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# Can alternative wine networks foster sustainable business model innovation and value creation? The case of organic and biodynamic wine in Tuscany

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Over the past two decades, the wine sector has witnessed a significant rise in sustainable practices driven by concerns about sustainability and their impact on wine quality. However, the lack of a common framework for sustainability concepts has resulted in a wide range of practices. Among these, biodynamic viticulture has gained remarkable traction among producers due to its perception as a strong quality indicator, despite the lack of scientific consensus and regulatory alignment across countries. Biodynamics traces its origins back to the organic movement and is viewed by some scholars as a radical progression of organic agriculture. The surging popularity of biodynamics is rooted in the expanding organic movement, reflecting consumer demand for ecologically-conscious, premium goods. Amid this complex backdrop, the wine industry grapples with navigating diverse sustainability approaches and formulating effective business models for competitiveness. Vital is comprehending and adeptly conveying sustainability values to consumers. Prior research mainly quantified sustainability's impacts, external drivers, and motivations. However, a gap remains in exploring sustainable business models' role in driving innovation and value creation through alternative networks in the wine sector. This paper presents findings from a phased qualitative study in Tuscany (Italy), reflecting on the evolving landscape. The results underscore synergies between biodynamic and organic approaches, emphasizing their strong connection with the territory. These strategies synergistically promote sustainability and differentiation, enhancing product quality, reducing environmental impact, and fostering territorial engagement. The study accentuates the role of territorial and business context, profoundly influencing collaborative and proactive strategies among producers, exemplified by networks like Lucca Biodinamica. These networks catalyze innovation, knowledge dissemination, and collaborative initiatives, profoundly impacting strategy adoption and advocating for sustainability. Within such ecosystems, a nurturing environment for sustainability practices is cultivated, spurring innovation and winery cooperation. Case studies vividly illustrate that wineries within these networks frequently adopt proactive sustainability stances, grounded in shared environmental and societal commitment. Conversely, some scenarios feature place-rooted leadership models tied to factors like origin, winemaking tradition, and wine tourism, driving innovation. Participating in alternative wine networks represents a strategic choice with lasting personal and economic implications—a framework for innovation and embracing sustainability.

## KEYWORDS

sustainable business models, biodynamic wineries, organic wineries, alternative wine networks, multifunctional agriculture, wine sustainability

## 1. Introduction

Over the past 20 years, the wine sector has witnessed a remarkable surge in sustainable practices, fuelled by the industry's heightened consciousness of sustainability concerns and its perceived enhancement of wine quality (Gilinsky et al., 2016; De Steur et al., 2019). However, the absence of a unified sustainability framework has resulted in a wide spectrum of practices (Santini et al., 2013). Biodynamic viticulture, known for its distinct identity and holistic methodology, has gained traction among producers as a potent quality indicator (Negro et al., 2015), despite the lack of global scientific consensus and regulatory alignment (Hughner et al., 2007; Szolnoki, 2013). Its adoption is propelled by potential advantages encompassing soil health, water management, pollution mitigation, climate resilience, and biodiversity preservation.

This approach shares historical roots with the early 1990s organic movement, where consumer preferences shifted from industrial agri-food products to “high-quality” food and wine, increasingly associated with environmentally-friendly farming practices (Dejas, 2013; Ponte, 2016). Goodman (2003) termed this shift a ‘quality turn,’ centered on trust, embeddedness, and locality. Analyzing this transformation, Krzywoszynska (2015) delineates relational and reflective activities fostering alternative food and beverage networks. The ascent of biodynamics in the wine sector likely corresponds to the organic network's development, with scholars viewing biodynamics as an advanced iteration of organic agriculture (Castellini et al., 2017). Within this context, alternative wine networks arise as localized, self-organized systems connecting producers and consumers, emphasizing proximity, sustainability, equitable relationships, and ethical practices to revolutionize the wine industry (Barbera and Dagnes, 2016).

Organic and biodynamic vitiviniculture share common principles but diverge in their sustainable winemaking methods. Organic viticulture adheres to regulations like the EU Regulation (European Union, 2018) 2018/848, banning synthetic chemicals (fertilizers, herbicides, insecticides), and emphasizes environmental impact reduction. It aims to optimize grape quality and health by managing soil fertility, pest control, and weed management. Techniques include composted fertilizers, green manure, and residue burial, embodying the “feed the soil, not the plant” philosophy (Dejas, 2013). Certification comes from government bodies or third-party agencies after a three-year transition.

Biodynamic agriculture, conceived by Rudolph Steiner in the 1920s, embraces a holistic and ethical farming philosophy. It envisions the farm as a living, interconnected entity that nurtures biodiversity, ecosystem vitality, and cultural creativity (Castellini et al., 2017). Sharing core principles with organic farming (Pergamo et al., 2016), both certifications limit chemical inputs, emphasize soil fertility regeneration, and endorse biodiversity. Biodynamic certification, typically issued by the Demeter Association, builds upon organic certification to further restrict the use of additives and minimizing sulfur dioxide.

Debate exists about the significance of organic and biodynamic markets in the literature, with some questioning the need for further research. Lockshin and Corsi (2012) posit these markets as small, stable niches, where consumers may prioritize quality over sustainability attributes. However, Pomarici and Vecchio (2019) counter with rising demand for healthful, quality foods and beverages. Research also reveals diverse and evolving consumer preferences (Schäufele and Hamm, 2017), compelling producers to meet these needs and effectively communicate their sustainability efforts. As interest in biodynamics grows among wine producers, organizations, and NGOs, the rationale for deeper research is evident, particularly in addressing business and management gaps within the context of organic agriculture.

Over the past 20 years, organic vineyard expansion has been exceptional, showing a 600% surge overall and a 114% rise in the past decade (Willer et al., 2021). The global organic vineyard area has more than quadrupled, reaching 468 thousand hectares in 2019, comprising about 7% of the total global vineyard expanse. Of this, roughly 17 thousand hectares hold biodynamic certification. France, Italy, and Spain, key players in advocating sustainable agriculture, encompass 70–75% of the organic vineyard area. Notably, Italy boasts a 5% share of biodynamic farms within the organic sector, yielding an approximate turnover of 4.6 billion Euros. Throughout this transformation, these nations have witnessed the rise of various sustainability-linked methodologies (Corbo et al., 2014) and diverse ‘bottom-up’ marketing initiatives (Brunori and Rossi, 2000).

The wine sector faces the challenge of navigating the diverse and stimulating landscape of sustainability approaches, which can be challenging from a business perspective. Understanding effective business models to achieve a competitive advantage through sustainability is therefore crucial. It is important to accurately communicate sustainability values to wine consumers, as there is a risk of overestimating the benefits and idealizing certain aspects of greener brands. This will ultimately benefit consumers who are willing to pay a premium for sustainable products.

The current research landscape in sustainable wine business predominantly centers around quantifying the transformative effects (Merli et al., 2018; Broccardo and Zicari, 2020; Muñoz et al., 2020; Masotti et al., 2022). External drivers (Castellini et al., 2017; Obi et al., 2020) and motivations have also been examined (Casini et al., 2010; Vecchio, 2013). Some studies delve into sustainability certification indicators (Corbo et al., 2014; Muñoz et al., 2020; Stanco and Lerro, 2020), exploring their influence on consumer decisions (Sogari et al., 2015). Yet, the majority focuses on production efficiency and quality, lacking insight into the translation of societal and environmental value into winery profitability and competitive edge. Significantly, research has largely disregarded sustainable business models (SBM), entrepreneurial acumen, and innovation's role in fostering sustainability (Barth et al., 2021).

The aim of this paper is to address this gap by focusing on SBMs associated with alternative—i.e., organic and biodynamic—wine

networks, paying special attention to the process of business model innovation and value creation at territorial level. It does so by answering the following set of questions: RQ1. What specific conditions add value to the choice of a sustainable business model? RQ2. What kind of strategies are implemented for sustainability? RQ3. What are the main implications for the management?

Since the research encompassed three different fields of study and their interconnections—sustainability in the wine sector, the role of SBMs, and the impact of organic and biodynamic wine on sustainability innovation and value creation at the territorial level—we adopted a phased qualitative research process.

The remainder of the paper is organized as follows: the next section illustrates the results of a critical literature review, addressing concepts and gaps related to wine sustainability (2.1) and to SBMs and business model innovation (2.2) and the initial definition of an analytical framework (AF) (2.3). The research methodology is illustrated in section 3, whereby we outline the case study region, sample selection for semi-structured interviews, and methods applied for data analysis. Findings are illustrated in detail in section 4, while in section 5 we draw from the main results to further refine the AF and discuss the case study implications. Finally, the conclusion section pays specific attention to the main limitations and the practical value of the insights for the wine management.

## 2. Results of the critical literature review

In this section, we describe the results of a critical literature review we conducted to achieve a twofold objective. First, we identified and appraised most significant contributions in the fields of wine sustainability and Sustainable Business Models and provided a conceptual synthesis. Second, we used the most significant conceptual items to start developing a new AF, which we outline in this section and then resume in the discussion.

### 2.1. What is wine sustainability?

Despite the abundance of scientific publications, there is currently no prevailing definition or vision of sustainability among academics, policymakers, nor winemakers. This lack of consensus has led to diverse interpretations and operational approaches, impacting decision-making for both producers and consumers. A clear understanding of the opportunities and benefits of a common sustainability implementation is needed (Baiano, 2021).

The wine industry's focus on sustainability extends beyond specific agricultural modes (organic, biodynamic, green, natural, regenerative, etc.) or certifications (e.g., the French *Haute Valeur Environnementale*, *Terra Vitis*, etc.). Various practices and production methods aim to minimize impacts and protect or enhance natural resources, such as soil, but wine has also a long tradition of acknowledging the importance of the natural environment, as epitomized in the nineteenth century by the concept of *terroir*, which emphasizes the connection between production site characteristics and wine quality.

Sustainability in the wine sector encompasses a broad term that involves recognizing the long-term impact of human activities on the

environment. Gilinsky et al. (2016), for instance, define wine business sustainability as the preservation of land for future generations and encompassing the entire supply chain, energy consumption, and social responsibility.

Research on wine sustainability has primarily focused on consumer perceptions and sustainable production (Casini et al., 2010). However, there is a need to address the ambiguous nature of sustainability and bridge the gaps in understanding between countries and wineries (Warner, 2007; Ohmart, 2008). In this regard, Santini et al. (2013) conducted a systematic review of wine sustainability research and found significant heterogeneity in management, strategic, and marketing literature, with geographic areas facing stronger sustainability pressures showing significant differences. Other authors have explained different degrees of sustainable behavior among companies through models evaluating sustainability orientation (Casini et al., 2010).

The benefits of sustainability strategies and their impact on winery performance are understudied (Gilinsky et al., 2014). Sustainability is seen as a niche strategy contributing to differentiation and cost reduction, and offering a competitive advantage in the global market while playing a role in brand management and value creation for marketing and communication (Dressler and Paunovic, 2021).

An interesting aspect of the wine sector response to the sustainability challenge is the development of business networks that focus on sustainability programs (e.g., California Sustainable Winegrowing Alliance, Wine Sustainable Policy in New Zealand, etc.). Most of the literature analyzed the environmental performance of these programs (Hughey et al., 2005; Pullman et al., 2010; Corbo et al., 2014; Giacomarra et al., 2016; Gilinsky et al., 2016; Flores, 2018), while little has been said about the integration of social and economic aspects of sustainability and its implication for the management of the wineries (Klohr et al., 2013). The International Organization of Vine and Wine (OIV) defined sustainable vitiviniculture in “CST 1–2004” as a global strategy encompassing economic viability, quality production, viticultural precision, environmental integrity, product safety, consumer health, and cultural preservation (Aurand et al., 2014). Though originally social-centric, subsequent guidelines (CST 1/2008, VITI 422/2011, and OIV's 016 General Principles of Sustainable Vitiviniculture) have leaned toward environmental aspects, sidelining social and economic facets (Merli et al., 2018). Yet, consensus is growing that sustainability must span the supply chain, including water/energy efficiency, social responsibility, and labor conditions (Gilinsky et al., 2016). This entails resource efficiency, reduced chemicals, lower emissions, and better waste management, while respecting workers' rights, contextual integration, and ensuring safety.

### 2.2. What are business models, business model innovation and sustainable business models?

Business Model (BM) research spans diverse areas, offering valuable insights into organizational strategies, consumer behavior, market dynamics, and sustainability (Barth et al., 2021). However, there is no universally accepted definition of BM, and the literature in the agricultural sector lacks a unifying theory. Scholars have related the concept to business innovation (McGrath, 2010; Taran et al.,

2015), circular approaches (Bocken et al., 2018; Lüdeke-Freund et al., 2019), social entrepreneurship (Yunus et al., 2010), and sustainability (Schaltegger and Wagner, 2011; Adams et al., 2016; Yang et al., 2017; Dressler and Paunović, 2020). Interest was shown in the analysis of single business cases or by addressing the entire value chain (Amit and Zott, 2012).

BM offers valuable insights into a company's profitability, operations, customer base, and value propositions. It serves as a conceptual tool for understanding how a firm operates and plays a crucial role in management, including analysis, performance assessment, communication, and innovation (Beattie and Smith, 2013; Bocken et al., 2014). With a well-defined BM, companies can gain deeper insights into their operations, make informed decisions, drive growth, and adapt to the ever-changing business landscape. BMs play a crucial role in shaping a firm's competitive strategy. They involve strategic decisions related to the design of products or services offered to the market, pricing strategies, production costs, differentiation tactics through value propositions, and the firm integration within a broader value network. By carefully addressing these aspects, businesses can position themselves strategically, create unique value for customers, and establish a sustainable competitive advantage in the market.

Some authors call for 'static vs. dynamic approaches' (Lee, 2015). A static approach to BM portrays a collection of interconnected core components that form a cohesive whole, while the dynamic approach presents a means of effectively managing organizational change and fostering innovation within the organization. In the dynamic approach, it is assumed that value is created through interrelationships and interactions among the components of the business model. Changes in one component can have direct or indirect effects on other components, highlighting the interconnected nature of the system. This dynamic gives rise to what Brannon (2011) refers to as Business Model Innovation (BMI). It entails the exploration of innovative approaches to create novel combinations using existing model components. BMI extends beyond processes and products, encompassing 'the way you do business' (Amit and Zott, 2012) in terms of the value generated, not only for customers but for a broader range of stakeholders. Through a comprehensive value-network perspective, BMI has the potential to catalyze the transformation of the entire system. Likewise, SBMs embrace the creation of economic, social, and environmental value for a diverse set of stakeholders (Bocken et al., 2014). SBMs models that create a competitive advantage through superior customer value not only benefit the company but contribute to sustainable development within the broader society (Lüdeke-Freund et al., 2019).

Barth et al. (2021) introduced a Three Values (3V) framework for SBMs, based on earlier work by Schaltegger et al. (2016) and Bocken et al. (2014) and encompassing three traditional elements: (i) the value proposition (product/service offering, customer segments, and customer relationships), (ii) value creation and delivery (activities, resources, partners, and distribution channels), and (iii) value capture (cost structure and revenue model).

With their study on business models for sustainability in the food and beverage industry of Germany, Dressler and Paunović (2020) provided empirical evidence to the SBM categories by Schaltegger and Wagner (2011). They create a typology of SBM that encompass environmental and societal objectives within evolving market environments, establishing a connection to the innovation driven by

sustainability. Likewise did Bocken et al. (2014) with the sustainable archetypes approach.

However, existing analyzes of business models often overlook the essential connection with the internal and external business environment and related strategies. This results in a static understanding of business model typologies. A broader perspective has been adopted by Grando et al. (2020), who argued that conditions encompass the comprehensive business environment, including various factors that influence wineries' behavior. Similarly, Vergamini et al. (2019) identified a set of conditions specific to the wine sector at regional level, including physical factors, agro-ecological conditions, regulations, standards, firm resources and capabilities, and socio-cultural factors related to terroir characteristics. The impact of such conditions on firm strategies varies depending on the region, reflecting distinct local configurations and networks of farmers (Paasi, 2010; Ilbery et al., 2016). For instance, Chaminade and Randelli (2020) provided evidence that the transformation process of the bio-district of Panzano (Italy) is unique to its specific location, despite the strong growth of the organic and biodynamic movement. Pomarici et al. (2021) suggested that place-based SBMs emphasize the importance of a regional perspective when examining how wineries make decisions related to quality and marketing channels. Brunori (2007) defined relational relocation as a strategy of reconfiguration of both production and consumption in alternative food networks (AFN).

### 2.3. A proposal for a new analytical framework

This paper offers a comprehensive perspective on the business environment by integrating internal and external conditions. Beyond the conventional elements (e.g., assets, resources, and organizational aspects), we explore their interaction within the broader regional context. Our approach captures conditions influenced by wineries and those prompting unique strategies, thus impacting the 3Vs framework. Value proposition shifts consequently shape sustainability practices and innovative BMs. Drawing on the insights of Vergamini et al. (2019) and Grando et al. (2020), we gauge producers' capacity to shape strategies. Our analysis of internal conditions encompasses a wide spectrum of factors influencing strategies, such as resources, capabilities, culture, and mission, with a focus on core business attributes, notably scale. The long-term characteristics of the production unit—logistics, organization, and reputation—also influence strategy development. Moreover, factors like working capital, investment traits, credit options, debt levels, and sunk costs significantly impact strategy evolution. These elements interplay directly and indirectly with three additional sets of conditions shaping the firm's regional context: factor endowment, soft laws, and terroir traits. While distinguishing internal, external, and regional conditions may not always be straightforward, it's essential to note that the dynamic nature of the business environment is interconnected with strategies crafted in response to changing circumstances and the emergence of new business models. Taking into account this representation of the business environment, we therefore outline a proposal for a new AF comprising—and integrating—earlier work by Dressler and Paunović (2020), Schaltegger and Wagner (2011), and Schaltegger et al. (2012).

Illustrated in Figure 1, the AF takes the form of a sustainable practices pyramid, molded by the evolving business environment and resulting strategies. On the left side are distinct business models arrayed along a sustainability gradient—from financially-driven and market-oriented to the pinnacle of sustainable entrepreneurship. The pyramid’s right side portrays strategies aligned with sustainable practices and their corresponding BMs. Defensive strategies maintain the existing model with minimal changes, yielding limited sustainability impact. Accommodative strategies introduce some BM enhancements, while proactive strategies involve complete BM redesign for comprehensive innovation. Notably, proactive strategies have a deeper, enduring influence than accommodative ones. In practice, blurry BM boundaries and hybrid strategies emerge. The success of a BM is intertwined with geographical context, market dynamics, institutional frameworks, and industry relations—factors pivotal in determining the fate of innovative models, whether they thrive or face challenges.

We provide a description of how various levels of sustainability approaches can manifest within the wine industry, as illustrated in Figure 1:

- At the foundational level, ‘enhanced’ Geographical Indication (GI) requirements are embraced by ‘financial and market-oriented’ BMs, aiming for quality, process control, and market integration (Freyer and Bingen, 2015). This model focuses on containing costs, increasing profitability, and gaining a

competitive advantage (Dressler and Paunović, 2020). European wineries adhering to GI schemes prioritize environmentally conscious vineyard management and winemaking that preserves terroir values. Stringent control procedures ensure wine quality, and additional voluntary measures address specific environmental goals. While these companies prioritize quality and terroir, their sustainability changes are minimal, often aligning with a defensive—also: conservative—strategy.

- Progressing, an evolving level emerges, characterized by engagement with certification schemes that communicate sustainability, protect consumers, and ensure transparency. Accommodative BMs adopt these approaches, leveraging certifications and standards as marketing tools for customer loyalty, service enhancement, and social engagement. The focus is on ‘customer-centric’ and ‘social-centric’ BMs that align with sustainability goals, aiming to create meaningful narratives for sustainable production. Organic certification, focusing on sustainable agricultural practices and reducing harmful inputs, indirectly addresses social aspects, i.e., by ensuring a safer working environment. Similarly, Vegan and food safety certifications (e.g., ISO 22000, TS 22000, IFS Food, and ISO 22005) prioritize efficiency and resource conservation rather than social aspects. Here, a move toward social responsibility can involve fair trade practices and community development support.
- Moving upwards, toward advanced sustainability approaches, wine producers integrate agricultural, technological, social, and

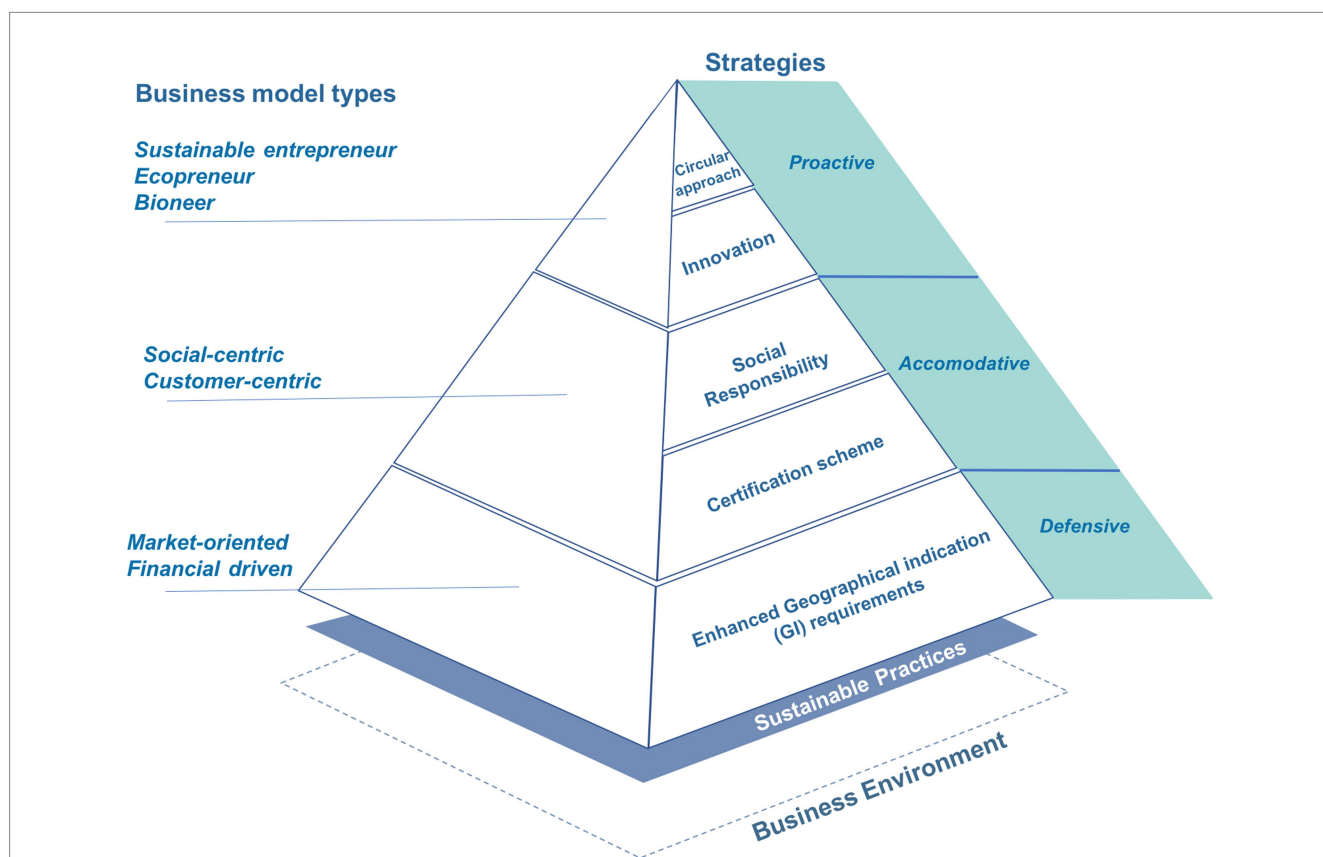


FIGURE 1 Sustainable practices in relation to strategies and business model types. Source: Authors’ own elaboration from Dressler and Paunović, (2020); Schaltegger and Wagner, (2011); Schaltegger et al., (2012).

organizational innovations through proactive strategies. These innovations enhance current sustainability practices and often introduce novel ones. At this level, organic and biodynamic producers coexist, where biodynamics strive to surpass and extend beyond organic methods. 'Natural wines' producers adopt minimal intervention, additives-free methods, often utilizing organic or biodynamic grapes (Corbo et al., 2014). Further innovation encompasses transformative shifts like cooperation networks, novel principles, and system thinking. Biodynamics emphasizes complexity and interdisciplinary skills. The 'bioneers' approach within biodynamics values natural substances, reconnecting wine to its origins and managing risks through diversity. Producers at the highest sustainability echelon target circularity. 'Ecopreneurs' BMs close cycles, minimizing resource use and emissions. Regenerative farming prioritizes soil health, water protection, and biodiversity, seen through practices like cover crops and non-chemical pest management, all reducing environmental impact.

- At the top, 'Sustainable producers,' performing leading sustainability approaches. Waste reduction, efficient water use, energy conservation are paramount. Climate change mitigation involves carbon sequestration, reduced emissions, and water conservation. Plastic replacement with natural materials is adopted. Energy efficiency is achieved through renewables and geothermal systems. Environmental and social goals are actively communicated through private certifications<sup>1</sup> and recognized standards, with greenhouse gas emission reductions tracked.

The pyramid framework is resumed in the Discussion section, where the results of the case study are discussed according to—and contribute to refine—the AF.

### 3. Methodology

This paper is grounded in a broad critical reflection conducted through a phased qualitative research process, encompassing three interconnected fields of study, namely: sustainability in the wine sector, the role of SBMs, and the impact of organic and biodynamic wine on sustainability innovation and value creation at the territorial level. We initiated our research by conducting a critical literature review, resulting in an initial AF (sections 2.1, 2.2 and 2.3). Subsequently, we conducted a case study, collecting data from multiple sources, including through semi-structured interviews. Data analysis through coding techniques allowed us to refine our framework, which forms the basis for our discussion (Yin, 1984; Merton and Kendall, 1990; Saldaña, 2013).

#### 3.1. Case study region and sample selection

The research was conducted in Tuscany (Italy) from 2019 to 2023. The reasons for selecting Tuscany as a case study region are manifold. Here, environmental factors, combined with social, economic, and

historical influences have contributed to the development of viticulture, and wine production plays a vital role for territorial identity, which is in turn globally recognized as a distinguished brand.

More than 12,700 wine companies cultivate nearly 60,000 hectares of vineyards, contributing to 10% of the national vine area. In the last harvest season, they produced 2.04 million hectolitres of wine, making Tuscany the seventh-largest Italian region with 5% of total production (ISMEA, 2022). Despite the significance of wine production, the business landscape primarily consists of small-scale enterprises, with an average vineyard area of 4.7 hectares per firm. Cooperatives play a minor role in the industry, with 15 social wineries contributing to about 18% of the total regional production. The great prominence of individual brands is a distinguishing feature of Tuscany, compared to other wine-producing regions.

An additional key factor contributing to the region's success is the wide range and diversity of the 58 GIs it holds. Among these, there are 52 Protected Designation of Origin (PDO) and 6 Protected Geographical Indication (PGI), which collectively cover nearly all of Tuscany's vineyard area (96.4%), exceeding the relatively high national average of approximately 63%.

The quest for distinctiveness and quality is also reflected in the analysis of data related to organic viticulture. In fact, 32% of the regional vineyard area (i.e., over 19 thousand hectares) is cultivated using organic farming methods, with significant growth during the period between the two censuses (2010–2020), even compared to the national level. Similarly, approximately 350 thousand hectoliters of organic wine produced in Tuscany represent a significant 15% share of national organic wine production.

We conducted a set of 24 semi-structured interviews with stakeholders from the wine industry in Tuscany. The selection of interviewees followed a snowball sampling approach, which began with an initial consultation involving six experts from diverse fields, including manager of organic and biodynamic wineries in Italy, biodynamic agriculture advisors, sommeliers and scholars associated with the Viticulture and Oenology Degree program at the University of Pisa (i.e., entomologists, oenological microbiologists, and agronomists). From an initial list of 150 wineries, we selected 24 biodynamic and organic wine producers, reflecting heterogeneity in their sustainability practices and business approaches, and ensuring territorial coverage (Table 1). Interviews lasted approximately 1 h and were recorded and transcribed. The interview structure encompassed various aspects, including the company's history, objectives, vision, organizational characteristics, key elements of the business environment, and the broader territorial and regional context. Central aspects of production (specialization/diversification, significant changes, investments, etc.), sales, and marketing were also covered. A special focus was dedicated to sustainability in its broadest sense, aiming to navigate through the diverse topics addressed and to discern the aspects on which companies have set their strategies and priorities.

#### 3.2. Data analysis

We applied coding methods (Saldaña, 2013) to analyze interview transcriptions and field notes using NVivo.<sup>2</sup>

<sup>1</sup> These include the Italian V.I.V.A. program, Sustainable Winegrowing Alliance in California - CSWA program, Sustainable Winegrowing New Zealand - SWNZ, and the Sustainable Wine of Spain certification.

<sup>2</sup> To gain a deeper understanding of the interview questions and protocol, we recommend consulting Teixeira (2021).

TABLE 1 Organic and biodynamic wineries interviewed in Tuscany between 2019 and 2022.

ID	Province	Certification	Vineyard (ha)	Production (bt/y)	Export (%)	Labels	Price range (Euros)
P01	SI	Biodynamic	175	700.000	80	15	9–220
P02	SI	Biodynamic	31	90.000	75	6	25–200
P03	SI	Biodynamic	12	50.000	-	5	20–44
P04	SI	Organic	12	15.000	50	5	12–50
P05	SI	Organic/self-declared biodynamic	145	850.000	55	13	12–90
P06	SI	Self-declared organic	12	60.000	90	9	7–24
P07	SI	Biodynamic	4	10.000	99	3	20–30
P08	SI	Organic/Self-declared biodynamic	12	35.000	60	8	12–95
P09	SI	Organic	31	90.000	60	6	19–150
P10	LU	Biodynamic	22	70.000	50	3	20–100
P11	LU	Biodynamic	18	120.000	80	8	11–48
P12	LU	Biodynamic	2	12.000	80	5	9–40
P13	LU	Biodynamic	5	20.000	40	4	20–30
P14	PI	Biodynamic	15	70.000	70	10	11–50
P15	PI	Organic	10	40.000	50	7	10–45
P16	PI	Biodynamic	18	80.000	55	7	12–85
P17	PI	Biodynamic	32	155.000	90	6	15–170
P18	PI	Organic	25	100.000	-	13	9–65
P19	LI	Organic	23	150.000	50	14	12–40
P20	LI	Biodynamic	3	13.000	30	4	17–32
P21	LI	Ongoing organic	25	185.000	70	5	20–170
P22	AR	Biodynamic	360	>700.000	90	30	5–22
P23	AR	Biodynamic	10	37.000	45	4	17–52
P24	GR	Biodynamic	35	280.000	80	8	9–50

Source: Authors' own elaboration.

In the first round of coding, we used generic methods like 'structural coding' and 'attribute coding' to organize materials according to the themes addressed in the interviews and the main features of the interviewees. An initial codebook included a basic list of codes, such as the characteristics of the wine farm, the structure, production methods, sustainability investments and main challenges.

Further rounds of coding were used to identify patterns in the business environment, and to understand the conditions which had a role in shaping the wineries' strategies. We prioritized conditions based on explicit expressions from producers and consensus during discussions. At this stage, the codebook had been integrated with internal, external, and regional conditions (see Tables 2, 3), and sustainable practices (Table 4), and others emerging from the data. With the final rounds of coding, we linked the observed sustainable practices to the different categories of BMs and strategies derived from the literature and outlined in the framework. This mixed inductive and deductive coding approach allowed us to refine our analytical framework through empirical evidence.

## 4. Results

### 4.1. Business environment conditions

To address RQ.1 "What conditions add value to the choice of a sustainable business model?," we analyzed interview data to identify the business environment conditions that played a fundamental role in shaping the wineries' strategies. We prioritized conditions based on explicit expressions from producers and consensus during discussions. The identified conditions were then categorized and classified using the AF into internal (Table 2) and regional factors (Table 3). To facilitate the understanding of the connections between these conditions, we will provide a cross-referenced analysis of the obtained data, guiding the reader to delve deeper into specific aspects within each table.

At the organizational level, family-based structures and changes in winery management are crucial conditions for sustainable business models. This is exemplified in the provinces of Lucca and Siena, where the presence of ancient villas and historical estates dating back to the

TABLE 2 Internal conditions of firms.

Organization	Family	17
	New management	6
	Merging pre-existing wineries	1
Resource and capabilities	Financial	12
	Wine-making tradition	6
	Reputation	3
	Heritage properties	9
	Tech. investments	7
	Consolidated relations	2
	Multifunctional capabilities	6
	Value	Innovation
Tradition		4
Quality		9
Culture	Creative	16
	Charismatic	9
	Cooperative	5
	Paternalistic	5
	Authoritarian	3
Mission	Prioritizing sustainability	7
	Environmental stewardship	5
	Increase quality	5
	Modernization	2
	Brand survival	2
	Viability	2
	Efficiency	2
	Territorial integration	3

Source: Authors' own elaboration.

15th and 19th centuries, respectively, showcases the long-term management of essential wine assets such as cellars and vineyards. Family-owned businesses with vertical integration have the advantage of controlling both production and marketing, including wine tourism. The family-oriented structure also demonstrates a greater openness to sustainability-driven innovations. This model aligns with existing literature on innovation (Salvato and Melin, 2008; Schmieder, 2014; Miller et al., 2015), emphasizing the family's profound connection to the land and their ability to harmonize tradition and innovation for a sustainable transition (place-based leadership). In regions with a strong winemaking heritage like Montalcino and Montepulciano, leadership changes have been necessary to align mission and values with enhanced sustainability. For instance, P01, a renowned winery in Montepulciano, shifted toward a fully biodynamic system under new ownership. Additionally, external investors acquiring wineries in Tuscany, especially in profitable areas, can lead to significant changes and impact the development of sustainability practices.

Innovation is a key condition in the value system of both models. While the family acts as a catalyst for innovation processes related to quality (improving grape quality, refining techniques and vinification standards, seeking blends that resonate with international preferences, and rediscovering the richness of the regional ampelographic heritage,

TABLE 3 Regional conditions.

Factors endowment	Total
Access to credit	6
Skilled workforce	5
Proximity to cultural cities	15
Organic demand and networks	14
Technology innovation	4
Tourism demand	6
RDP measures	4
Price levels	9
Land access	7
Soft laws	
Domestic	12
Civic	6
Opinion	3
Market	9
Terroir	
PDO area	9
Indigenous grape variety	4
Farmers' network	7
Heritage area	3
Agroecological conditions	12
Cultural and recreational services	5

Source: Authors' own elaboration.

etc.), authenticity, ethics, respect for nature, and sustainability (as values), on the other hand, non-family-owned wineries have demonstrated a greater focus on the relationship between innovation and tradition, and innovation and quality (e.g., blending native and international grape varieties like Sangiovese, Cabernet Sauvignon, Merlot and use modern winemaking techniques, or just adopting advanced fermentation methods that enhance both wine quality and innovation).

In addition, the family structure aligns with regional organizational models in the wine sector of Tuscany, characterized by fragmented supply among small and medium-sized enterprises (Vergamini et al., 2019). Family-owned wineries ensure continuity over time, while innovation primarily thrives in contexts with substantial financial resources (as indicated by 50% of the respondents). In other cases, external conditions as part of the regional context (see Table 4), such as access to credit, land availability, EU support, and premium prices, also influence sustainability-oriented choices in the Region.

The wine industry's development of sustainable models in Tuscany is facilitated by the combination of long-standing traditions, utilization of historic properties, and investments in modernization (resource and capabilities). Wineries incorporate advanced technologies, multifunctionality, and mixed agriculture to expand their scope and enhance sustainability. Creativity and charismatic leaders drive significant changes, while inter-company



TABLE 4 Sustainable practices and sustainable business model types.

SBM	Sustainable practices	Total
Financial-driven	Product diversification Respect minimum environmental and social standards	-
Market-oriented	PDO/PGI standards (preserve territorial conditions) Control processes, products and market (export) Reinforced conditionality standards (CAP) Voluntary agri-environmental schemes (RDP) Improve land-use	1
Customer-Centric	Organic certification Reducing risks for workers Increase transparency Process & resources optimisation: targeted energy savings, recycling (pruning for compost, use of recyclable materials and packaging)	2
Social-centric	Biodynamic certification Assets preservation Long-term stakeholder relation Social engagement activities	4
Bioneer	Preservation of family value Focus on innovation (agricultural, technological, social and organizational) Cooperation networks Risk management	8
Ecopreneur	Minimize resource consumption and Environmental emissions Prioritize soil protection, biodiversity management, pollinator habitat restoration, sustainable fertilizer usage, and social engagement	4
Sustainable Entrepreneur	Promoting farm as integrated system Minimizing waste Efficient water resource utilization Energy savings Social responsibility International sustainability standards Increase sustainability communication	5
Total		24

Source: Authors' own elaboration.

cooperation is important in less-developed regions. Some prioritize sustainability as an integrated environmental and social mission, while others focus on environmental stewardship or efficiency (mission). The focus on quality, modernization, brand preservation, and territorial development is stronger in regions well-suited for terroir viticulture. These efforts result in a strong differentiation of processes, products, and services, utilizing available resources such as animals, forests, vineyards, and other crops (e.g., wheat). However, territorial context influences corporate culture, with some regions emphasizing collaboration and others relying on authoritative approaches. Overall, the wine industry in Tuscany is gradually shifting toward wines with reduced environmental impact, while maintaining high-quality products and integrating sustainability into their missions.

When examining regional factors, these decisions are additionally bolstered by other conditions, including the closeness to cultural cities, the presence of a skilled workforce, as well as growing organic wine demand and networks. The proximity to cities with a rich cultural heritage is considered a crucial condition. Numerous wineries derive advantages from their connection with these centers, especially

in terms of foreign demand and tourism, resulting in enhanced stability in incoming financial flows.

In situations of limited financial resources or when the production area lacks quality recognition—perhaps due to not being a prominent PDO area or lacking any PDO designation—farmers' networks have emerged as pivotal, especially among various terroir conditions. Producers highlight the value of well-established organic and biodynamic networks within the region, acting as important innovation clusters that assist sustainable transformation. The “organic/biodynamic producers network” represents a collective of farmers, vineyard owners, and winemakers dedicated to sustainable agriculture. It involves knowledge sharing, collaborative marketing, supply chain integration, advocacy, education, certification, research, and resource sharing. This network fosters innovation, community, and environmentally friendly practices within agriculture and wine making. Through collaboration, it enhances sustainable farming, disseminates knowledge, and supports a positive industry impact. A notable example is the flourishing cooperative community of biodynamic vineyards and farms in Lucca, which has developed through cooperative relationships and the shared commitment to

chemical-free practices. This cooperative network has not only contributed to the region's development but has also facilitated the exchange of knowledge among local farmers:

*"We drew inspiration from Lucca Biodinamica due to our geographical location in Lucca. Engaging in discussions and idea-sharing prompted us to venture into adopting similar practices. We started with experiments in a small vineyard, dedicating approximately three years to this endeavor. Encouraged by the positive outcomes, we subsequently made the decision to extend these practices to our other vineyards." -P11*

Geographical localization has a significant impact on the adoption of sustainable practices in the wine industry. In regions well-suited for quality viticulture (PDO area), innovative approaches have emerged, allowing for a more balanced relationship with natural resources compared to conventional methods. However, strict regulations and the absence of common guidelines for greener practices pose challenges for producers in communicating the new quality attributes, such as biodynamic methods, to consumers. Traditional practices associated with PDO schemes can create resistance to change, particularly for established wineries with recognized brands. Some producers in less popular PDO areas have chosen to differentiate themselves by abandoning the emphasis on origin and focusing on international blends and greener production methods. Brand stretching strategies have been employed in these cases.

*"Having immersed myself in biodynamics for numerous years, I proudly market my wine as a biodynamic wine. However, for a biodynamic winery situated in Montalcino, the significance of displaying a biodynamic logo may be less critical. Conversely, in PGI area or with a generic Chianti, highlighting the biodynamic aspect proves to be a successful marketing strategy." - P14*

Finally, favorable environmental and climatic conditions, along with specific agricultural practices (agroecological conditions), as well as the presence of areas recognized as UNESCO sites (heritage area), and the presence of cultural and recreational services have facilitated farm differentiation.

## 4.2. Mapping wine farms strategies according to sustainable practices and business model types

To address RQ2. *What kind of strategies are implemented for sustainability?* we identified and then categorized the different sustainable practices implemented by organic and biodynamic wineries. In Table 4, we categorized the various practices under the typologies of SBM identified in the framework.

Only one winery from the province of Livorno stands out for its Market-oriented BM. The winery aims to leverage the quality of the territory, i.e., 'belonging to the renowned Bolgheri PDO' to enhance its competitiveness, primarily through communication. Its actions are oriented toward product diversification while respecting local winemaking practices and traditions, thus exerting a place-based leadership. The practices focus on complying with the standards set

for the PDO, therefore minimum environmental requirements in relation to the territory.

Customer-oriented goals are pursued by three companies located in renowned viticulture areas between Livorno and Siena (Bolgheri, Montalcino, Montepulciano). While they share many practices associated with the "territorial tradition," they also emphasize the green label and make minor efficiency adjustments to strengthen their customer relationships and enhance their value proposition.

Four companies perform practices linked to the Social-centric BM, which gives prominence to the company's social than the environmental sphere. Interviews have affirmed that biodynamics provides companies with a narrative of the "interconnection between humans and nature," resonating strongly with customers in terms of social justice and a commitment to the welfare of the living world and future generations. Clearly, companies at this level, if certified biodynamic, are also certified organic in terms of production and processing aspects. However, their practices focus on the conservation of company assets, the development of long-term relationships with customers and suppliers, and include social commitment initiatives. For example, the case of the company P21 in the province of Livorno, which commissioned a prominent figure in the Italian urban art movement a mural within the company premises. The artwork aims to showcase to visitors the company's work environment.

Approximately 70% of the interviewees declared adopting advanced sustainability approaches, the main characteristic of which is the creation of innovation-based business models that can solve broader market and societal problems. An exemplary case for the model of the bioneer is represented by the biodynamic companies in the province of Lucca. These farmers (P10, P11, P12, and P13) came together to embrace biodynamic practices through collaboration. They formed friendships and later established the formal association Lucca Biodinamica, which quickly gained prominence as one of the leading biodynamic districts in Italy. As one interviewee put it:

*"As a small farmer, there is no risk in producing your goods in a specific manner because your product will always stand out, particularly in the case of biodynamics where each wine has its unique authenticity. In Lucca Biodinamica, where the majority of people produce wine, there exists a positive relationship among us, and we don't perceive each other as competitors." -P12*

The Lucca Biodinamica network is dedicated to promoting the widespread adoption of biodynamic practices within the local system. Their efforts involve disseminating innovative techniques, exchanging knowledge and equipment among members to reduce costs, and enhancing connections with local restaurants, suppliers, and consumers. The network actively promotes the organic and biodynamic credentials of the Lucca region, considering it a crucial factor in long-term sustainability. Their goals include strengthening the network, expanding the reach of biodynamic methods, and raising consumer awareness about sustainable practices.

Organic and biodynamic companies, both certified and non-certified, fall under the BM of the Ecopreneur. They have developed innovative practices with a clear focus on soil protection, biodiversity management, restoration of pollinator habitats, sustainable use of fertilizers, and social engagement. These companies have an integrated vision of environmental performance within their

TABLE 5 Sustainable strategies and effects on 3Vs framework.

Key conditions	SBM	Sustainable strategies	Effects on 3Vs framework
PDO area Prox. to cultural cities Heritage properties	FD	Defensive/Conservative	The wineries maintain their traditional value proposition rooted in the wine tradition and reputation of the region. Improvements in land use are addressed as well as small efficiency-oriented changes as long as they align with industry regulations or PDO standards. The primary focus is on retaining customer loyalty and enhancing the perceived value of territorial wines. Sales channels (exports), as well as partners and distributors, are facilitated by the proximity to historic cities and internationally renowned cultural centers.
Wine-making tradition Reputation PDO Area Prox. To cultural cities	MO		
Financial Wine-making tradition Ind. Grape variety Quality Prox. to cultural cities Organic demand Tourism Price levels	CC SC	Accommodative	The focus on quality now includes environmental considerations. The value proposition is evolving to meet the changing consumer demands. The industry is becoming more open to the outside world, enhancing its reputation, brand, and appeal to employees. Sustainability-oriented risk management and other basic changes, including process renewal, partnering with different value network participants, and targeting new market segments, may be necessary in order to achieve the desired differentiation and secure the organization's operations, reputation, and long-term viability. The adoption of measures for integrating sustainability considerations and engaging stakeholders is crucial for incorporating sustainability into business strategies and operations.
Agroecological conditions Skilled workforce Farmers' network Technology innovation and investments Creative, Charismatic, and Cooperative culture Multifunctional capabilities	B EC SE	Proactive	A proactive strategy involving incremental and continuous organizational change to enhance value proposition, creation, and capture. The winery radically embraces sustainable innovation, integrating environmental and social sustainability into products/services and efficiency measures. Improved performance and competitive advantage are achieved through outstanding environmentally and socially responsible products and services, benefiting risk management, reputation, and brand value. Communication embodies the new values and is reinforced by sustainability certifications and other international voluntary standards.

Source: Authors' own elaboration. FD, financial driven; MO, market oriented; CC, customer-centric; SC, social-centric; B, bioneer; ECO, ecopreneur, and SE, sustainable entrepreneur.

business framework, with practices that aim to minimize resource consumption and environmental emissions.

Finally, the winery P01 is an example of 'Sustainable entrepreneur'. It is located in the renowned wine region of VINO Nobile di Montepulciano (Siena) and stands out as a large and well-established producer that has embraced sustainability as its core mission. Going beyond the mere marketing aspect, P01 views biodynamics as a comprehensive approach that has allowed for the integration of additional standards such as ISO 9001 and Bcorp, which focus on meeting social and environmental requirements. The adoption of biodynamics has not only provided a framework for the winery's operations but has also facilitated the transfer of this vision to its employees:

*"Our objective is to cultivate a substantial amount of land in a sustainable and ethical manner and establish ourselves as a prominent producer of Nobile wine in Montepulciano. With our current size, we have the potential to shape the future of agriculture, and that is precisely what we aim to accomplish here." -P01*

Likewise, though from a different environment, a small-scale wine farm (P20) stands out by being the first in the Bolgheri area to achieve organic and biodynamic certification. Despite limited resources, P20 has found a way to differentiate itself within the prestigious region.

The producer is committed to continuously improving its infrastructure, social initiatives, and environmental assets, acknowledging the social aspect as challenging but important for long-term benefits.

*"I believe that farmers have the potential to collaborate and devise strategies to meet the required standards by establishing networks with neighbouring farmers. This is precisely what I plan to do here with other winegrowers who may not practice biodynamics but have an interest in livestock or beekeeping. When you genuinely care about biodynamics and recognize its positive impact, you find a way to incorporate it into your practices. It goes beyond marketing; being biodynamic is a matter of conscience and personal commitment." -P20*

### 4.3. Effects of the strategies on the 3V framework

To address RQ3. *What are the main implications for the management?*, we continue by exploring, on a continuum of generic sustainable strategies (defensive/conservative, accommodative, and proactive), how these strategies impact the value proposition, creation, and capture (Table 5).

We grouped wineries strategies into three strategic domains where varying levels of sustainability can be implemented. In the first domain, we found defensive/conservative wineries oriented toward territorial quality. These wineries are situated in regions boasting rich wine-making traditions such as Montepulciano and Bolgheri, granting them a competitive advantage in terms of market recognition. These wineries present management with a comprehensive set of implications. The significance of recognizing and leveraging historical winemaking traditions emerges as crucial, underscoring the preservation of conventional methods and heritage as defining factors for the winery's unique identity. Management, in their endeavour to set products apart, emphasized the distinctive attributes of territorial quality, effectively attracting consumers in search of authenticity. By establishing ties with renowned wine-producing regions, they heightened market recognition and bolstered brand trust. The maintenance of elevated quality standards emerged as pivotal in sustaining reputation and fostering customer loyalty. Deliberations concerning industry leadership, customer education, and the harmonious fusion of tradition and innovation assumed paramount importance. The integration of sustainability practices, while upholding the integrity of historical context, highlighted management's pivotal role in aligning tradition with contemporary demands.

Then we identified organic, biodynamic, and mixed-approach wineries (combining organic certification and biodynamic self-declared) pursuing accommodative strategies. These wineries, situated in territories renowned for producing territorial wines (Montepulciano, Montalcino, and Bolgheri), actively pursue the production of high-quality wines that reflect their origins. They expand their focus to include environmental concerns, aligning with EU policies and meeting the rising demand for healthy and more natural wines (organic). This transition involved not only changes in production practices but also a broader focus on conveying ethical values related to environmental sustainability and biodiversity preservation. P04 embarked on a journey of winery modernization with a strong emphasis on social and ecological aspects, as highlighted by the interviewee:

*"In 2017, we initiated the conversion to organic practices. Our focus now lies in conveying our ethical values, which prioritize environmental sustainability and biodiversity preservation in our vineyards." -P04*

Nevertheless, the reputation and branding benefits derived from sustainability activities are limited due to their predominantly internal focus and association with quality-related factors. Despite internal efforts, these wineries struggle to fully harness positive branding from sustainability initiatives. Their accommodative strategies—process, product, and organizational innovations—are hemmed in by existing business paradigms. For instance, transitioning wineries focus on communicating greener practices and developing organic products. P04, a Chianti Classico winery, shifted from bulk wine to premium organic offerings. Leading local businesses notably catalyze such changes, setting industry norms and guiding others, exemplified by their role in P04's transformation. Accommodative strategies also encompass differentiation strategies that prioritize cost and efficiency while actively addressing sustainability issues and strategically aligning with local food networks to enhance appeal to specific stakeholder groups. Included in the accommodative strategies are

wineries situated in less prominent regions (like P24 in Grosseto), where a reduced emphasis on internal quality enables a heightened focus on environmental and social aspects. Strategies involve a greater engagement in sustainability (and related communication) to partially enhance appeal to specific stakeholder groups and local food networks.

Most wineries (70%) in this study, however, fall under the category of proactive strategies. These organic and biodynamic wineries demonstrate a strategic approach that prioritizes sustainable innovation and targets environmentally conscious market segments, diverging from traditional competitive positions tied to origin. In these wineries, the management recognized the value of aligning business strategies with sustainability goals and catering to evolving consumer preferences for environmentally-friendly products. In the most advanced wineries (P01, P02, P03, P16, P18, and P22), the proactive strategy focuses on actively pursuing cost and efficiency-oriented activities that are designed to achieve social and environmental objectives. Enhanced sustainability performance yields benefit in terms of risk management, reputation, and corporate brand value. In many cases, the presence of a business culture oriented toward creativity and innovation in a highly dynamic business environment has allowed for remarkable developments. By allocating resources toward sustainability initiatives can be instrumental in achieving meaningful changes in the organization's operations and practices.

In others, financial resources have facilitated sustainable transformation. P01, for instance, embraces biodynamics as more than just a marketing tool: through a stewardship strategy it integrates other standards like ISO 9001 and Bcorp, shaping its vision, attracting high-skilled workers and engaging with stakeholders. Several wineries actively engage in boundary-spanning activities and integrates stakeholders into their operations, and this allow wineries to capture the value of societal and environmental benefits. This also involves a new value proposition that focuses on influencing territorial behavior. For instance, in the case of Lucca Biodinamica, the network aims to foster the widespread adoption of the biodynamic method within the local system. Producers P10, P11, P12, and P13 achieve this by sharing innovative practices, knowledge, and equipment among themselves, resulting in cost reduction and stronger connections with local restaurants, suppliers, and consumers. The emphasis on organic and biodynamic credentials, as well as highlighting the unique characteristics of the Lucca region, is considered vital for the long-term consolidation of the network, the expansion of the biodynamic approach, and raising consumer awareness. Furthermore, these producers demonstrate a sustainable strategy that prioritizes cooperative relationships over financial resources. Similarly occurs for P20 which, despite its limited size and resources, strives to enhance its infrastructure, social connections, and environmental assets. When asked about social aspects, the interviewee admitted they may pose challenges and may not yield immediate profits, but as they put it:

*"I believe farmers can collaborate and develop strategies to meet the standards by forming networks with their neighbours. Here, I plan to collaborate with other winegrowers who may not practice biodynamics but are interested in livestock, or I may venture into beekeeping. If you genuinely care about biodynamics and believe it brings positive qualities, it goes beyond mere marketing. Being biodynamic is a matter of conscience." -P20*

Management can greatly benefit from prioritizing cooperative relationships over relying solely on financial resources to achieve sustainability goals. Recognizing the potential inherent in collaborative networks among wineries is crucial. When wineries share innovative practices and resources within a network, it can result in tangible advantages such as cost reductions, forging stronger local connections, and ultimately solidifying sustainability efforts over the long term.

## 5. Discussion: a dynamic approach to sustainable practices, SBMs and strategies

### 5.1. Enhancing sustainable business models: identifying value-adding conditions

Exploring Tuscany's wine industry spotlights innovative SBMs rooted in territorial values. Diverse sustainability efforts, shaped by various conditions and strategies, are evident. The analysis of SBM determinants (RQ1) reveals a multifaceted dynamic. Internal and regional factors (Tables 2, 3) emerge as key in shaping winery landscape sustainability. Family-based structures, coupled with evolving winery management, notably impact SBMs. Family-owned businesses, especially with vertical integration, excel in overseeing production, marketing, and tourism, harmonizing tradition with sustainability-focused innovation. Wineries prioritize sustainability through modernization, advanced technologies, multifunctionality, and diversified agricultural practices. Charismatic leaders and creativity drive change, especially in marginal areas, relying on cooperation. Resource-centric strategies lead to differentiation across processes, products, and services. Guided by missions and culture, wineries emphasize sustainability, quality, and modernization. Regional contexts shape corporate culture, promoting collaboration or authority. Aligned with institutional analysis and development framework (Ostrom, 2011), regional conditions notably shape wineries' strategies via factors like factors endowment, soft laws, and terroir attributes. Proximity to cultural centers, credit access, skilled labor, and rising organic demand steer decisions. External factors impact regions with quality disparities. Amid alternative farmers' networks and terroir dynamics, collaborations like Lucca Biodinamica drive innovation and sustainability. These networks encourage experimentation and knowledge sharing, nurturing best practices. Geographical location, especially in PDO zones, strongly influences sustainability. Unique techniques, environments, and cultures foster farm diversity, enriching the winery landscape.

### 5.2. Strategies for sustainability: unveiling implementation approaches

Analyzing RQ2, the study comprehensively categorizes strategies across various SBM types rooted in organic and biodynamic winery practices. Ranging in environmental and social emphasis, some balance efficiency and sustainability, while others prioritise innovation and cooperative networks for holistic sustainability. The pyramid framework (see section 2.3, Figure 1) is revisited to refine insights from

the case study. At the base, a few wineries follow 'enhanced GI requirements', stressing quality, tradition, and local terroir over risky innovations. This reflects defensive strategies arising from viewing sustainability as a potential source of risks. Such wineries prioritize reputation, heritage, and territorial quality, incrementally adapting to norms and regulations. Some adopt sustainability practices for brand alignment rather than inherent value. Quality programs tied to shared institutions can hinder sustainable innovation (Boyer, 2020), favoring sales stability via cause-related marketing. These findings underscore a limited focus on market-oriented strategies in the examined wineries, deviating from existing literature (Santini et al., 2013). Contextual nuances in the Tuscan wine industry may explain strategy variations.

Advancing up the pyramid, consumer-centric and social-centric wineries exhibit heightened sustainability commitment. Through organic certification and eco-friendly practices, they target eco-conscious consumers. These strategies surpass typical market-oriented models, prioritizing environment and society over territorial wine quality, leveraging sustainability for differentiation. Organic and biodynamic associations wield influence, shaping regulations and prices. Notably, the biodynamic certification's principles of social justice and responsibility extend beyond organic standards, adding layers of value for human beings, equal opportunities, and safe working conditions. Accommodative strategies emerge when wineries transition from a territorial to an environmentally and socially conscious value proposition, actively incorporating sustainable practices to appeal to changing consumer preferences.

Then our investigation confirms Bioneers excelling in sustainability. Rooted in family values, they champion innovation, risk management, and collaboration. Lucca Biodinamica is a prime instance, of promoting biodynamics, knowledge sharing, and consumer sustainability awareness. This proactive stance reshapes the value proposition, emphasizing cooperation and driving transformative local change.

Ecopreneurs, nearing the pyramid's top, prioritize sustainability through soil protection, biodiversity management, and social engagement. Beyond certifications, their strategies reflect values exceeding regulations, offering adaptable sustainability integration. These wineries exemplify evolving business boundaries, accommodating varied ethics and environmental values.

At the peak, the Sustainable Entrepreneur Model's transformative potential is evident. In distinct business settings, two wineries adopt biodynamic farming, reshaping value, value creation, and sustainability integration. Biodynamics differentiates and drives continuous winery enhancement, reaching employees and neighboring farms. Proactive strategies catalyze innovation via sustainability-induced changes in processes, products, and organization. Aligning innovation-led sustainability and dynamic capabilities underscores innovation's centrality in sustainable models. By weaving sustainability into their operational fabric, these wineries ensure that sustainability transcends mere lip service, becoming a powerful force that propels both innovation and transformation.

### 5.3. Management implications: key takeaways and actionable insights

Customizing sustainable strategies is vital, acknowledging the flaws in generic approaches. Wineries' diverse sustainability stages call

for context, resource, and market-aligned strategies. Capitalizing on historical heritage benefits those with rich traditions, enhancing uniqueness. Leveraging tradition, reputation, and quality while integrating regional eco-friendly practices proves advantageous.

Consumer shifts toward ethical and sustainable products highlight the need to align with these evolving trends. Integrating sustainability into the value proposition resonates with eco-conscious consumers, while transparent communication attracts them. Strategic innovation, like bioneer and sustainable entrepreneur models, is key. Collaborations and networks foster resource-sharing for sustainable innovation.

Vital is robust stakeholder engagement: nurturing bonds with customers, suppliers, and local communities boosts sustainability and aligning with stakeholder values through social initiatives enhances brand reputation and loyalty. Certifications like organic or biodynamic align with sustainability goals and confer a competitive edge.

Networking and collaboration are integral components. Associations like Lucca Biodinamica serve as examples of the potential impact of collaborative networks on driving sustainability. Establishing partnerships with fellow wineries to share best practices, reduce costs, and collectively advance sustainability efforts can yield positive outcomes.

Adopting a forward-looking vision for sustainability, prioritizing long-term benefits over immediate profits, is recommended. Sustainable practices can yield substantial gains in areas such as risk mitigation, brand elevation, and customer loyalty. Effective communication plays a pivotal role in this process, and likewise transparently conveying the value of sustainability initiatives to consumers, stakeholders, and the broader community.

Sustainability thrives on constant improvement: evaluating and enhancing initiatives keeps wineries attuned to trends, tech, and consumer shifts. Coherent integration solidifies credibility and authenticity.

Leadership is pivotal. Active management in sustainability, resource allocation, innovation culture, and environmental responsibility drives winery progress, aligning identity, values, and market dynamics.

There are several implications for the management. First, small wine businesses with limited resources need to find the necessary inputs and capabilities for innovating through territorial connections (Dressler and Paunović, 2020; Pomarici et al., 2021). These can be informal or formal networks, producer associations, wine unions, and inter-branch organizations such as wine Consortia for PDOs. Being part of a larger system offers various advantages to individual producers through the scope, relation, and network economies, but in some cases also disadvantages.

Second, in the context of sustainable practices, the adoption process is not fixed, individual, or limited to a simple choice between alternative cost-effective options. Instead, it is influenced by a dynamic and ever-evolving real-world environment. This process involves ongoing education, the exploration of innovative approaches, and a strong emphasis on social factors (e.g., toward families and the territorial community). Third, by prioritizing sustainability, businesses can enhance their appeal to highly skilled workers and attract new talent who are drawn to organizations with a strong reputation for sustainability practices. Finally, it requires a more holistic farming management that becomes a key element in branding and storytelling, particularly for small family wineries with a multi-generational vision.

It serves as a consistent and balanced communication strategy, aligning the company's interests through stakeholder interaction and refining positioning and brand communication.

## 6. Conclusion

This research study delves deeply into the potential of alternative wine networks to drive SBM innovation and value creation in the wine industry, with a specific focus on the Italian context. The findings illuminate the intricate interplay between business environment conditions, strategic choices, and SBMs.

Research findings shed light on two essential aspects: the pivotal role played by alternative wine networks in nurturing innovation and collaboration, catalyzing the adoption of forward-looking sustainability strategies, and the significance of the strong link between wine and the territory, aligning with recent insights on place-based transformation and territorial innovation ecosystems for sustainability (Köhler et al., 2019; Chaminade and Randelli, 2020; Arcuri et al., 2023).

Both organic and biodynamic approaches are identified as facilitators of sustainable business model innovation and value creation, each with varying gradients of sustainable practices, strategies, and porous boundaries. These approaches not only enhance product quality and reduce environmental impact but also contribute to the long-term viability and resilience of the agri-food system, guided by the systems thinking inherent in biodynamic agriculture.

The study's theoretical contributions are twofold: it refines the existing theoretical frameworks, elucidating how alternative wine networks influence both foundational and apex levels, and it bridges the gap between sustainable business strategies and the role of management and innovation for sustainability. The insights gleaned from alternative wine networks elucidate how sustainability becomes an integrated facet of winery operations, bolstering both ecological resilience and economic viability.

The study's focus on the Tuscany wine industry potentially limits the generalizability of findings to other regions or sectors. Despite efforts to ensure diversity among wineries, the relatively small sample size necessitates caution in extending results. Qualitative interviews offer depth, but might not fully encompass wineries' strategies. Augmenting with quantitative data could provide a more encompassing perspective. Future research could delve into policy effects on extending sustainability in the wine sector, especially in light of the European Commission's proposal to review the GIs system. Addressing this would enrich the understanding of sustainable strategies, enhance validity, and contribute to holistic management frameworks.

In sum, this study underscores the symbiotic relationship between alternative wine networks and sustainable business strategies, revealing a nexus that holds potential for shaping a more environmentally and socially conscious future for the wine industry and beyond.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Author contributions

RT: methodology, formal analysis, investigation, data curation, writing – original draft preparation, review, and editing. DV: conceptualization, methodology, formal analysis, writing–original draft preparation, review, and editing. FG: review and editing and supervision. SA: conceptualization, methodology, formal analysis, writing–review and editing. GB: supervision and research design. AC: conceptualization and supervision. All authors contributed to the article and approved the submitted version.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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