

RESEARCH ARTICLE

# Drivers, adoption, and evaluation of sustainability practices in Italian wine SMEs

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## Abstract

Based on a survey with 64 small and medium-sized enterprises (SMEs) in two Italian wine regions, this study aims to (a) identify key drivers and barriers of the adoption of sustainability and (b) compare the adoption and evaluation (use, financial/labor investments, and satisfaction) of sustainability practices in four management domains (marketing, chain, operational, and innovation). Results show that internal drivers were considered to be more important than external drivers. Economic sustainability-oriented drivers scored significantly lower than drivers related to other dimensions, such as environmental sustainability and heritage. Key barriers refer to labor and investments costs, as well as concerns about greenwashing. Although there are substantial differences in adoption and evaluation of sustainability practices within and between management domains, this study confirms their widespread adoption in wineries. Among users, satisfaction levels outweigh the perceived investments. Except for innovation management practices, financial investments are considered to be lower than labor investments. Positive correlations between use-satisfaction (within each management domain) and between investments or satisfaction levels (between management domains) further lend support for producers' adoption of multiple practices. At sustainability dimension level, heritage is negatively correlated with the evaluation indicators, indicating that it may act as a potential barrier to some sustainability practices. Segmentation analysis identified a low (30%) and high sustainability clusters (70%), which differ significantly in terms of sustainability perceptions and drivers, adoption, and evaluation of practices, as well as company characteristics. Future research needs to validate the findings on SMEs, compare our measures with more objective evaluation indicators, future adoption rates, and multidimensional sustainability practices.

## KEYWORDS

adoption, drivers, Italy, small and medium-sized enterprises, survey, sustainability, wine producers

## 1 | INTRODUCTION

Sustainability, as a multidimensional concept, builds upon economic, environmental, and social principles to foster societal well-being and prosperity (Griggs et al., 2013; Robert, Parris, & Leiserowitz, 2005)

and improve company performance (Eccles, Ioannou, & Serafeim, 2014; Goyal, Rahman, & Kazmi, 2013). In the agro-food sector, the call for sustainability practices has never been greater. To address the adverse environmental impact and resource inefficiencies of current food production systems (Galanakis, 2018; Guinée et al., 2006), policy

makers have prioritized sustainable development of agro-food systems, as illustrated in the Europe 2020 Strategy (Jänicke, 2012) and the 2030 Agenda of the United Nations (e.g., Sustainable Development Goals 2 and 12; Sachs, 2012).

In the wine industry, the adoption of sustainability practices has gradually increased over the last decade (Gilinsky, Newton, & Vega, 2016; Santini, Cavicchi, & Casini, 2013). Whereas wine producers are confronted with sustainability issues related to greenhouse gas emissions and the use of water, land, pesticides, and energy (Christ & Burritt, 2013; Gabzdylova, Raffensperger, & Castka, 2009), the growing need to address sustainability is reinforced by the high degree of competitiveness in the globalized wine sector and consumers' and policy makers' awareness of the sustainability challenges in wine production (Fiore, Silvestri, Conto, & Pellegrini, 2017; Nazzaro, Marotta, & Rivetti, 2016).

Scientific research on stakeholders' perceptions and practices of sustainability in the wine sector was often oriented towards the end user, for instance, by exploring consumers' attitudes or purchase intentions towards sustainable (organic, environmental-friendly) wine practices, products, or labels (Lockshin & Corsi, 2012; Mariani & Vastola, 2015; Schäufole & Hamm, 2017). More research with wine producers is needed to better understand their adoption and evaluation of sustainable practices (Grimstad, 2011; Santini et al., 2013).

Wine producers' decision to adopt sustainable practices in their production process is determined by a variety of drivers (for a review, see Mariani & Vastola, 2015; Santini et al., 2013). Thereby, a distinction is generally made between internal and external drivers (Mariani & Vastola, 2015; Marshall, Cordano, & Silverman, 2005; Sinha & Akoorie, 2010). At internal level, past studies have highlighted the role of strategic and monetary drivers, such as competitive advantage, product quality, and higher profits (Gabzdylova et al., 2009), which are compatible with the resource-based view (of the firm) theory (Dodds, Graci, Ko, & Walker, 2013). External drivers often refer to other actors, such as stakeholder pressure, compliance to regulations, or consumer demand (Dodds et al., 2013; Gabzdylova et al., 2009; Pomarici, Vecchio, & Mariani, 2015), and have been grounded in stakeholder theory (Marshall, Akoorie, Hamann, & Sinha, 2010). Although research has shown that internal drivers dominate producers' adoption decision (Dodds et al., 2013; Gabzdylova et al., 2009; Pomarici et al., 2015), evidence is sometimes conflicting (Forbes & De Silva, 2012; Mariani & Vastola, 2015), which calls for more empirical research to analyze the importance of each type of driver (Marshall et al., 2010; Santini et al., 2013). Also, studies that identify potential barriers to the application of sustainability in wineries, such as time intensity, the extra costs, or a lack of information, are scarce (Dodds et al., 2013; Pomarici et al., 2015; Szolnoki, 2013).

With respect to producers' adoption of specific sustainability practices, much emphasis was put on environmental management systems (EMS; Gilinsky et al., 2015; Marshall et al., 2010), such as the ISO 14001 standard, for which the majority of wineries (i.e., family-owned or small-scaled) often lack financial resources (Borsellino et al., 2016; Szolnoki, 2013). There is a need to go beyond EMS (Christ & Burritt, 2013; Flores, 2018) and related sustainable practices, such as

eco-certification (Giacomarra, Galati, Crescimanno, & Tinervia, 2016), programs, guidelines, and voluntary standards (Mariani & Vastola, 2015). In line with the potential beneficial impacts of the adoption of sustainability on cost reduction, competitive advantage or differentiation in wine companies (Atkin, Gilinsky, & Newton, 2012; Flint & Golcic, 2009; Gilinsky et al., 2015; Signori, Flint, & Golcic, 2017), including small and medium-sized enterprises (SMEs; Malesios et al., 2018), one can assign sustainability practices to different management domains, among which marketing, operational, supply chain management, and innovation management.

First, marketing management approaches can be applied to improve the value of sustainability in the wine sector (Bresciani, Ferraris, Santoro, & Nilsen, 2016; Contò, Fiore, Vrontis, & Silvestri, 2015). Examples are price premiums that reflect consumer's interest (Delmas & Grant, 2014; Sellers-Rubio & Nicolau-Gonzalbez, 2016; Vecchio, 2013), sustainability labeling (Berghoef & Dodds, 2013), or other promotion tools to further communicate sustainability efforts (e.g., agro-tourism, wine tastings, or e-commerce; Fiore et al., 2017; Mariani & Vastola, 2015).

Second, sustainability can also be addressed through practices that are linked to supply chain management (Flint & Golcic, 2009; Varsei & Polyakovskiy, 2017), such as recycling, efficient packaging, and transport (Merli, Preziosi, & Acampora, 2018; Pullman, Maloni, & Dillard, 2010; Soosay, Fearn, & Dent, 2012; Szolnoki, 2013), by which collaboration with other producers (e.g., cooperatives) or other stakeholders in the chain can be initiated (Gabzdylova et al., 2009; Mariani & Vastola, 2015). A meta-analysis by Golcic and Smith (2013), for example, demonstrated a positive link between environmental supply chain practices and various forms of firm performance.

Third, from an operational management perspective, a large variety of regional or national sustainability projects have been implemented in the wine industry (Flores, 2018; Gilinsky et al., 2015). Adoption and certification of standards, for example, have demonstrated environmental as well as societal and marketing benefits (Hughey, Tait, & O'Connell, 2005; Prajogo, Tang, & Lai, K.-h., 2012). Despite the higher economic costs (e.g., Pomarici et al., 2015), sustainability projects are considered to be key drivers of competitive advantage (Atkin et al., 2012). Other sustainability practices within operational management relate to precision or integrated agriculture, reduction in agrochemical use or greenhouse gas emissions, protection of biodiversity, and recycling (Borsellino et al., 2016; Flores, 2018; Merli et al., 2018; Pullman et al., 2010).

Fourth, innovation is recognized as an important tool to achieve competitive advantage in agriculture (Sunding & Zilberman, 2001; Thompson & Scoones, 2009) and the wine sector in particular (Aylward, Glynn, & Gibson, 2006). Innovation management can take place in the vineyard and cellar, for instance, through new harvest methods, renewable energy sources, or fermentation software (Borsellino et al., 2016; Merli et al., 2018; Stasi, Muscio, Nardone, & Seccia, 2016).

This study aims to (a) identify key drivers and barriers of the adoption of sustainability and (b) compare the adoption and evaluation (intensity of use, financial and labor investments, and level of

satisfaction) of sustainability practices in different management domains (marketing, chain, operational, and innovation).

With respect to the first objective, wine producers' perceptions of both internal and external drivers will be measured. Then, sustainability practices, as derived from scientific literature, will be evaluated and compared within and between management domains. Such practices are generally oriented towards environmental sustainability, with or without linkages to other sustainability dimensions. Nevertheless, particular attention will also be devoted to the multidimensional nature of sustainability. Previous studies have illustrated the importance of social, economic, and environmental sustainability in the grape and wine sector (Cardone, De Boni, Jouini, & Roma, 2018; Pullman et al., 2010; Varsei & Polyakovskiy, 2017), though only few measured wine producers' perceptions of sustainability dimensions (Borsellino et al., 2016) or impacts (Pomarici et al., 2015; Prajogo et al., 2012). This study will use this multidimensional framework to compare producers' perceptions of the importance of sustainability dimensions and the drivers for sustainable wine production, as well as to evaluate the role of both on the evaluation of the environmentally oriented sustainability practices.

It is important to note that this analysis also considers heritage as another important dimension of sustainability in wine production that aligns with the extended definition of sustainable viticulture and wine making by the International Organization of Vine and Wine (Flores, 2018; OIV, 2016), as it is linked to culture as a fourth sustainability dimension (Auclair & Fairclough, 2015; Soini & Dessein, 2016). This contributes to research on sustainability perceptions with farmers and complements the consumer-oriented literature (Choi & Ng, 2011).

The study focuses on two traditional wine regions of an "old world" wine country (Tuscany and Emilia-Romagna, Italy), where heritage can be considered as a potential driver of sustainability (Flint, Golcic, & Signori, 2011; Flores, 2018) and innovation (Vrontis, Bresciani, & Giacosa, 2016). This study specifically targeted small and medium-sized companies, as officially defined by the European Union (European Commission, 2003). The European wine sector mainly consists of small producers (Comité Européen des Entreprises Vins, 2016). In their struggle to be competitive in this fragmented sector, SME wineries have a growing interest in adopting sustainability practices (Cordano, Marshall, & Silverman, 2010; Hamann, Smith, Tashman, & Marshall, 2017; Hatak, Floh, & Zauner, 2015), despite their limited resources.

## 2 | MATERIALS AND METHODS

### 2.1 | Survey and data collection

The standardized survey used for analysis consists of three main sections. The first part dealt with producer's sustainability perceptions and the drivers/barriers of the adoption of sustainability practices. Prior research in the wine sector demonstrates producers' difficulty in understanding sustainability (Szolnoki, 2013). After providing the producers with a general definition of sustainability, they were asked to indicate the importance of each of the four dimensions of

sustainability on a 5-point (from 1 = *not important* to 5 = *very important*) scale (Merli et al., 2018; Szolnoki, 2013). Thereby, wine producers were given information about these dimensions, based on their main principles and some examples (Corbo, Lamastra, & Capri, 2014; Szolnoki, 2013). Whereas previous research shows heterogeneity regarding sustainability definitions in the wine sector (Corbo et al., 2014; Flint et al., 2011; Flores, 2018), the focus here is also on the three-dimensional concept of sustainability in wine studies (Merli et al., 2018; Thompson & Forbes, 2011), with an additional heritage dimension (Flores, 2018; OIV, 2016). It is important to mention that these four variables reflect wine producers' overall perceived importance of the dimensions as a whole (Armindo, Fonseca, Abreu, & Toldy, 2019; Borsellino et al., 2016) but are not developed based on different items (Pullman et al., 2010).

Furthermore, respondents were given statements on the potential drivers (17 statements) of the adoption of sustainability in their wineries, measured on a 5-point Likert scale (from 1 = *strongly disagree* to 5 = *strongly agree*). An overview of the drivers and their sources is presented in Table 1. This table categorizes these drivers according to the type of driver (internal/external) or the sustainability dimensions (environmental, economic, social, and heritage), based on their composite variables (see further). These typologies were not revealed to respondents, as they only received a random list of drivers. Also, barriers (14 statements) were questioned, using the same agreement scale. The list of drivers was compiled based on different studies (Atkin et al., 2012; Borsellino et al., 2016; Christ & Burritt, 2013; Gabzdyllova et al., 2009; Merli et al., 2018; Prajogo et al., 2012; Szolnoki, 2013).

The second part investigated producers' utilization and evaluation of various sustainability practices. Given that adoption decisions regarding sustainability practices in wineries are a function of perceived costs and benefits (Christ & Burritt, 2013), producers were also asked to estimate the labor and financial investments, as well as their level of satisfaction. A 5-point semantic scale for intensity (from 0 = *none* to 4 = *significantly*) was used for each of the four evaluation indicators (intensity of use, financial/labor investments, and level of satisfaction). A total number of 23 practices were derived from the literature (Borsellino et al., 2016; Mariani & Vastola, 2015; Merli et al., 2018; Pomarici et al., 2015; Stasi, Muscio, Nardone, & Seccia, 2016; Szolnoki, 2013). In close consultation with key experts and the wine producers interviewed during the pilot test, each of the practices was assigned to the different management domains: marketing (six statements), supply chain (three statements), operational (seven statements), and innovation management (five statements). An overview of the sustainability practices and their sources is presented in Table 2.

A third and final part looked at key company characteristics (Atkin et al., 2012; Castellini, Mauracher, Procidano, & Sacchi, 2014; Gilinsky et al., 2016; Prajogo et al., 2012). Whereas the sample was balanced according to the region (Emilia Romagna or Tuscany), the following items were measured: age of the company (based on the year of foundation; Castellini et al., 2014), production level (in hectoliters per year; Atkin et al., 2012), type of ownership (family-owned, nonfamily owned, and cooperative; Atkin et al., 2012), and employment (number

**TABLE 1** Overview of drivers

| Internal drivers                                                                        | References                                                                                                                      |
|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Ethical choice (heritage)                                                               | (Borsellino et al., 2016; Flores, 2018; Szolnoki, 2013)                                                                         |
| To protect regional products (heritage)                                                 | Self-developed                                                                                                                  |
| To reduce pollution, energy, material consumption, and carbon footprint (environmental) | (Borsellino et al., 2016)                                                                                                       |
| To protect the biodiversity (environmental)                                             | (Borsellino et al., 2016; Flores, 2018)                                                                                         |
| To protect the landscape (heritage)                                                     | (Dodds et al., 2013; Mariani & Vastola, 2015; Pomarici et al., 2015)                                                            |
| To have a higher product quality (heritage)                                             | (Borsellino et al., 2016; Dodds et al., 2013)                                                                                   |
| To improve work safety and security for employees (social)                              | (Dodds et al., 2013; Fiore et al., 2017; Mariani & Vastola, 2015; Szolnoki, 2013)                                               |
| To differentiate and compete (economic)                                                 | (Borsellino et al., 2016; Dodds et al., 2013; Sellers-Rubio & Nicolau-Gonzalbez, 2016)                                          |
| To improve efficiency and control in operations (economic)                              | (Flores, 2018)                                                                                                                  |
| To justify a price premium (economic)                                                   | (Sellers-Rubio & Nicolau-Gonzalbez, 2016)                                                                                       |
| External drivers                                                                        | References                                                                                                                      |
| To obtain a safe environment for residents, neighbors, and community (social)           | Self-developed                                                                                                                  |
| To obtain a safe product for customers (social)                                         | Self-developed                                                                                                                  |
| To enter new markets (economic)                                                         | (Gabzdylova et al., 2009)                                                                                                       |
| To meet customers' demands for sustainable products (economic)                          | (Borsellino et al., 2016; Fiore et al., 2017; Gabzdylova et al., 2009; Szolnoki, 2013)                                          |
| To comply with governments' policy or regulations (social)                              | (Dodds et al., 2013; Fiore et al., 2017; Flores, 2018; Gabzdylova et al., 2009; Mariani & Vastola, 2015; Pomarici et al., 2015) |
| To improve relations with the stakeholders (economic)                                   | (Dodds et al., 2013; Mariani & Vastola, 2015)                                                                                   |
| To obtain subsidies (economic)                                                          | (Borsellino et al., 2016)                                                                                                       |

Note. For each driver, the most relevant sustainability dimensions (environmental, economic, social, and heritage) is mentioned between brackets (Corbo et al., 2014; Flores, 2018). The self-developed drivers were suggested by the interviewees (pilot test phase) and are linked to the definition and conceptualization of sustainability in the wine sector (Corbo et al., 2014; OIV, 2016; Szolnoki, 2013).

of fulltime equivalent employees; Castellini et al., 2014). With respect to sustainability, the use of specific sustainability certificates/labels (yes/no) was measured based on a list of nine certificates/labels derived from different sources (Atkin et al., 2012; Castellini et al., 2014; Corbo et al., 2014; Gabzdylova et al., 2009). Finally, respondents were asked whether they ever obtained advice on sustainability practices from an organization/association (yes/no).

Qualtrics, a web-based software for online surveys, was used to support the data collection. A pretest with seven Tuscan wineries in September 2017 was conducted to evaluate the questionnaire in terms of length, content, and understanding. The sampling was limited to two key wine regions of Italy, Tuscany, and Emilia-Romagna. Potential respondents were invited through e-mail and visited during wine fairs (Enologica and Vinitaly) and/or on-site. In total, 64 managers with decision-making responsibilities from SME wineries agreed to participate, with the two wine regions equally represented.

## 2.2 | Data analysis

The Qualtrics data were exported to SPSS Statistics 24 for statistical analysis. Recoding of data was performed for four variables. Age of the company, production level, and employment were transformed into categorical variables to counter potential impacts of outliers (e.g., due to the large age range in the sample of 64 SMEs). The cutoff levels (25 and 50 years, five permanent staff members, and 500 hectoliters per year) were established after the data collection, in close consultation with the interviewees of the pilot test. In order to compare users and nonusers, the intensity of use scale was also recoded into a dummy variable of adoption (yes/no).

Different composite variables were developed by calculating a mean score of all respective items (see Table 3). First, two continuous variables of the company characteristics were developed: the "number of implemented certificates/labels," based on the dummy variables of the implementation of each of the specific certificates/labels, and the "number of adopted practices," based on the dummy variables of the adoption of each of the sustainability practices. Second, drivers were categorized according to the type of driver (internal vs. external) and the four sustainability dimensions (environmental, economic, social, and heritage). For each dimension and type of driver, a composite variable was developed based on the mean score of all relevant items (i.e., drivers). A similar approach was followed to construct a composite variable for each of the evaluation indicators, both within (four variables) and across the management domains (one variable). This makes it possible to compare different evaluation indicators within each management domain, and the same indicator across the domains. Reliability analysis was used to analyze the internal consistency of the composite variables. Although Cronbach alpha values of the newly developed composite variables generally reach the threshold of 0.5 (Hinton, McMurray, & Brownlow, 2014) and, in most cases, exceed the 0.6 level (Churchill, 1979), the evaluation of marketing practices was less internally consistent with respect to the intensity of use,

**TABLE 2** Overview of sustainability practices

| Management domain | Sustainability practice                                                      | References                                                                                                                                                                                 |
|-------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Marketing         | 1. Organic certification                                                     | (Berghoef & Dodds, 2013; Corbo et al., 2014; Delmas & Grant, 2014; Flores, 2018; Gabzdylova et al., 2009; Gilinsky et al., 2015; Merli et al., 2018; Pullman et al., 2010; Szolnoki, 2013) |
|                   | 2. Bio-dynamic certification                                                 | (Berghoef & Dodds, 2013; Delmas & Grant, 2014; Flores, 2018; Gabzdylova et al., 2009; Merli et al., 2018; Pullman et al., 2010; Szolnoki, 2013)                                            |
|                   | 3. Quality label (DOC/DOCG)                                                  | (Berghoef & Dodds, 2013; Delmas & Grant, 2014; Flores, 2018; Gabzdylova et al., 2009; Merli et al., 2018)                                                                                  |
|                   | 4. Promotion/advertising tools <sup>a</sup>                                  | (Fiore et al., 2017; Flint & Golcic, 2009; Flores, 2018; Gabzdylova et al., 2009; Gilinsky et al., 2016; Mariani & Vastola, 2015; Merli et al., 2018; Szolnoki, 2013; Vecchio, 2013)       |
|                   | 5. Using a specific distribution channel                                     | (Fiore et al., 2017; Flint & Golcic, 2009; Flores, 2018; Gabzdylova et al., 2009; Gilinsky et al., 2016; Merli et al., 2018; Szolnoki, 2013)                                               |
|                   | 6. Premium price for sustainability                                          | (Atkin et al., 2012; Delmas & Grant, 2014; Flores, 2018; Pullman et al., 2010; Sellers-Rubio & Nicolau-Gonzalez, 2016; Vecchio, 2013)                                                      |
| Chain             | 1. Efficient transport                                                       | (Borsellino et al., 2016; Flint & Golcic, 2009; Flores, 2018; Pullman et al., 2010; Varsei & Polyakovskiy, 2017)                                                                           |
|                   | 2. Efficient packaging <sup>b</sup>                                          | (Borsellino et al., 2016; Flint & Golcic, 2009; Flores, 2018; Pullman et al., 2010; Varsei & Polyakovskiy, 2017)                                                                           |
|                   | 3. Sharing experiences and knowledge about sustainability among stakeholders | (Borsellino et al., 2016; Flores, 2018; Gilinsky et al., 2015; Mariani & Vastola, 2015; Merli et al., 2018; Pullman et al., 2010; Szolnoki, 2013; Varsei & Polyakovskiy, 2017)             |
| Operational       | 1. Precision agriculture                                                     | (Flores, 2018; Merli et al., 2018)                                                                                                                                                         |
|                   | 2. Integrated agriculture <sup>c</sup>                                       | (Flores, 2018; Merli et al., 2018)                                                                                                                                                         |
|                   | 3. Italian sustainability projects <sup>d</sup>                              | (Corbo et al., 2014; Flores, 2018; Gilinsky et al., 2015; Merli et al., 2018; Pullman et al., 2010)                                                                                        |
|                   | 4. Reduced use of agrochemicals <sup>e</sup>                                 | (Borsellino et al., 2016; Flores, 2018; Gabzdylova et al., 2009; Merli et al., 2018; Pullman et al., 2010)                                                                                 |
|                   | 5. Protection of biodiversity <sup>f</sup>                                   | (Borsellino et al., 2016; Flores, 2018; Merli et al., 2018; Pullman et al., 2010)                                                                                                          |
|                   | 6. Recycling <sup>g</sup>                                                    | (Borsellino et al., 2016; Flores, 2018; Gilinsky et al., 2015; Merli et al., 2018; Gabzdylova, 2009 #23; Pomarici et al., 2015; Pullman et al., 2010)                                      |
|                   | 7. Reduction of greenhouse gas emissions                                     | (Borsellino et al., 2016; Flores, 2018; Gabzdylova et al., 2009; Merli et al., 2018; Pullman et al., 2010)                                                                                 |
| Innovation        | 1. Renewable energy sources <sup>h</sup>                                     | (Borsellino et al., 2016; Flores, 2018; Gilinsky et al., 2015; Merli et al., 2018;                                                                                                         |

(Continues)

**TABLE 2** (Continued)

| Management domain | Sustainability practice                                               | References                                                                                                     |
|-------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
|                   | 2. Green constructions in the vineyard <sup>d</sup>                   | Pullman et al., 2010; Antonio Stasi, Alessandro Muscio, Gianluca Nardone, & Antonio Seccia, 2016)              |
|                   | 3. Green constructions in the cellar <sup>j</sup>                     | (Borsellino et al., 2016; Flores, 2018; Merli et al., 2018; Pullman et al., 2010; Antonio Stasi et al., 2016)  |
|                   | 4. Green constructions in packaging <sup>k</sup>                      | (Borsellino et al., 2016; Flint & Golobic, 2009; Flores, 2018; Merli et al., 2018; Antonio Stasi et al., 2016) |
|                   | 5. Collaboration with universities and research centers on innovation | (Flores, 2018; Gilinsky et al., 2015; Antonio Stasi et al., 2016)                                              |

Note. All practices are linked to environmental sustainability, whereas some practices are directly linked to economic sustainability (efficient transport/packaging, price premium for sustainability), social sustainability and heritage (quality label), or all dimensions (Italian sustainability projects). Abbreviations: DOC, Denominazione di Origine Controllata (controlled designation of origin); DOCG, Denominazione di Origine Controllata e Garantita (controlled and guaranteed designation of origin).

<sup>a</sup>For example, agro-tourism, internet, and fairs.

<sup>b</sup>For example, reducing the weight of bottles.

<sup>c</sup>Either through software or based on visual inspection (e.g., for water/pesticide use).

<sup>d</sup>For example, ISO 14001 and social reporting.

<sup>e</sup>For example, fertilizers, herbicides, fungicides, and pesticides.

<sup>f</sup>For example, crop diversification/intercropping (with herbs).

<sup>g</sup>For example, reusing stems and branches, using local manure, and purification of waste waters.

<sup>h</sup>For example, biomass and solar panels.

<sup>i</sup>For example, novel harvest methods and new varietals.

<sup>j</sup>For example, fermentation software, precision bottling and filling machines, and sensory analysis.

<sup>k</sup>For example, radio frequency identification (RFID), screw cap, and glass top.

**TABLE 3** Overview of composite variables of drivers and practices: Number of items, mean, and standard deviation

| Drivers                  | Number of items (1–5 agreement scale) | $\bar{x}$ | SD        |           |              |           |      |           |      |
|--------------------------|---------------------------------------|-----------|-----------|-----------|--------------|-----------|------|-----------|------|
| Type                     |                                       |           |           |           |              |           |      |           |      |
| Internal                 | 10 sustainability drivers             | 4.08      | 0.36      |           |              |           |      |           |      |
| External                 | 7 sustainability drivers              | 3.68      | 0.54      |           |              |           |      |           |      |
| Sustainability dimension |                                       |           |           |           |              |           |      |           |      |
| Environmental            | 2 sustainability drivers              | 4.45      | 0.61      |           |              |           |      |           |      |
| Economic                 | 7 sustainability drivers              | 3.43      | 0.78      |           |              |           |      |           |      |
| Social                   | 4 sustainability drivers              | 4.05      | 0.61      |           |              |           |      |           |      |
| Heritage                 | 4 sustainability drivers              | 4.46      | 0.47      |           |              |           |      |           |      |
| Practices                | Number of items (0–4 intensity scale) | Use       | Financial | Labor     | Satisfaction |           |      |           |      |
|                          |                                       | $\bar{x}$ | SD        | $\bar{x}$ | SD           | $\bar{x}$ | SD   | $\bar{x}$ | SD   |
| Management domain        | 6 sustainability practices            | 1.47      | 0.75      | 1.02      | 0.63         | 1.28      | 0.65 | 1.76      | 0.74 |
| Marketing                | 6 sustainability practices            | 1.47      | 0.75      | 1.02      | 0.63         | 1.28      | 0.65 | 1.76      | 0.74 |
| Chain                    | 3 sustainability practices            | 1.83      | 1.50      | 1.11      | 0.98         | 1.25      | 0.99 | 2.33      | 1.74 |
| Operational              | 7 sustainability practices            | 2.41      | 0.82      | 1.87      | 0.70         | 2.10      | 0.78 | 3.03      | 0.72 |
| Innovation               | 5 sustainability practices            | 1.82      | 1.44      | 1.68      | 1.31         | 1.26      | 0.99 | 2.48      | 1.55 |

Abbreviation: SD, standard deviation.

labor, and satisfaction. Nevertheless, at each management domain level, all items (i.e., practices) were retained to reflect better the depth of the domain, characterized by a diversity of practices.

Paired sample *t* tests were used to determine differences in perceived importance between the two types of drivers or the four sustainability dimensions, as well as to compare mean scores between

the evaluation indicators within each management domain. Pearson bivariate correlations were used to compare the associations between the evaluation indicators within a management domain as well as, to compare the same evaluation indicator between different management domains.

Hierarchical cluster analysis was performed to distinguish relatively homogenous groups of wine producers. The four aggregated evaluation indicators, that is, composite variables based on the mean scores of each evaluation indicator of all 23 practices, were inserted as cluster variables into the cluster analysis. Ward's cluster method, based on squared Euclidean distances, was used. After selecting the most suitable cluster solution (i.e., two clusters), cluster membership was analyzed using profiling variables related to the company characteristics (see also Table 4). Independent samples *t* test and chi-squared

tests were carried out with, respectively, continuous and categorical profiling variables were carried out to detect significant differences between both clusters.

### 3 | RESULTS

#### 3.1 | Sample descriptives

The wine companies in our sample were equally distributed between the two targeted neighboring regions in Northern (Emilia Romagna) and Central Italy (Toscana; Table 4). Furthermore, they were more or less balanced in terms of the age of the company, with most companies younger than 50 years. Given that our sample targets SMEs only,

**TABLE 4** Sample descriptives (*n* = 64)

|                              | <i>N</i> | (%)  |                                                       | <i>n</i>          | (%)     |
|------------------------------|----------|------|-------------------------------------------------------|-------------------|---------|
| Region                       |          |      | Use of sustainability certificates/labels             |                   |         |
| Emilia Romagna               | 32       | 50.0 | DOC/DOCG (heritage)                                   | 33                | 51.6    |
| Tuscany                      | 32       | 50.0 | Organic label (environmental)                         | 31                | 48.4    |
| Age of the company           |          |      | Bio-dynamic label (environmental)                     | 8                 | 12.5    |
| <25 years                    | 25       | 38.5 | EMAS (environmental)                                  | 1                 | 1.6     |
| 26–50 years                  | 26       | 40.0 | ISO 14001 (environmental)                             | 6                 | 9.4     |
| 50+ years                    | 14       | 21.5 | Carbon footprint (environmental)                      | 6                 | 9.4     |
| Type of ownership            |          |      | Viticultura sostenibile V.I.V.A (sustainability)      | 7                 | 10.9    |
| Family                       | 40       | 62.5 | TERGEO (sustainability)                               | 1                 | 1.6     |
| Nonfamily                    | 17       | 26.6 | Social report certification (sustainability)          | 7                 | 10.9    |
| Cooperative                  | 7        | 10.9 | Number of sustainability certificates/labels          | $\bar{x}$ : 1.19  | SD: 0.5 |
| Employment (permanent staff) |          |      | 0                                                     | 7                 | 10.9    |
| <5                           | 35       | 54.7 | 1                                                     | 0                 | 0.0     |
| >5                           | 29       | 45.3 | 2                                                     | 29                | 45.3    |
| Production level             |          |      | 3                                                     | 19                | 29.7    |
| ≤500 hl/year                 | 45       | 70.3 | 4                                                     | 6                 | 9.4     |
| >500 hl/year                 | 19       | 29.7 | 5 or more                                             | 3                 | 4.7     |
|                              |          |      | Advice from a sustainability association/organization |                   |         |
|                              |          |      | No                                                    | 46                | 71.9    |
|                              |          |      | Yes                                                   | 18                | 28.1    |
|                              |          |      | Overall perceived importance of sustainability        | $\bar{x}$         | SD      |
|                              |          |      | Environmental                                         | 4.63 <sup>a</sup> | 0.68    |
|                              |          |      | Economic                                              | 4.27 <sup>b</sup> | 0.89    |
|                              |          |      | Social                                                | 3.75 <sup>c</sup> | 0.84    |
|                              |          |      | Heritage                                              | 3.80 <sup>c</sup> | 0.96    |
|                              |          |      | All dimensions                                        | 4.11              | 0.52    |

*Note.* Sustainability labels/certificates are either linked to sustainability as a whole, or a specific sustainability dimension, as indicated between brackets. The number of sustainability certificates/labels is derived from the variable "use of sustainability certificates/labels." Letters (<sup>a,b,c</sup>) denote significant differences. *P* values of paired samples *t* tests are env-eco (*p* = .08), env-soc (*p* = .001), env-her (*p* = .001), eco-soc (*p* = .001), eco-her (*p* = .004), and soc-her (*p* = .745). Overall perceived importance of each sustainability dimension was based on a single item.

Abbreviations: DOC, Denominazione di Origine Controllata (controlled designation of origin); DOCG, Denominazione di Origine Controllata e Garantita (controlled and guaranteed designation of origin); SD, standard deviation.

it is not surprising that the majority of wine producers were family owned (63%), with less than five staff members (55%) and a production level below or equal to 500 hectoliters per year (70%).

Except for seven companies, most companies had at least one sustainability-related label or certificate (89%), most often one (45%) or two (30%). The most commonly implemented labels are the Denominazione di Origine Controllata (DOC)/Denominazione di Origine Controllata e Garantita (DOCG; 52%) and the organic label (48%), which focus on heritage and environmental sustainability, respectively, whereas other (environmental) sustainability labels and certificates were less popular. With respect to advice about sustainability, the majority of the companies did not receive any advice from an association (72%). Sustainability was considered to be very important according to the Italian wine producers, with an average score of 4.1 out of 5 (Table 4). When looking at the specific dimensions, environmental sustainability is perceived as significantly more important than economic sustainability, followed by the heritage and social dimension. Only the environmental and social dimensions of sustainability are significantly correlated, with a positive coefficient of 0.476 ( $p = .001$ ).

### 3.2 | Drivers and barriers to the adoption of sustainability

Figure 1 categorizes the mean importance of each driver according to (a) the type of driver (internal vs. external) and (b) the sustainability dimensions (environmental, economic, social, and heritage). On average, internal drivers were perceived as more important than external drivers (paired sample  $t$  test,  $p < .001$ ). Most importance was attached

to the ethical choice (internal) behind their adoption of sustainability. Whereas all drivers were considered important to some extent, wine producers seem to be least driven by price premiums (internal) or subsidies (external). The paired samples  $t$  tests between the drivers of each sustainability dimension ([Dimension]\_ALL) indicate significant differences for all comparisons ( $p = .001$ ), except between environmental sustainability and heritage ( $p = .824$ ). Whereas the economic dimension as such is deemed crucial to wine producers, insights in the key drivers provides a slightly different picture. Economic sustainability drivers generally score significantly lower than the other dimensions. The environmentally oriented drivers, though lower in number, are consistently higher, in line with the overall importance wine producers attach to this dimension. However, the drivers that are related to the heritage play a much more important role than expected based on producers' overall sustainability perceptions.

Similar as for the drivers to implement sustainability practices, a large diversity in mean values is reported for the barriers (Figure 2). Whereas three barriers are generally considered to be less important, that is, lack of customer interest, poor information on sustainability practices, or technical difficulties, most barriers were considered relatively important. Several issues were pointed out as crucial barriers, such as the bureaucracy, the time and labor intensity, and the abuse of the concept of sustainability, also known as greenwashing (Seele & Gatti, 2017).

### 3.3 | Adoption of sustainability practices

Out of all 23 sustainability practices, our sample adopts 15 practices on average, with a standard deviation of 4 and a range of 16 practices

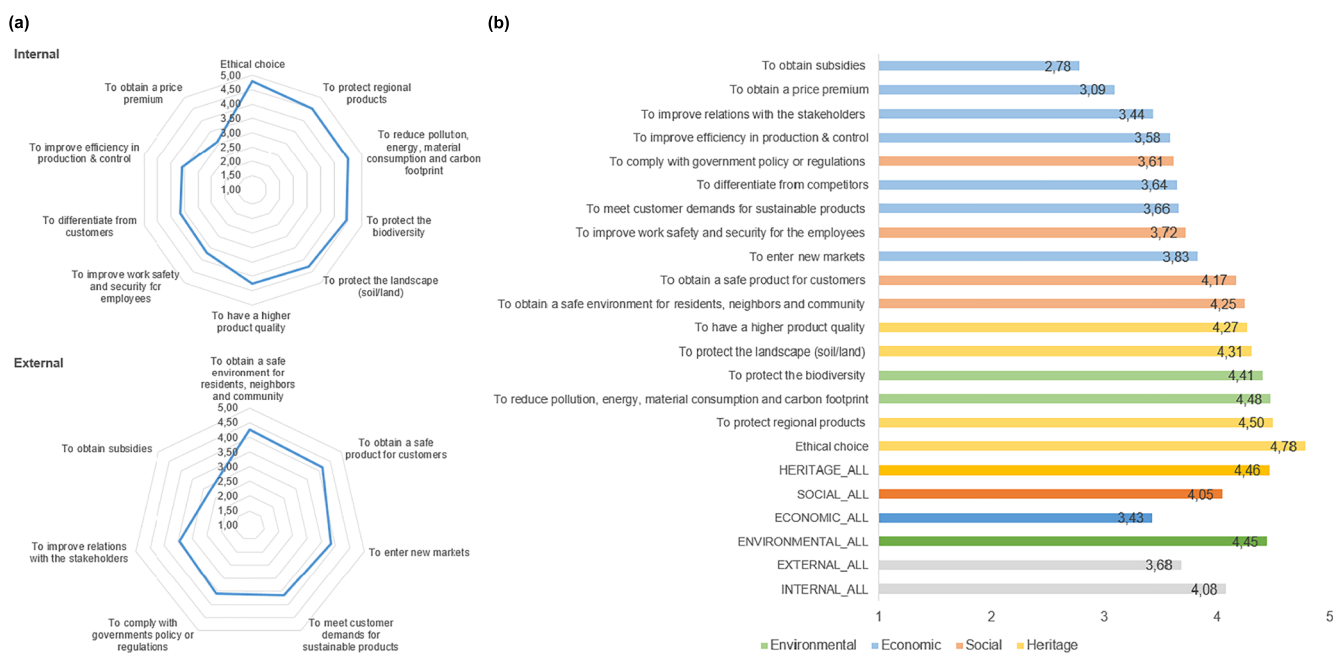


**FIGURE 1** Drivers of the implementation of sustainability in wine companies, mean values of importance, per (a) type of driver and (b) sustainability dimension. Based on agreement scales (1–5). In panel b, the last six items refer to the composite variables of the dimension specific ("[DIMENSION]\_ALL") and type of drivers ("[TYPE]")

**FIGURE 2** Barriers to the implementation of sustainability in wine companies, mean values of importance

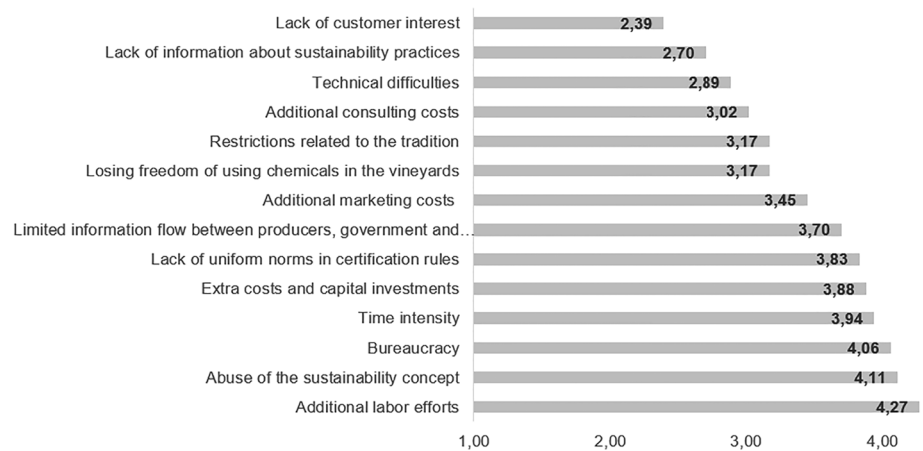


**TABLE 5** Wine producers' adoption of sustainability practices, per management domain, in absolute (#) and relative numbers (%)

|             |                                                                              | Number of |          | Percentage of |          |
|-------------|------------------------------------------------------------------------------|-----------|----------|---------------|----------|
|             |                                                                              | Users     | Nonusers | Users         | Nonusers |
| Marketing   | 1. Organic certification                                                     | 35        | 29       | 54.7          | 45.3     |
|             | 2. Bio-dynamic certification                                                 | 11        | 53       | 17.2          | 82.8     |
|             | 3. Quality label (DOC/DOCG)                                                  | 31        | 33       | 48.4          | 51.6     |
|             | 4. Promotion/advertising tools <sup>a</sup>                                  | 57        | 7        | 89.1          | 10.9     |
|             | 5. Using a specific distribution channel                                     | 44        | 20       | 68.8          | 31.3     |
|             | 6. Premium price for sustainability                                          | 35        | 29       | 54.7          | 45.3     |
| Chain       | 1. Efficient transport                                                       | 41        | 23       | 64.1          | 35.9     |
|             | 2. Efficient packaging <sup>b</sup>                                          | 41        | 23       | 64.1          | 35.9     |
|             | 3. Sharing experiences and knowledge about sustainability among stakeholders | 44        | 20       | 68.8          | 31.3     |
| Operational | 1. Precision agriculture                                                     | 60        | 4        | 93.8          | 6.3      |
|             | 2. Integrated agriculture <sup>c</sup>                                       | 62        | 2        | 96.9          | 3.1      |
|             | 3. Italian sustainability projects <sup>d</sup>                              | 17        | 47       | 26.6          | 73.4     |
|             | 4. Reduced use of agrochemicals <sup>e</sup>                                 | 64        | 0        | 100.0         | 0.0      |
|             | 5. Protection of biodiversity <sup>f</sup>                                   | 62        | 2        | 96.9          | 3.1      |
|             | 6. Recycling <sup>g</sup>                                                    | 60        | 4        | 93.8          | 6.3      |
|             | 7. Reduction of greenhouse gas emissions                                     | 64        | 0        | 100.0         | 0.0      |
| Innovation  | 1. Renewable energy sources <sup>h</sup>                                     | 46        | 18       | 71.9          | 28.1     |
|             | 2. Green constructions in the vineyard <sup>i</sup>                          | 51        | 13       | 79.7          | 20.3     |
|             | 3. Green constructions in the cellar <sup>j</sup>                            | 47        | 17       | 73.4          | 26.6     |
|             | 4. Green constructions in packaging <sup>k</sup>                             | 42        | 22       | 65.6          | 34.4     |
|             | 5. Collaboration with universities and research centers on innovation        | 38        | 26       | 59.4          | 40.6     |

Abbreviations: DOC, Denominazione di Origine Controllata (controlled designation of origin); DOCG, Denominazione di Origine Controllata e Garantita (controlled and guaranteed designation of origin).

<sup>a</sup>For example, agro-tourism, internet, and fairs.

<sup>b</sup>For example, reducing the weight of bottles.

<sup>c</sup>Either through software or based on visual inspection (e.g., for water/pesticide use).

<sup>d</sup>For example, ISO 14001 and social reporting.

<sup>e</sup>For example, fertilizers, herbicides, fungicides, and pesticides.

<sup>f</sup>For example, crop diversification/intercropping (with herbs).

<sup>g</sup>For example, reusing stems and branches, using local manure, and purification of waste waters.

<sup>h</sup>For example, biomass and solar panels.

<sup>i</sup>For example, novel harvest methods and new varietals.

<sup>j</sup>For example, fermentation software, precision bottling and filling machines, and sensory analysis.

<sup>k</sup>For example, radio frequency identification (RFID), screw cap, and glass top.

(minimum 5 and maximum 21). Table 5 provides an overview of the adoption rates of the 23 sustainability practices. Thereby, practices are categorized according to the four management domains. Most of the variation in adoption is found in the domain of marketing management, where the share of users ranges from 17% (bio-dynamic certification) to 89% (promotion/advertising tools). Although the latter can be considered as an umbrella of commonly applied practices, more targeted tools such as organic certification, a specific distribution channel or a price premium are also implemented by more than half of the sample. The three practices that belong to the chain management domain, that is, tools for efficient transport, packaging, and sustainability-oriented knowledge transfer, obtain similar high adoption rates (64–68%). Sustainability practices at operational management level are highly adopted, more than in any other management domain. Except for specific Italian sustainability projects, all practices are implemented by at least 94% of the respondents. Also, the innovation management practices are often used, with adoption rates around 60% or above. Aside from the popularity of using renewable energy sources, green constructions in the vineyard appear to be slightly more present than those in packaging and cellar. Innovation-oriented collaboration with universities and research centers is least adopted in this domain, with 41% nonusers.

### 3.4 | Evaluation of sustainability practices

Figure 3 depicts wine producers' evaluation of sustainability practices they adopt, by using four indicators: the perceived intensity of use, costs (financial and labor investments), and benefits (level of satisfaction). Regardless of the sustainability practice or the management domain, the satisfaction level had the highest mean and the lowest standard deviation. When comparing the average costs and benefits for each practice, the level of satisfaction always outweighed the perceived financial/labor investments. More variation was found in the other indicators, by which the overall financial investments had the lowest mean, though only slightly lower than for labor investments.

When looking at the specific management domains, financial investments were the lowest for knowledge transfer between stakeholders (chain management) and researchers (innovation management) and for price and distribution strategies (marketing management), whereas organic certification (marketing management), Italian sustainability projects, reduction of greenhouse gasses (operational management), renewable energy sources and green constructions in the vineyard, cellar, and packaging (innovation management) were considered more expensive practices. In terms of labor investments, average values for distribution and price strategies (marketing management) were again lowest, followed by more financially intensive practices like renewable energy sources and green constructions (innovation management) and efficiency in packaging and transport (chain management). Labor-intensive practices were mostly related to marketing management, such as certification, both organic and bio-dynamic, and other promotion/advertising tools. Also, Italian

sustainability projects (operational management) were considered to be labor-intensive.

Figure 4a shows the mean values of the evaluation indicators of the sustainability practices, aggregated for each management domain. Except for financial versus labor investments in operational management practices, all indicators in each management domain were significantly different from each other ( $p < .001\%$ , paired samples  $t$  tests). Thereby, producers' evaluation of the labor investments were significantly higher than the financial investments, but not for innovation management practices, which were considered to be relatively more expensive than labor-intensive. Figure 4b shows small differences between the management domains, especially for the intensity of use and the level of satisfaction. Although significance testing was not computed for this panel, due to differences in the number of users for each management domain, mean values of investments differed most, with chain management and innovation management considered to require the least investments in, respectively, finances or labor. Operational management practices, which are used the most, are associated with higher labor needs and are together with innovation management practices, most costly.

Table 6 summarizes the results of the bivariate correlations between the evaluation indicators within (panel a) and between the different management domains for each evaluation indicator (panel b). Regarding the former, positive correlations were reported in all analyses. As expected, significant correlation coefficients were obtained for the intensity of use and the perceived investments (financial/labor). The more a wine producer uses a sustainability practice, the larger the investments. Satisfaction, however, had a lower number of significant correlations and was mostly associated with labor investments.

The second pool of correlations demonstrates significant, positive relationships between the financial or labor investments of nearly all groups of management practices. Regarding the satisfaction levels, all correlations between the management domains are (highly) significant. In other words, highly satisfied wine producers for one management domain of practices are associated with high satisfaction levels in another domain of practices.

Another important pool of correlations analyzes the association between the overall perceived importance of sustainability dimensions or the drivers (according to type and dimension) on the one hand and the overall evaluation indicators on the other (Table 7). The importance of the environmental and social dimension, as well as the associated drivers, was positively correlated to (nearly) all of the evaluation indicators. Surprisingly, the value wine producers attach to the economic dimension was not associated with how much they use, invest, or are satisfied with sustainability practices in their company. However, at the level of drivers, the economic dimension was significantly correlated with most evaluation indicators. Regarding heritage, a negative (mostly significant) correlation was found at the level of overall perceived importance and drivers (not significant). This provides indications that heritage often does not go hand in hand with intensive use of, and investments in practices, and may eventually lower satisfaction levels. As expected,



**FIGURE 3** Wine producers' evaluation of sustainability practices per management domain, mean values. Mean values were based on a 0–4 rating scale, except for “use” where nonusers (“0”) were excluded. The number of users of each practice is listed in Table 5

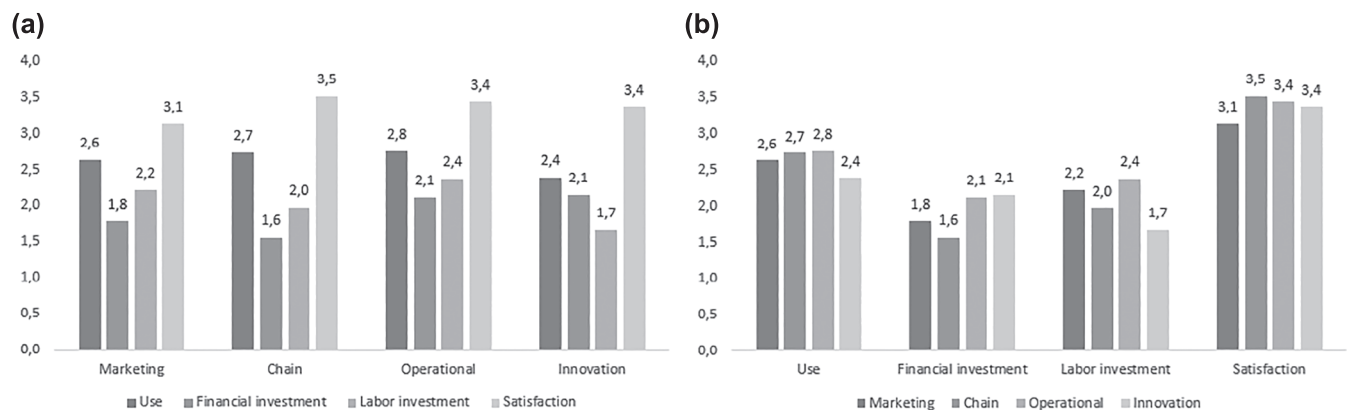


**FIGURE 4** Wine producers' evaluation of sustainability practices, mean values (a) per management domain and (b) per evaluation indicator. Mean values were based on the average score of all items (0–4 rating scale) within a management domain. The number of users of each practice is listed in Table 5

internal and external drivers were positively associated with most of the evaluation variables.

### 3.5 | Segmentation of sustainable wine companies

Hierarchical cluster analysis revealed two distinct groups of wine producers, namely, the “low sustainability” (19 companies, 29.7% of

the sample) and “high sustainability” cluster (45 companies, 70.3%). As shown in Table 8, the means of all cluster variables are significantly different between both clusters, with the wine producers in the high sustainability cluster indicating, on average, higher intensity of use, financial/labor investments, and a higher level of satisfaction.

These clusters can be further profiled based on the characteristics of the wine producers. There are 10 variables for which both

**TABLE 6** Correlations between (a) the different evaluation indicators, within each management domain, and (b) the different management domains, for each evaluation indicator

| (a)                    | Marketing | Chain     | Operational | Innovation   |
|------------------------|-----------|-----------|-------------|--------------|
| Use—financial          | 0.617**   | 0.430**   | 0.646**     | 0.903**      |
| Use—labor              | 0.394**   | 0.380**   | 0.771**     | 0.688**      |
| Use—satisfaction       | 0.174     | 0.463**   | 0.107       | 0.401**      |
| Financial—labor        | 0.624**   | 0.170     | 0.837**     | 0.760**      |
| Financial—satisfaction | 0.124     | 0.106     | 0.058       | 0.518**      |
| Labor—satisfaction     | 0.422**   | 0.383**   | 0.193       | 0.448**      |
| (b)                    | Use       | Financial | Labor       | Satisfaction |
| Marketing—chain        | −0.092    | 0.152     | 0.048       | 0.655**      |
| Marketing—operational  | 0.164     | 0.357**   | 0.329**     | 0.541**      |
| Marketing—innovation   | −0.035    | −0.016    | 0.115       | 0.479**      |
| Chain—operational      | 0.261     | 0.415**   | 0.614**     | 0.837**      |
| Chain—innovation       | 0.569**   | 0.558**   | 0.414**     | 0.842**      |
| Operational—innovation | 0.414**   | 0.505**   | 0.670**     | 0.825**      |

\*Statistical significance at 5%.

\*\*Statistical significance at 1%.

\*\*\*Statistical significance at 0.1%.

**TABLE 7** Correlations between the aggregated evaluation indicators and the perceived importance of drivers (per type and dimension)

|                      | Use      | Financial | Labor    | Satisfaction |
|----------------------|----------|-----------|----------|--------------|
| Perceived importance |          |           |          |              |
| Environmental        | 0.470*** | 0.432***  | 0.420*** | 0.473***     |
| Economic             | 0.140    | 0.188     | 0.174    | 0.181        |
| Social               | 0.283*   | 0.275*    | 0.297*   | 0.126        |
| Heritage             | −0.340** | −0.225    | −0.272*  | −0.417***    |
| Drivers (type)       |          |           |          |              |
| Internal             | 0.306*   | 0.392**   | 0.297*   | 0.172        |
| External             | 0.458**  | 0.411**   | 0.387**  | 0.353**      |
| Drivers (dimension)  |          |           |          |              |
| Environmental        | 0.279*   | 0.278*    | 0.274*   | 0.285*       |
| Economic             | 0.359**  | 0.390**   | 0.336**  | 0.204        |
| Social               | 0.401**  | 0.335**   | 0.347**  | 0.316*       |
| Heritage             | −0.100   | −0.029    | −0.134   | −0.082       |

\*Statistical significance at 5%.

\*\*Statistical significance at 1%.

\*\*\*Statistical significance at 0.1%.

segments differed significantly, namely, the number of practices, advice from a sustainability association, age of the company, type of ownership, perceived importance of environmental sustainability and heritage, and the aggregated drivers for all four dimensions. In line with the lower intensity of use, members of the low sustainability cluster also implement a significantly lower number of practices. Furthermore, this segment is significantly more represented by wine producers from old, family businesses, who did not receive advice from a

sustainability organization or association. Regarding sustainability perceptions, the members of the low sustainability cluster attach significantly more importance to heritage, but less to environmental sustainability. Finally, when drivers are aggregated for each of the sustainability dimensions, their average scores were significantly lower in Cluster 1. Also, the ranking of these groups of drivers differed. Whereas the most important pool of drivers in the low sustainability cluster deal with heritage, the environmental drivers are prioritized in the high sustainability cluster. When drivers were split up according to the type of driver (internal vs. external), no significant differences were obtained. Other company characteristics, such as region, employment, production level, and the number of certificates/labels did not produce significant differences between both clusters.

## 4 | DISCUSSION

This study examines producers' drivers, adoption, and evaluation of sustainability practices in Italian wine SMEs and contributes to the literature on sustainability practices by wine producers in several ways. First, it extends the body of empirical research on drivers of sustainable wine production (Gabzdylova et al., 2009; Santini et al., 2013). Thereby, it evaluates a comprehensive list of external and internal drivers derived from past wine literature and is the first study to evaluate the importance of sustainability drivers from a multidimensional point of view. Second, the novelty of using a comprehensive list of 23 sustainability practices, which is developed based on a large body of wine producer studies, lies in the classification of practices into four management domains. This is also one of the first studies to look at aggregated groups of practices (Pullman et al., 2010), and one of the first to compare adoption of practices from different managerial domains (Dodds et al., 2013). Moreover, the

**TABLE 8** Segmentation analysis of wine producers: Significant differences, by *t* test and  $\chi^2$  test

|                                                     | Cluster 1: low sustainability | Cluster 2: high sustainability | Total sample      | Value                       |
|-----------------------------------------------------|-------------------------------|--------------------------------|-------------------|-----------------------------|
| Cluster variables                                   |                               |                                |                   |                             |
| Evaluation of sustainability practices <sup>a</sup> | $\bar{x} \pm SD$              | $\bar{x} \pm SD$               | $\bar{x} \pm SD$  | <i>t</i> value              |
| Use                                                 | 0.85 ± 0.37                   | 2.32 ± 0.70                    | 1.89 ± 0.92       | 74.471 <sup>***</sup>       |
| Financial investments                               | 0.64 ± 0.30                   | 1.75 ± 0.61                    | 1.42 ± 0.74       | 55.474 <sup>***</sup>       |
| Labor investments                                   | 0.69 ± 0.28                   | 1.81 ± 0.52                    | 1.48 ± 0.69       | 78.610 <sup>***</sup>       |
| Satisfaction                                        | 1.08 ± 0.30                   | 2.40 ± 0.58                    | 2.40 ± 1.00       | 178.141 <sup>***</sup>      |
| Profiling variables (significant)                   |                               |                                |                   |                             |
| Sustainability practices                            | $\bar{x} \pm SD$              | $\bar{x} \pm SD$               | $\bar{x} \pm SD$  | <i>t</i> value              |
| Number of adopted practices                         | 9.90 ± 2.81                   | 16.90 ± 2.23                   | 14.88 ± 4.05      | 115.183 <sup>***</sup>      |
| Advice                                              | % of cluster sample           | % of cluster sample            | % of total sample | <i>c</i> <sup>2</sup> value |
| No                                                  | 100.0                         | 60.0                           | 71.9              |                             |
| Yes                                                 | 0.0                           | 40.0                           | 28.1              | 10.574 <sup>***</sup>       |
| Age (company)                                       | % of cluster sample           | % of cluster sample            | % of total sample | <i>c</i> <sup>2</sup> value |
| Young                                               | 31.6                          | 42.2                           | 39.1              |                             |
| Middle                                              | 26.3                          | 46.7                           | 40.6              |                             |
| Old                                                 | 42.1                          | 11.1                           | 20.3              | 8.067*                      |
| Type of ownership                                   | % of cluster sample           | % of cluster sample            | % of total sample | <i>c</i> <sup>2</sup> value |
| Family                                              | 89.5                          | 51.1                           | 62.5              |                             |
| Nonfamily                                           | 5.3                           | 35.6                           | 26.6              |                             |
| Cooperative                                         | 5.3                           | 13.3                           | 10.9              | 8.556*                      |
| Perceived importance                                | $\bar{x} \pm SD$              | $\bar{x} \pm SD$               | $\bar{x} \pm SD$  | <i>t</i> value              |
| Environmental                                       | 4.26 ± 0.99                   | 4.78 ± 0.42                    | 4.63 ± 0.68       | 13.646 <sup>***</sup>       |
| Heritage                                            | 4.42 ± 0.96                   | 3.53 ± 0.84                    | 3.80 ± 0.96       | 8.615 <sup>**</sup>         |
| Drivers                                             | $\bar{x} \pm SD$              | $\bar{x} \pm SD$               | $\bar{x} \pm SD$  | <i>t</i> value              |
| Environmental                                       | 4.21 ± 0.69                   | 4.54 ± 0.55                    | 4.45 ± 0.61       | −2.046*                     |
| Economic                                            | 3.05 ± 0.69                   | 3.59 ± 0.76                    | 3.43 ± 0.78       | −2.653 <sup>**</sup>        |
| Social                                              | 3.81 ± 0.60                   | 4.15 ± 0.60                    | 4.05 ± 0.61       | −2.084*                     |
| Heritage                                            | 4.64 ± 0.40                   | 4.39 ± 0.48                    | 4.46 ± 0.47       | 2.024*                      |

<sup>a</sup>The four evaluation indicators (composite variables) were inserted into the hierarchical cluster analysis. Each variable represents the mean score on an evaluation indicator, across practices, and management domains.

\*Statistical significance at 5%.

\*\*Statistical significance at 1%.

\*\*\*Statistical significance at 0.1%.

inclusion of four evaluation indicators (intensity of use, financial and labor investments, and level of satisfaction) goes beyond current adoption literature that is mainly targeted towards the identification of drivers (Santini et al., 2013) and complements those studies that evaluate sustainability programs in the wine sector (e.g., EMS; Corbo et al., 2014; Flores, 2018; Hughey et al., 2005; Merli et al., 2018), which are considered to be more appropriate for large wine producers (Cordano et al., 2010; Szolnoki, 2013). Third, this study addresses the need for more research on sustainability perceptions and practices at the level of the wine producer (Santini et al., 2013) rather than at the consumer level (Mariani & Vastola, 2015). Whereas qualitative research techniques are often used for analyzing wine producers (Santini et al., 2013; Szolnoki, 2013), this study further extends the application of quantitative research in sustainability adoption studies in wineries, especially in the case of SMEs (Hamann

et al., 2017). Moreover, based on the survey data, a segmentation analysis was performed to classify sustainable wine producers based on a variety of profiling variables, among which the rarely examined perceptions of sustainability dimensions (Borsellino et al., 2016). Regarding the latter, heritage was added as a relatively novel but relevant dimension in the wine sector.

#### 4.1 | Drivers and barriers of the adoption of sustainability

Our study lends support for the prevailing evidence on the important role of internal drivers (Dodds et al., 2013; Gabzdylova et al., 2009; Pomarici et al., 2015). In particular, the ethical choice, the protection of regional products, and environmental benefits (e.g., protection of

biodiversity or landscape) were considered highly important. Whereas some external drivers were emphasized, such as drivers related to environmental and product safety, the internal drivers remained the dominant group of drivers. This was also illustrated in the segmentation analysis, where internal drivers outweighed the external drivers in both the low and high sustainability clusters.

When looking at the sustainability drivers from a multi-dimensional perspective, the environmental dimension was dominating, in line with a previous Italian wine study (Borsellino et al., 2016). Whereas past studies highlight the importance of economic viability of sustainability practices in wine industries (Merli et al., 2018), especially in larger companies (Pomarici et al., 2015; Szolnoki, 2013), economic sustainability-oriented drivers surprisingly obtained the lowest score in our study. Although the lower importance does not necessarily imply a lack of rational behavior on economic grounds, the implementation of sustainability appears to be more associated with other (e.g., environmental) impacts (Gilinsky et al., 2015; Knight, Megicks, Agarwal, & Leenders, 2019; Whitehead, 2017). Also, social sustainability scored low, which slightly contradicts with the ranking of dimensions in another Italian wine producer study (Borsellino et al., 2016). Heritage, however, is another sustainability dimension that forms an important group of drivers. The DOC/DOCG label, for example, was the most commonly used label, which further underlines the value of heritage and tradition as part of production and, hence, marketing. As such, our study underlines the multidimensionality of drivers of the adoption of sustainability (Flores, 2018), while highlighting internal drivers as being more influential than external drivers (Atkin et al., 2012; Gabzdylowa et al., 2009; Pomarici et al., 2015; Stasi et al., 2016).

With respect to the barriers to the implementation of sustainability in wine production, the importance of external and internal factors was more balanced. At the internal level, key concerns referred to investments in capital (Dodds et al., 2013), labor, and time (Pomarici et al., 2015), whereas the most important barriers linked to the external environment were the bureaucracy and the abuse of the sustainability concept (Szolnoki, 2013). The latter, also known as greenwashing, was even ranked second, after additional labor efforts, and is known to be a key challenge for wine industries (Berghoef & Dodds, 2013; Delmas & Grant, 2014; McEwan & Bek, 2009) as it may affect stakeholders' perceptions (Delmas & Burbano, 2011; Torelli, Balluchi, & Lazzini, 2019). The issue of greenwashing may also be related to another external barrier, namely, the lack of uniform norms, something which has also been stressed in literature (Mariani & Vastola, 2015; Pullman et al., 2010).

## 4.2 | Adoption and evaluation of sustainability practices

The findings of our study on SME wineries confirm the growing adoption of sustainability practices in the wine sector (Gilinsky et al., 2016). Unlike other typologies of practices (Flores, 2018; Pullman et al., 2010), our study uses a typology based on the management

domains in order to evaluate the implementation of specific sustainability practices. The findings point to a widespread adoption of a variety of practices. On average, the participating wine producers have implemented a total number of 15 sustainability practices (65% of all 23 targeted practices) across different management domains. When excluding the least implemented practices, that is, bio-dynamic certification (17%) and Italian sustainability projects (26%), adoption rates vary between 48% and 100%.

First, strategic marketing practices, such as strategies related to product/process (certification), place (distribution strategy), and price (premium), are often adopted in the participating Italian wineries. Although this reflects a general interest in marketing sustainability as a tool for competitiveness (Fiore et al., 2017), several marketing tools are not adopted by a substantial share of the wineries. A case in point is the price premium. Although consumers generally tend to be willing to pay for sustainable wine (Delmas & Grant, 2014), 45% of wine producers in our sample did not introduce a premium for sustainability, similar as in a New Zealand study (Gabzdylowa et al., 2009). This may be due to, for example, the difficulties of demonstrating the positive effects of sustainability (Pullman et al., 2010).

Second, all chain marketing practices have an adoption rate above 64%. While chain-based strategies targeted at increased efficiency, for example, of transport or packaging, are popular, also collaboration and knowledge transfer between chain actors appears to be common practice for a lot of wine producers. Their interest may be a consequence of the relatively low costs and high satisfaction levels associated with chain management practices. Previous research also demonstrated that horizontal and vertical chain collaboration might also be beneficial as it facilitates the adoption of other sustainability practices and triggers eco-innovations (Stasi et al., 2016).

Third, at operational management level, adoption rates are the highest, which may suggest that sustainability practices in this domain are more easily connected to positive impacts at environmental and also at economic level (Christ & Burritt, 2013; Gilinsky et al., 2015). Only the lack of participation in Italian sustainability projects stands out. Despite the economic benefits of EMS, like the ISO 14001 standard (Merli et al., 2018), the economic costs associated with its implementation (Pomarici et al., 2015; Szolnoki, 2013), most likely account for one of the lowest adoption rates of all targeted practices. Also, the focus on SMEs may have led to a lower adoption of these larger sustainability projects, as the wine producers considered them to be very labor-intensive. From a research point of view, however, it also shows that when going beyond the evaluation of (advanced) EMS, sustainability appears to be widely present in the wine sector (Marshall et al., 2010), also in the case of SMEs.

Finally, practices related to innovation management are adopted by more than 60% of the wineries in our sample. Through sustainability-oriented innovations, these wine producers address the need for innovative answers and technology-driven solutions for challenges in the wine sector, such as the use of scarce resources (Fiore et al., 2017; Gilinsky et al., 2016).

Whether wine companies adopt sustainability practices often depends on whether the perceived benefits outweigh the costs

(Cambrà-Fierro & Ruiz-Benítez, 2011; Tee, Boland, & Medhurst, 2007). This was certainly the case in our sample, in which a subjective indicator of benefits as the degree of satisfaction generally exceeded the costs, that is, perceived financial and labor investments. Regarding the latter, larger variation was observed between as well as within managerial domains. Nevertheless, the satisfaction levels of labor (innovation management) or financially intensive practices (operational management) were similar to those of less intensive practices in terms of labor (innovation management) and financial investments (chain management). The positive correlations between the intensity of use and the investments within each managerial domain and between the different satisfaction levels of the four management domains further illustrate that the implementation of sustainability in wineries is often characterized by an adoption strategy of multiple practices.

Furthermore, the segmentation analysis identified two clusters, that is, low versus high sustainability clusters. The majority of wine producers (70%) belong to the “high sustainability” cluster and are characterized by a higher number of sustainability practices and more optimistic evaluation of sustainability practices (use, labor and financial investments, and satisfaction). Age of the company and type of ownership were also considered to be key determinants of cluster membership, which corresponds with previous research (Gilinsky et al., 2016). Older family businesses, as well as those that did not obtain advice, are significantly more represented in the low sustainability cluster. In terms of perceived importance of sustainability dimensions and drivers, heritage plays a different role in each of the clusters. In the low sustainability cluster, heritage-related drivers are considered most important. Together with the overall, negative association between the perceived importance of heritage and the lower use, investments, and satisfaction levels, this study points at the role of heritage as a potential barrier to environmental sustainability practices. Although heritage is more and more considered as a dimension of sustainable development, especially in the wine sector (OIV, 2016; Vrontis et al., 2016), future research could examine how heritage driven decisions and traditional values in wineries affect the feasibility and cost-effectiveness of, for instance, environmental sustainability practices.

#### 4.3 | Limitations and future research

This study is subject to limitations. First of all, the sample only consisted of SMEs from two Italian wine regions. Given that wine producers' decision making on sustainability practices is affected by region (Gilinsky et al., 2015; Gilinsky, Santini, Lazzeretti, & Eyler, 2008; Mariani & Vastola, 2015) and size of the company (Gabzdyllova et al., 2009), it is important to interpret our results with caution and validate them in future SME research. Given the sampling procedure, by which only managers with decision-making responsibilities for winery operations were considered eligible for completing the questionnaire, and the information about the purpose of the study, our convenience sample may be self-selected and biased towards an

overrepresentation of wineries that attach importance to (environmental) sustainability.

Second, this study relies on wine producers' perceptions, for instance, from drivers to evaluation indicators. Future research could also extend or improve the various measures included in this study. For example, internal drivers in our study were related to the company setting, whereas other researchers looked at personal drivers, such as personal values (Gabzdyllova et al., 2009) and preferences, managerial attitudes, and subjective norms (Marshall et al., 2010; Marshall et al., 2005). Evaluation indicators associated with the actual impacts (costs and benefits) of practices could be objectively measured in order to underpin the producers' perceptions reported in this study. Comparison of producer perceptions with findings from impact analysis would further improve the understanding of sustainability adoption in the wine industry (Christ & Burritt, 2013). Another methodological limitation refers to the measurement of the overall perceived sustainability dimensions. Rather than using a single measure (Armindo et al., 2019; Borsellino et al., 2016), one could have opted for a construct of items, in line with the conceptualization of impact perceptions (Pullman et al., 2010).

Third, the evaluation of practices is based on actual adoption. Although uncertainty about the costs and benefits associated with the implementation of novel practices has been shown to create difficulties in surveys with wine producers (Mariani & Vastola, 2015), it would be valuable to explore also the intended adoption of practices in the future, or over time (Papagiannakis, Voudouris, & Lioukas, 2014). Future studies could also aim to improve the impact of existing sustainability practices. One example is to integrate green, agile, and lean management approaches (Carvalho, Duarte, & Cruz Machado, 2011; Dues, Tan, & Lim, 2013; King & Lenox, 2001) into sustainable wine production operations. Furthermore, as our list of practices was mainly oriented towards environmental sustainability, either alone or in combination with other sustainability dimensions, it would also be important to further integrate the multidimensional sustainability framework into wine producer research.

Fourth, our study only looks at one stakeholder, that is, wine producers. One could also integrate the end user in this field of research in order to obtain and compare stakeholders' valuation and evaluation of specific practices. Given the geographical differences in consumer wine behavior (Santini et al., 2013), a regional comparison would be worthwhile to undertake.

## 5 | CONCLUSIONS

Based on a survey with 64 SMEs in two Italian wine regions, this study analyzed wine producers' drivers, adoption, and evaluation of sustainability practices. On average, wine producers in our study implemented 15 out of 23 practices, whereas nearly all of them (89%) obtained at least one sustainability label or certificate. Although SMEs often lack sources to implement more advanced sustainability programs (Halme & Korpela, 2014), such as EMS (Borsellino et al., 2016; Szolnoki, 2013), our broad analysis of practices shed novel insights in

the implementation of sustainability across different management domains. From a marketing point of view, producers are more and more tackling sustainability issues (Fiore et al., 2017; Marshall et al., 2005) in order to meet and benefit from the increased consumer demand for sustainability attributes in wine (Schäufele & Hamm, 2017). Marketing practices were also relatively well adopted in our sample of SMEs, but our study shows that adoption rates were as high and often higher in other management domains, especially in operational management practices.

In terms of evaluation, substantial differences were reported within and between management domains (marketing, chain, operational, and innovation). Nevertheless, users of sustainability practices generally rate the benefits (as expressed in their satisfaction levels) higher than the investments (in labor and financial resources). Financial investments are generally considered to be lower than labor investments, except for sustainability practices in innovation management. From a cost-benefit point of view, it appears that, overall, the currently implemented practices are positively perceived, which is also reflected in the (significant) positive correlations between use and satisfaction (within each management domain). The (significant) positive correlations between the investments or satisfaction levels (between management domains) further lend support for producers' adoption of a diversity of sustainability practices.

The widespread implementation of sustainability in SME wine companies is further confirmed in our segmentation analysis, which identified a small "low sustainability" cluster (30%) and a large "high sustainability" cluster (70%). The lower scores on satisfaction and importance of drivers need to be tackled to increase adoption of sustainability practices in the low sustainability cluster. One could target the most represented members in this cluster, that is, older family businesses, who did not receive any sustainability advice.

Furthermore, our study suggests that both internal and external drivers matter in producers' decision to implement sustainability, but internal drivers are prevailing. Thereby, the ethical choice appears to be the most important internal driver. At the level of barriers, greenwashing is considered to be an important issue, aside from labor and investments costs. The wine producers' perception of abuse of the concept of sustainability is a crucial aspect that policy makers and other stakeholders need to address to further increase satisfaction levels of sustainability practices.

This study also devoted particular attention to the application of the multidimensional sustainability framework at the level of overall sustainability perceptions and drivers. Overall, the economic dimension is considered most important to wine producers, but in terms of drivers, other dimensions, such as environmental sustainability and heritage, appear to be drive producers' sustainability decisions. The inclusion of heritage, which is considered to be a fourth sustainability dimension in wine production, plays a particular role. Despite the importance of heritage-oriented drivers, heritage has shown to be negatively correlated with the evaluation indicators at the aggregated management domain level. This provides indications that heritage may act as a potential barrier to some (environmental) sustainability practices. Not surprisingly, the "low sustainability" cluster also focuses

more on heritage as a sustainability dimension than the "high sustainability" cluster.

Despite the aforementioned limitations, this study has shed more light on sustainability in the wine sector and wine SMEs in particular. While sustainability has received a lot of attention in the wine SMEs of our study, the study also underlines the diversity in drivers, adoption, and evaluation of sustainability practices.

## CONFLICT OF INTERESTS

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