has always been on the fields and their neighborhoods. Water issues have been underlined as a priority for the wineries that faced periods of drought due to climate change. According to the interviewees an increasing development of

the precision irrigation system systems has preserved soils from the damage and increased the efficiency on the resource use as well as the reduction of related costs. These practices combined with a lower use of pesticides also improve the quality of the soil and its related biodiversity (Fransen et al., 2018). A healthy soil means enhanced health of the vines, an improved preservation of the landscape as well as an increase in the resilience of plants. Biodiversity preservation could be granted by practices such as the sexual confusion practice, the use of natural fertilizer and the employment of pesticides just when is necessary. This is possible just through a managerial awareness on the biodiversity issues and a consequent constant monitoring of the vineyard health (Figueiredo et al., 2018). In addition, several entrepreneurs underline the increasing attention on the energy savings by the use of renewable energies or the development of circular economies from the field to the cellar. A clear example of this trend is the use of waste from pruning or processes in the cellar for feeding the heating system.

Under the *economic* and *social* sustainability, a number of key aspects have been identified by the interviewees. The main issues are related to the relationship between the winery and its community and the local stakeholders that effect and can be affected by the winery's actions. One important example is the importance of selecting season workers coming from the local community. Considering the Italian job market this is not always possible, and the wineries employ, through Italian employment agencies, foreign workers. The suppliers are another stakeholder group that could receive a positive influence by the wine production when the local wineries decide to select the local growers according to a "kilometre-zero" internal policy. Additionally, the winery itself could be an active member of the community having a positive economic influence, supporting local initiative and improving the relationship with local stakeholder groups such as schools and municipalities. Considering the internal aspect of social sustainability, several entrepreneurs underlined the importance of health and safety programs, but also the increasing space given to training on sustainability, in particular for the seasonal workers. In addition, the wineries that collaborate on sustainable practises, by partnerships or informal collaborations, highlighted the common sharing of knowledge and the creation of virtuous circles in which managers and winemakers emulate good practices even by competitors. The economic aspects on sustainability in wineries are difficult to monitor and even detect. Despite this the entrepreneurs expect to improve the efficiency in the wine production processes and obtain an economic return from the rise of the wineries image and legitimacy on the market.

As summarized in Table 1, the wineries that applied a strict protocol for sustainability underlined a wide number of practices in order to enhance

sustainable actions not only limited to a certification request. On this concern, from the vineyard treatment to the harvesting phase, several frameworks have been built to monitor the production and to identify areas for further improvement, but no one has steered the attention to the majority of Italian wineries. Interviewees underlined the need for a more comprehensive standard that embeds the features of the projects and protocols developed until now. Another aspect that is still missing in the available frameworks is a clear system of measurement for assessing sustainability in wineries and considering a clear distinction between practices in the vineyard and in the cellar. The lack of measurement is perceived by the entrepreneurs that have formerly experimented with different tools, such as carbon footprint or water footprint that have been seen as a starting point for further and more complex measurements. None of the interviewed wineries present a sustainability reporting system and it is very rare to see them present sustainable practices on their website.

Table n. 1 - Dimensions of sustainability in Italian wineries

	Environmental	Social	Economic
1) Vineyard	<ul style="list-style-type: none"> • Water saving • Less chemical weeding • Rationalization of phytosanitary treatments • Land preservation • Biodiversity preservation campaigns • Participation to environmental local plans • Recycling • Cover cropping • Natural fertilizer • Compost as fertilizer • Local specific flora • Sexual confusion 	<ul style="list-style-type: none"> • Landscape restoration • Participation to local plans • Work opportunity for local community (e.g., seasonal workers) • Local Partnerships • Health and safety plans • Training on sustainability • Stage opportunities for students • Family norms, values and beliefs 	<ul style="list-style-type: none"> • Water cost reduction • EU funds for sustainable agriculture and innovation • Increasing mark up and value of sales • Self-production of energy (e.g., by solar panels) • Value co-creation
2) Cellar	<ul style="list-style-type: none"> • Recycling (e.g., barriques, pallet) • Low energy and natural lighting • Waste heat recovery (from pruning shoots and wine production waste) • Night air cooling • Heat recovery • Screw-cap closures • No chemical products for cleaning • Ozone treatment for barriques cleaning • Supplier selection • Low-impact packaging 	<ul style="list-style-type: none"> • Work opportunity for local community • Purchase fruit from local growers • Local Partnerships and network on the supply chain • Health and safety plans • Training on sustainability • Alternating school and work • Stage opportunities for students • Firm Welfare • Family norms, values and beliefs 	<ul style="list-style-type: none"> • Improving efficiency in the use of energy during wine production process • Reducing water consumes • Self-production of energy (e.g., by solar panels) • New network on the supply chain for improving economies of scale • Brand Reputation and identity

Fonte: our elaboration

5. Discussion and conclusions

Recent studies underline that sustainability practices in the wine sector have been partially driven by consumers' expectations (Atkin et al., 2012) and increasing attention to more sustainable production in terms of economic, social, and environmental impacts of the wine production (Flores, 2018). This increasing attention has driven the spontaneous development of sustainability-related standards, protocols and projects and an increasing number of wineries has been involved. Among the studies on sustainable practices in wineries, there is no recognized definition of sustainability in this industry, nor a common framework for the implementation of sustainable practices. For this reason, several initiatives have appeared to recognise sustainability issues and to promote practices and actions. (Forbes et al., 2012; Klohr et al. 2013). Despite the increasing number of studies exploring the sustainable practices in the wine sector, little is still known on the Italian system (Ardente et al., 2006; Santini et al., 2013). Considering the impact of the Italian production on the worldwide market and the recent trends where consumers are increasingly demanding a more sustainable production (Pucci et al., 2018), the current study presents an updated view on the range of sustainable practices developed by Italian wineries. This explorative study contributes to the wine management research, providing a comprehensive picture of the dimensions through which the wine producers can enhance innovation towards sustainability (Galbreath et al., 2016) as well as embed environmentally friendly treatments on the vineyard (Christ et al., 2013). Results presented here come from the field of implementation of sustainable programs into Italian wineries, with a focus on actions carried out.

The present study shows that a wide number of actions can be developed in a winery but that the attention at the moment is more dedicated on the practices on the vineyard rather than in the cellar. In accordance with previous studies done in Italy the development of more sustainable practices is driven by the management's attitudes to sustainable issues (Schaltegger, 2002), a family-business recognising the importance of sustainable practice (Gilinsky et al., 2015) and a personal desire of the entrepreneur for a higher quality of grapes harvested (Marshall et al., 2005; Tee et al., 2007). The interviewed persons underlined the importance of meeting a growing demand from consumers that are increasingly aware of the environmental impacts of the wine productions and are consequently looking for certified and sustainable products (Baird et al., 2018). As also noted by Sautier et al., (2018), the involvement in certification, projects and programs on sustainability partially responds to the need for growing the winery image, partially to understanding and enhancing the sustainable techniques and in some parts to increasing the

quality level of vineyard management (Wagner, 2007). Despite that it is still difficult to demonstrate an actual impact given by the reduction on the use of pesticides on the field, this study confirms a general perception of the greener practices in contributing to improving the quality of both the grapes harvested, which are healthier with the reduction of chemical fertilizers, and the workers' health.

There is attention on improving eco-efficiency in the processes considering the circular economy and its potentials for recycling waste as source of heating (Moggi et al., 2015). In this sense, the level of development is diversified and embed wineries that enhance efficiency toward sustainability from the vineyard to the bottle and others that just start from a single process (Isaak, 2002), demonstrating a different sensitivity from the management on sustainable issues (Schaltegger, 2002). The water use is also perceived as a growing concern, considering the use of the water in a more precise and punctual way compared to the past and the groundwater quality after eventual treatments (Miglietta, et al., 2018; Pino et al., 2017).

Previous studies mainly described environmental aspects of sustainability in wineries (Christ et al., 2013) and little attention was paid to social and economic impacts. From the results of the present study these two further dimensions were shown as fundamental. Considering the traditional production where this study is settled, cultural and social aspects are embedding the close ties between wineries and their communities and the importance that this link is playing in building profitable relationships (Pucci et al., 2018). The interviewees highlighted the importance of the rise of knowledge on sustainability, which had been disseminated among other farmers, thanks also to the cooperative nature of some wineries (Begalli & Capitello, 2015) or the development of formal and informal network among these entities (Annunziata et al., 2018; Warner, 2007; Hillis, Lubell & Hoffman, 2018).

Similarly to the results in the previous studies in other countries (Cambra-Fierro et al., 2011; Ohmart, 2008a; Forbes and De Silva, 2012), the present research highlights the difficulty in measuring sustainable farming operations and their improvements because sustainable viticulture addresses a wide range of practices across the continuum of sustainability. On one hand, several dimensions are quite difficult to detect and measure (e.g., biodiversity, community health). On the other hand, respondents' perceptions on cost efficiency improvement is probably due to the rationalization of processes requested by sustainable programs and protocols (Bastianoni et al., 2001). According to Gabzdylova et al. (2009), participating to these programs also permits wineries to have a good impression on consumers as well as the possibility to apply a mark-up on the final products.

As a qualitative explorative study, the present research has some limitations related to the number of interviews and the focus just on one country. Looking for a wider field of research, further development of the present paper will also explore hospitality dimension (e.g., wine tours, bed & breakfast) and considering a wider range on wineries. Despite its limitation, the present paper proposes a comprehensive picture of the main practices observed in the Italian wineries during the rise of a more sustainable production and could potentially be developed into a valuable tool for scholars and practitioners approaching the issue of sustainability in wineries. Being that the phenomena of sustainability in wineries is at its infancy this study provides a first picture of a traditional system of production that is gradually steering toward sustainable innovation.

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