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Sicilian Wineries' Intention to Comply With Sustainability Certification as a Strategic Business Behavior

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ABSTRACT

The present study explores the factors influencing Sicilian wineries' willingness to adopt sustainability certification, which represents an increasingly relevant tool for enhancing the environmental, social, and economic performance viticulture's sector. The behavioural determinants that shape Sicilian winegrowers' intentions to adhere to sustainability certification were investigated applying an extended model of the *theory of planned behavior*. The model incorporates the traditional theory of planned behavior constructs (attitude, subjective norms, and perceived behavioural control) alongside two additional factors: perceived benefits of certification and the general orientation towards sustainability. The findings substantiate the robustness of the TPB model adopted in elucidating the behavioural intentions associated with sustainability certification. Among the relevant factors, attitude emerged as a strong and significant predictor of intention, underscoring the importance of wineries' positive evaluation of certification. Perceived behavioural control had a significant positive effect, suggesting that wineries are more likely to intend to adopt certification when they perceive a greater capacity to do so. Conversely, subjective norms did not significantly influence intention, suggesting that external social pressures play a limited role in this context. In an analogous manner, perceived benefits and sustainability orientation did not directly translate into stronger impact on intentions without supportive attitudes and a sense of control. The overall findings demonstrated a growing readiness among wineries to engage with sustainability initiatives, thus providing a foundation for future research assessing the impacts, barriers, and outcomes of sustainability certification in the wine sector.

1 | Introduction

In the vitiviniculture sector, sustainability-driven business management is regarded as a strategic choice that enables wineries to effectively address the novel environmental, social, and economic challenges confronting the sector (Agnusdei et al. 2026). These challenges include, above all, the impact of climate change, which has resulted in a generalised decline in production, rising inflationary pressures, and changing wine consumption habits (Ceccacci et al. 2025; Del Rey and Loose 2023). The *International*

Organization of Vine and Wine (OIV) has provided a comprehensive definition of sustainability for vitiviniculture, characterising it as a global strategy that encompasses economic viability, the production of quality products, environmental soundness, the diffusion of precision farming, social equity, and the valorisation of heritage, historical, cultural, ecological and aesthetic aspects (OIV 2004; Moisello 2025). The three-dimensional approach to sustainability, addressing environmental and social and economic aspects, is then translated into the commitment of vine farmers, winemakers and policymakers in the development

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of sustainable production plans to be integrated in the business as a long-term competitive element (Merli et al. 2017; Sgroi et al. 2023; Schimmenti et al. 2016).

The formal valorisation of the integration of sustainability principles in wine production is represented by the related certification, which serves as the primary tool of substantiating the veracity of the communicative values associated with the sustainability of a firm. They offer guarantees to all stakeholders involved, including producers, consumers, customers, relevant authorities and also consumers (Ravaglia et al. 2018; Lombardo et al. 2021). There are numerous regulated or voluntary certification schemes available to which wineries can adhere (Conti et al. 2024). Obtaining a certificate from one of these schemes demonstrates that a product, a process or a system conforms to one or more sustainability principles as defined by the reference standard. Within the paradigm of regulated certification, the reference rule or technical standard is defined, prepared, or managed by institutional bodies (European Commission, a State, a Region). In the context of voluntary certification, reference documents may be standards developed by official standard bodies or standards developed by private bodies. Certifications can be categorised into two distinct types: 'management/organisational' (B2B) and 'product' (B2C). Moreover, the adoption of technical documents by firms is not contingent upon the pursuit of certification; indeed, they serve as a methodological instrument in addressing complex issues, such as sustainability (ISMEA and Qualivita 2024).

In this perspective, sustainability certification should not be interpreted solely as a communication tool aimed at signalling environmental or social commitment, but increasingly as a strategic organisational choice capable of shaping governance structures and coordination mechanisms within agri-food value chains (Caracciolo and Lombardi 2012). Sustainability standards and certifications may function as managerial frameworks that codify practices, reduce information asymmetries, and facilitate coordination among supply-chain actors, particularly in fragmented agri-food systems (Meemken et al. 2021). In territorial contexts characterised by structural constraints and firm fragmentation, such as inner and peripheral areas, these mechanisms become even more relevant, as collective frameworks and support structures can compensate for limited individual capacity (Cascone et al. 2025). For wineries, certification can therefore support access to segmented markets where compliance is progressively treated as a prerequisite rather than a source of differentiation (Martins et al. 2022). Analysing wineries' intention to adopt sustainability certification is thus relevant not only to understand behavioural drivers at firm level, but also to anticipate potential operational implications for territorial agri-food systems, especially in regions characterised by a high prevalence of micro and small enterprises, such as Sicily.

Beyond their communicative role, sustainability certifications increasingly operate as governance devices that structure coordination, accountability, and credibility along agri-food value chains. Within the literature on voluntary sustainability standards, certifications are conceptualised as institutional arrangements that formalise sustainability-related rules, monitoring procedures, and compliance mechanisms, thereby shaping how sustainability practices are embedded in value chain governance (Marx et al. 2024).

As certification schemes become more widely adopted within specific sectors, their function may progressively shift from a discretionary differentiation strategy towards a more institutionalised managerial baseline. In such contexts, sustainability-related values and perceived benefits may represent shared background conditions rather than discriminating drivers of behavioural intention. Instead, firms' intentions are likely to depend more strongly on their perceived ability to operationalise certification requirements, mobilise organisational resources, and manage procedural complexity. Recent contributions focusing on sustainability governance and benchmarking in agri-food systems, including the wine sector, highlight how organisational readiness and coordination capacity play a decisive role in shaping effective certification uptake (Bertorelli et al. 2023; Depetris Chauvin et al. 2023).

The available certifications that may interest wineries are diverse in their focus (Timpanaro et al. 2016; Van Doorn et al. 2021), with some offering specific priorities on the environmental impacts such as organic farming, integrated production, Carbon Neutrality, ISO 14064-1:2019 and 14067:2018 standards on the Carbon Footprint, ISO 14001:2015 Environmental Management System, ISO 14046-1:2014 standard on Water Footprint, ISO 50001:2018 standard on energy management, and the EMAS certification. Regarding social aspects, examples of relevant certifications include Fairtrade, SA 8000, SEDEX and B Corp. Finally, the emergence of sustainable certification standards specific to wine production, predominantly developed by private entities, is unsurprising (Sgroi et al. 2023). Exemplary cases encompass the *Equalitas* and *SOSain Sicilia* standards in Italy, the *Sustainable Austria* project in Austria, the *Vignerons Engagés en Développement Durable* and *Terra Vitis* certifications in France, and the *FairChoice* label in Germany (Rugani and Lamastra 2023). Furthermore, in Italy, a public sustainability programme for the vitiviniculture sector, the *VIVA program—Sustainability in the Italian Wine Sector*, has been developed by the Italian Ministry of the Environment and Energy Security (MASE 2022).

The present study aims to analyse the willingness of Sicilian viticultures and wineries to adopt sustainability certifications through the application of the *theory of planned behavior* (TPB). The research focused on the survey of a sample of 100 Sicilian wine farms interviewed to investigate the decision-making process that leads to compliance with sustainability certification. The decision to focus on the Sicilian productive firms is motivated by the role that Sicilian vitiviniculture plays in Italy. According to the most recent data from the Regional Institute of Wines and Oils of Sicily (IRVO 2025) and the Institute of Services for the Agricultural and Food Market (ISMEA and Qualivita 2025), Sicily plays a leading role in the Italian wine sector: it represents 14.2% of the national vineyard area, ranking second among Italian regions in terms of vineyard surface. The region's viticultural output, encompassing wine and must, constitutes 6% of Italy's national total, thereby positioning it as the fourth most prominent region in Italy about wine production (IRVO 2025). According to the ISMEA-Qualivita Observatory (ISMEA and Qualivita 2025), the economic value of Sicily's PDO and PGI wines is €451 million. Regarding the practice of organic viticulture, Sicily has a leading national position, with approximately 38% of its vineyards cultivated organically (IRVO 2025).

The Sicilian wine sector is mainly characterised by a high prevalence of Small Medium Enterprises and family firms, which typically face fixed certification costs; lack of specialised staff; limited data collection capabilities (Moisello 2025). These characteristics and factor influence the adoption of certification scheme, from different degree, from partial, delayed, to total non-adoption (Stranieri et al. 2021). Indeed, the certification system, often requires compliance with multiple indicators (carbon, water, biodiversity, etc.), implying high organisational and monitoring requirements (Ingrassia et al. 2022). Moreover, the Sicilian wine chain is vertically disintegrated, with many small grape producers. On the other side emerge a strong fragmentation between grape growers, cooperatives, and bottlers (Corsi et al. 2023; Romano et al. 2021). Studies on Sicilian wineries participating in sustainability programs (e.g., SOSStain, Magis) show that *adoption is concentrated among structurally stronger firms*, often early adopters with better managerial capacity (Borsellino et al. 2019; Ingrassia et al. 2022) and better accomplish economies of scale and resource availability (Stranieri et al. 2021).

In consideration of Sicily's substantial contribution to the national wine sector and its leadership in organic viticulture, it is imperative to comprehend the factors influencing wineries' propensity to adopt certifications to promote responsible practices and support the long-term competitiveness and sustainability of the region's wine industry.

Previous research has focused on broad sustainability practices like innovation, carbon footprint, and tourism domination (Martínez-Falcó et al. 2024).

There are different studies also on certifications, but to the extent of our knowledge. There is a paucity of research specifically examining wineries' propensity to adopt certification schemes, with a particular gap in the literature concerning Sicily.

The decision to focus the study on Italy stems from the fact that the Italian wine sector is among the most relevant at the global level and is characterised by a high degree of territorial differentiation (Pomarici et al. 2021).

Indeed, the Sicilian context constitutes a theoretically relevant empirical setting, resulting in one of the largest wine-producing regions in Italy; it represents a structurally significant case within the global wine industry and therefore is representative of the sector (Borsellino et al. 2024). At the same time, the regional wine value chain is characterised by a high degree of fragmentation, a large number of small-scale producers, and limited vertical integration (Galati, Gristina, et al. 2015; Borsellino et al. 2020). A distinctive feature of the Sicilian system is the central role of cooperatives, which account for the majority of grape processing but are often associated with low value-added activities and bulk wine production (Schimmenti et al. 2016; Borsellino et al. 2020). Furthermore, the coexistence of heterogeneous organisational models, ranging from small family farms to integrated firms and hybrid cooperative structures, provides a rich context for comparative analysis (Galati, Borsellino, et al. 2015; Borsellino et al. 2020). Sicily presents a dynamic environment in which result favourable to investigate the interplay between value chain governance, organisational diversity, and sustainability strategies (Borsellino et al. 2016).

Investigating grape growers' propensity to adopt certification schemes sits at the intersection of individual decision-making, supply-chain governance, and sustainability transitions providing several theoretical and governance insights about adoption drivers at micro-level. Also, it aims to contribute to sustainability transition literature by explaining how environmental and quality-oriented practices emerge at the farm level. This could also offer useful policy and managerial implications, as it provides insights into the design of more effective incentives and coordination mechanisms within agricultural supply chains.

2 | Materials and Methods

2.1 | Theoretical Framework

The TPB is a widely employed cognitive model in the social sciences for examining individual decision-making processes (Ajzen 1991). Its extensive application supports the understanding of intentions and behaviours across various domains, including health, environmental practices and agricultural innovations. In the context of agriculture, TPB has been successfully employed to investigate farmers' and agribusiness entrepreneurs' willingness to adopt sustainable practices, organic production methods, and certification schemes (Despotović et al. 2019; Timpanaro, Pecorino, et al. 2023; Spina et al. 2023). The fundamental assumption of TPB is that behavioural intention exerts a direct influence on behaviour. Intention, in turn, is influenced by the individual's beliefs towards a particular behaviour, which is based on three key cognitive factors (Davis et al. 2002):

1. Attitude (ATT), defined as the level of positive or negative judgement of a certain behaviour.
2. Subjective norms (SN), which represent societal influences surrounding an individual, such as family, friends, colleagues, and consumers, on their decision-making process.
3. Perceived behavioural control (PBC), which is a personal assessment of access to resources and the opportunities required to participate in a particular activity.

In accordance with extant literature, this study adopted an integration of the TPB by including additional variables to the above-mentioned factors with a view to enhancing its predictive accuracy (Timpanaro, Pecorino, et al. 2023; Sarkar et al. 2022; Tama et al. 2021). The added factors were Benefits (B), capturing wineries' perceptions of the positive effects associated with sustainability certification, and Sustainability Orientation (SOST), reflecting their general orientation towards sustainability. The measurement scales for these constructs were adapted from previously validated instruments used in sustainability-related studies and tailored to the specific characteristics of the wine sector (Kaur et al. 2024; Badsar et al. 2023). More specifically, the adaptation process aimed to preserve the conceptual meaning of the original scales while aligning item wording with the organisational context of Sicilian wineries and the specific decision to comply with sustainability certification. The Benefits construct was operationalised through items capturing the expected competitive, managerial, and economic advantages associated with

certification, such as improved competitiveness, more efficient resource management, and better sales performance. In contrast, Sustainability Orientation was measured through items reflecting the firm's broader pro-sustainability mindset, including the perceived importance of sustainability for resource use, market positioning, collective action, and innovation. In both cases, the wording of the items was reformulated to ensure coherence with the wine-sector context and with the behavioural focus of the study.

Building on the TPB, the hypotheses of this study were developed by considering the specific nature of sustainability certification as both a behavioural decision at firm level and a governance mechanism within agri-food value chains. In the wine sector, sustainability certification does not only represent an environmental or ethical commitment, but also a strategic organisational choice through which wineries formalise production practices, improve credibility toward stakeholders, and respond to increasing market and institutional expectations. For this reason, the intention to comply with sustainability certification can be interpreted as the outcome of both individual-level cognitive evaluations and firm-level strategic considerations.

Attitude is expected to play a central role because wineries are more likely to intend to comply with sustainability certification when they evaluate it positively in terms of strategic relevance, reputational value, and potential contribution to firm competitiveness. Previous studies on sustainable innovation and certification-oriented behaviour in agriculture have shown that favourable evaluations of a practice increase farmers' and agri-food entrepreneurs' willingness to adopt it (Timpanaro, Pecorino, et al. 2023). In the context of wineries, this mechanism is particularly relevant because certification may be perceived as a tool for strengthening market positioning and communicating sustainability-related commitments. Therefore, the following hypothesis is proposed:

H1. *Respondents' attitude towards complying with sustainability certification has a positive effect on behavioural intention.*

Subjective norms may also influence certification intention because wineries operate within dense relational environments involving consumers, supply-chain actors, consultants, producer organisations, and institutional bodies. In agri-food systems, social and institutional expectations can shape firms' strategic decisions, especially when sustainability standards become increasingly visible in markets and value-chain relationships. In the wine sector, perceived approval from relevant stakeholders may therefore encourage wineries to consider certification as a legitimate and expected behaviour. Accordingly, the following hypothesis is formulated: Drawing on the TPB, individual attitudes toward a given behaviour are a central determinant of behavioural intention. In the context of sustainability certification in agri-food systems, positive attitudes toward compliance are shaped by perceived alignment with emerging sustainability norms and potential benefits, such as market access, reputational gains, risk reduction. Recent studies in the agri-food and wine sectors confirm that firms are more likely to express strong behavioural intentions toward certification when they perceive it as economically and strategically advantageous, particularly in markets increasingly driven by environmental differentiation and

ESG-oriented demand structures (Annunziata et al. 2018; Merli et al. 2019; Testa et al. 2020).

H2. *Wineries perceiving stronger social pressure to comply with sustainability certification are more likely to intend to do so.*

Perceived behavioural control is particularly relevant in the case of sustainability certification because compliance requires technical, organisational, financial, and administrative capabilities. Indeed, PBC, as conceptualised in the TPB, plays a crucial role in shaping behavioural intention, particularly in contexts where the targeted behaviour is complex, resource-intensive, and procedurally demanding. In the case of sustainability certification schemes, adoption is not merely a matter of positive attitude or social approval but also depends on the perceived ability of firms to comply with technical requirements, administrative procedures, auditing processes, and potential organisational restructuring. Unlike simple attitudinal approval, certification involves procedures, documentation, audits, and possible changes in farm or winery management. For micro and small enterprises, which are highly represented in the Sicilian wine sector, perceived feasibility and control over the process may therefore be decisive in transforming a favourable evaluation into a concrete intention. Recent literature on sustainability standards in agri-food systems highlights that certification schemes often entail significant compliance costs, including financial investments, managerial adaptation, and the acquisition of technical knowledge (Testa et al. 2020; Merli et al. 2019). Again, these barriers are particularly relevant for small and micro enterprises, which typically face constraints in terms of human capital, financial resources, and administrative capacity (Henson and Humphrey 2010; Ménard and Klein 2004). In this perspective, empirical studies show that firms with higher organisational capabilities and better access to technical support are more likely to adopt sustainability standards, as they perceive certification processes as manageable rather than prohibitive (Annunziata et al. 2018).

Based on this reasoning, the following hypothesis is proposed:

H3. *Respondents' perceived behavioural control has a positive effect on the intention to comply with sustainability certification.*

In addition to the traditional TPB constructs, this study extends the traditional framework by incorporating perceived benefits as an additional explanatory construct. While TPB typically focuses on attitudes, subjective norms, and perceived behavioural control, recent research in the field of sustainability transitions suggests that perceived instrumental outcomes play a central role in shaping firms' intentions toward voluntary environmental and quality standards.

In the context of sustainability certification in the agri-food and wine sectors, perceived benefits refer to the expected strategic, economic, and organisational advantages associated with certification adoption. These may include enhanced market access, improved competitiveness, reputational gains, greater transparency along the value chain, and more efficient resource management. Recent empirical studies on voluntary sustainability standards indicate that firms are more likely to engage with certification schemes when they anticipate tangible value creation rather than solely compliance costs or normative pressure

(Cammarata et al. 2024; Testa et al. 2020; Merli et al. 2019). Moreover, institutional and organisational studies suggest that firms evaluate sustainability standards through a cost–benefit logic, where adoption is more likely when expected advantages outweigh implementation costs and complexity (Scott 2014; Stranieri et al. 2021). In fragmented sectors such as wine production, where firms exhibit heterogeneous capabilities and resource endowments, perceived benefits become a critical determinant of whether certification is seen as an opportunity for upgrading or as an additional burden (Pomarici et al. 2015).

Accordingly, wineries that perceive sustainability certification as a source of competitive, organisational, and reputational benefits are expected to exhibit stronger behavioural intentions to comply with certification schemes.

H4. *Perceived benefits have a positive effect on the intention to comply with sustainability certification.*

Furthermore, this study incorporates sustainability orientation to capture the broader organisational mindset through which wineries evaluate sustainability as a guiding principle for business development, becoming a key organisational-level construct capturing the extent to which sustainability principles are embedded in a firm's strategy, decision-making processes, and long-term business vision. Moreover, unlike situational drivers such as perceived behavioural control or instrumental benefits, sustainability orientation may reflect a deeper normative and cognitive commitment to environmental, social, and territorial responsibility.

In this context, recent literature in agri-food and wine systems suggests that firms with a strong sustainability orientation are more likely to integrate sustainability considerations into strategic decisions and to perceive voluntary sustainability standards as coherent with their identity and long-term objectives (Caliskan et al. 2021; Sousa et al. 2024; Bagnato et al. 2025).

In addition, sustainability orientation somehow may shape the firms' strategic behaviour and supports the adoption of practices that are consistent with long-term competitiveness and differentiation (Alessandri et al. 2024). In the wine sector, where reputation, territorial identity, and quality characteristics are central competitive factors, sustainability orientation may reinforce the intention to adopt certification schemes by aligning business strategy with environmental and social expectations (Bertorelli et al. 2023).

Accordingly, wineries with a stronger sustainability orientation may exhibit higher behavioural intention to comply with sustainability certification schemes:

H5. *Wineries' sustainability orientation has a positive effect on the intention to comply with sustainability certification.*

Sustainability orientation is widely recognised in the literature as a fundamental organisational-level driver of proactive environmental and social behavior (Rahal et al. 2026). It reflects the extent to which sustainability principles are embedded in a firm's strategic vision, values, and decision-making processes (Keszei 2020). Unlike external pressures or perceived constraints, sustainability orientation represents an internalised commitment

that shapes how firms interpret and respond to sustainability-related challenges and opportunities (Si et al. 2019).

Some studies in agri-food systems suggest that firms with a strong sustainability orientation are more likely to voluntarily adopt environmental and quality standards, as they perceive such practices as consistent with their identity and long-term strategic objectives (Alvarez-Ochoa et al. 2024; Jia 2023; Annunziata et al. 2018). In this sense, sustainability orientation may function as a cognitive and normative driver that increases the likelihood that firms translate sustainability values into concrete behavioural intentions.

Moreover, sustainability orientation, if considered as an intangible strategic resource, may represent a resource that can favour competitive advantage by fostering innovation, reputation building, and alignment with emerging market demands. In this regard, sustainability-oriented wineries are more likely to perceive certification schemes not only as compliance mechanisms, but also as strategic tools for value creation and market positioning (León-Bravo and Caniato 2024).

Therefore, wineries characterised by a stronger sustainability orientation may exhibit a higher intention to comply with sustainability certification schemes.

Overall, the theoretical reasoning developed above leads to the extended TPB model illustrated in Figure 1, which summarises the hypothesised relationships among the constructs.

2.2 | Data Collection

The extended TPB model was implemented in a 5-point Likert scale system comprising 21 items to measure the constructs, with higher scores indicating greater agreement with the items. This study focuses on wineries operating in Sicily, a region characterised by a high prevalence of small and medium-sized enterprises and by a growing diffusion of sustainability-oriented practices in the wine sector (Borsellino et al. 2020). Sicily represents a particularly relevant context for analysing firms' intention to engage with sustainability certification, as wineries are increasingly exposed to market, institutional, and territorial expectations related to environmental and social performance (Borsellino et al. 2016).

Data were collected through a structured online questionnaire administered from April to May 2025.

The questionnaire items were developed by drawing on the TPB framework and on previous studies addressing sustainability-oriented behaviour, certification adoption, and sustainable practices in agricultural and agri-food contexts. The original wording of the items was adapted to fit the specific decision context of the study, namely wineries' intention to comply with sustainability certification schemes. Particular attention was paid to ensuring that each item referred to the organisational and strategic perspective of wine farms and wineries rather than to generic individual behaviour.

The traditional TPB constructs were operationalised by adapting items related to attitude, subjective norms, perceived behavioural

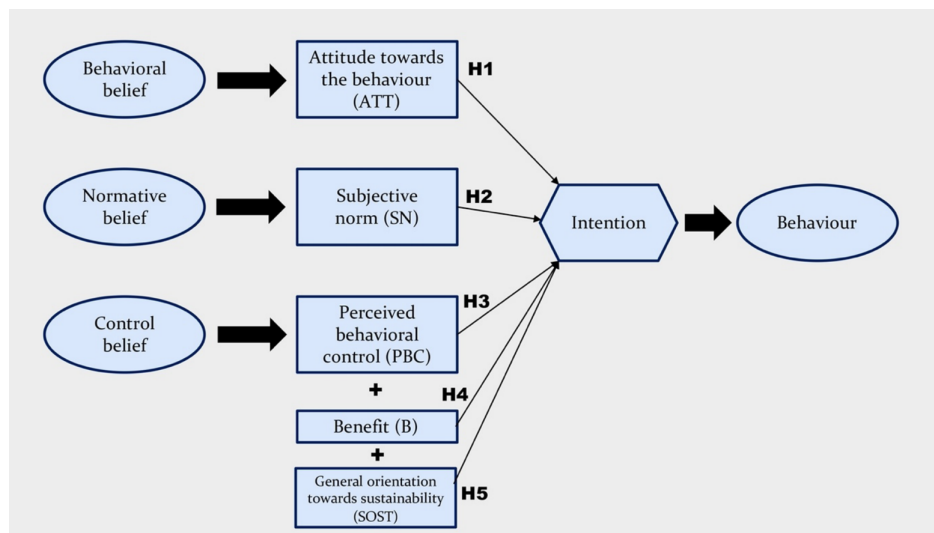


FIGURE 1 | Extended theory of planned behavior model.

control, and behavioural intention to the context of sustainability certification. The two additional constructs were developed to capture dimensions that are particularly relevant in the agri-food certification context. The Benefits construct focused on the expected strategic, managerial, and economic advantages of certification, including competitiveness, resource management, and sales performance. The Sustainability Orientation construct captured the broader organisational orientation toward sustainability, including resource management, collective commitment, competitiveness, and the link between sustainability and innovation.

The final set of items was then assessed empirically through the measurement model, including indicator loadings, internal consistency reliability, convergent validity, and discriminant validity.

The target population consisted of wineries operating in Sicily and actively engaged in grape growing and wine production. More specifically, the study focused on respondents directly involved in organisational and strategic decisions, namely winery owners, managers, or consultants.

A non-probability purposive sampling approach was adopted. The questionnaire was circulated through direct contacts, professional networks, and sector-specific mailing lists to reach firms considered relevant to the objectives of the study. Participation was voluntary, and respondents were informed about the academic purpose of the study and the anonymity of their responses.

Because the survey was distributed through multiple and partially overlapping channels, it was not possible to determine a precise denominator of contacted firms. Therefore, a formal response rate could not be calculated reliably. The final analytical sample consisted of 100 valid responses.

2.3 | Data Analysis

Data analysis was conducted using Partial Least Squares Structural Equation Modelling (PLS-SEM), which is particularly

suitable for analysing complex models with latent constructs and for exploratory research contexts focusing on prediction and theory development (Cammarata et al. 2024). This methodology is particularly well-suited for small-to-moderate sample sizes and models incorporating both reflective and formative indicators (Spina et al. 2023).

The analysis followed a two-step procedure. First, the measurement model was assessed in terms of reliability and validity. Internal consistency was evaluated using Cronbach's alpha and composite reliability (ρ_A), while convergent validity was assessed through average variance extracted (AVE). The reliability of the indicators was determined by means of item loadings (Hair et al. 2019). Discriminant validity was examined by comparing the square root of the AVE with the inter-construct correlations. Given that all constructs were measured through a single self-administered questionnaire, common method variance (CMV) was also considered. As a first statistical assessment, Harman's single-factor test was performed on all measurement items. The first unrotated factor accounted for 40.12% of the total variance, which is below the conventional threshold of 50%, suggesting that CMV is unlikely to represent a dominant source of bias (Table A1).

As a complementary assessment, full collinearity VIFs were examined at the construct level by regressing each construct score on the remaining constructs. All resulting VIF values ranged between 1.42 and 2.82, remaining below the conservative threshold of 3.3 (Table A2). Taken together, these results suggest that CMV is unlikely to substantially distort the structural relationships reported in the study, although it cannot be entirely ruled out.

In the second step, the structural model was assessed to test the hypothesised relationships among the constructs, after verifying the absence of multicollinearity. The significance of the structural paths was evaluated through a non-parametric bootstrapping procedure with 5000 resamples. For each relationship, standardised path coefficients, bootstrapped p values, and 95% bias-corrected confidence intervals were examined. In addition,

the explanatory power of the model was assessed by reporting the coefficient of determination (R^2) for the endogenous construct (INT), after verifying the absence of multicollinearity through variance inflation factor (VIF) diagnostics.

All analyses were performed using STATA 19.

The possibility of endogeneity was also considered, as behavioural models based on cross-sectional survey data and self-perceived variables may be affected by omitted variables, simultaneity, or reverse causality. Given the absence of longitudinal data or valid external instruments, the structural paths estimated in the PLS-SEM model were interpreted as theoretically grounded predictive relationships rather than as causal effects. Accordingly, the wording of the Results and Discussion sections was revised to avoid over-causal interpretations of the estimated coefficients.

3 | Results

The results provide evidence of differentiated relationships between the explanatory variables and wineries' intention to engage with sustainability certification schemes. While some constructs emerge as significant predictors of behavioural intention within the PLS-SEM model, others display weaker or non-significant associations, suggesting that intention is not uniformly explained by all the dimensions traditionally included in the TPB.

The following sections first assess the reliability and validity of the measurement model and subsequently examine the structural relationships among the constructs included in the empirical model.

Regarding the characteristics of the participants, the sample comprised 100 respondents, 89% of whom were male and 11% female. The data set revealed that most of the sample population held the role of winery holder, while the remainder of the interviewees were consultants. The mean age of the sample was 45 years, with a limited representation of individuals under the age of 30. The enterprises interviewed were predominantly micro-sized (75%), consistent with data indicating a higher prevalence of micro-companies in the Sicilian wine sector (AIDA database) and focused on firms that engage with both cultivation and processing at the production chain level. The main characteristics of the sample are listed in Table 1. It is a noteworthy observation that a considerable proportion of the enterprises that participated in the study (77%) have already attained a sustainability certification, which is a notable achievement and a testament to a general commitment to sustainability.

A relevant feature of the sample is that 77 out of 100 respondents (77%) already held at least one sustainability certification. To better contextualise the structural results, an exploratory comparison between certified and non-certified wineries was conducted using mean construct scores (Table 2). The exploratory comparison showed that certified wineries reported significantly higher mean scores for attitude, subjective norms, perceived behavioural control, perceived benefits, and behavioural

TABLE 1 | Sample features.

Variables	Respondents	
	No.	%
Gender		
Male	89	89.0
Female	11	11.0
Role in the enterprise		
Holder	64	64.0
Consultant	36	36.0
Age		
< 30	19	19.0
31–50	45	45.0
> 51	36	36.0
Types of enterprise		
Micro-sized enterprise	75	75.0
Small-sized enterprise	18	18.0
Medium-sized enterprise	5	5.0
Big-sized enterprise	2	2.0
Role in the supply chain		
Winegrowing farms	31	31.0
Wineries	8	8.0
Winegrowing farms with winery	60	60.0
Commercial companies	1	1.0
Already with a sustainability certification?		
Yes	77	77.0
No	23	23.0

TABLE 2 | Exploratory comparison between certified and non-certified wineries.

Construct	Not certified mean (SD)	Certified mean (SD)	<i>t</i> -test <i>p</i>	Mann–Whitney <i>p</i>
ATT	2.884 (0.776)	3.953 (0.757)	< 0.001	< 0.001
SN	3.130 (1.047)	3.897 (0.739)	0.0001	0.0011
PBC	2.928 (0.904)	3.483 (0.862)	0.0085	0.0099
B	2.696 (0.887)	3.632 (0.734)	< 0.001	0.0001
SOST	3.922 (1.034)	4.174 (0.657)	0.1627	0.4828
INT	2.493 (1.004)	3.316 (0.967)	0.0006	0.0016

intention. By contrast, sustainability orientation did not differ significantly between the two groups. This suggests that prior certification status is associated with more favourable strategic evaluations of certification and stronger intentions to engage with it, while sustainability-oriented values appear to be more broadly shared across the sample.

Table 3 presents the descriptive statistics for the TPB items and summarises the frequency of the respondents. It emerged favourable attitudes and perceptions among respondents regarding sustainability certification systems. In particular, the highest

TABLE 3 | Mean and standard deviation of the items.

Item	Statement	Mean (score)	Standard deviation
ATT ₁	For me, adopting a sustainability certification scheme is a strategic choice	3.70	1.1
ATT ₂	For me, adopting a sustainability certification scheme is a useful way to increase company profits	3.48	1.11
ATT ₃	For me, adopting in a sustainability certification scheme is a valuable choice for the company's image	3.94	0.98
SN ₁	My family and friends would approve of my company joining a sustainability certification scheme	3.84	1.04
SN ₂	My employees would approve of my decision to join a sustainability certification scheme	3.49	1.17
SN ₃	Most entrepreneurs in the wine industry would approve of my company joining a sustainability certification scheme	3.55	1.08
SN ₄	Consumers would approve of my products being certified as sustainable.	4.00	0.99
PBC ₁	I have the resources and expertise to join a sustainability certification scheme	3.55	1.12
PBC ₂	The decision to join a sustainability certification scheme is under my control	3.51	1.14
PBC ₃	It's easy for me to adhere to a sustainability certification scheme	3.00	1.13
B ₁	I believe that having a sustainability certification makes my farm more competitive	3.72	1.00
B ₂	I believe that having a sustainability certification leads to improved management of company resources, resulting in a reduction in fixed costs	3.09	1.16
B ₃	I believe that having a sustainability certification has a direct impact on sales performance, resulting in increased turnover	3.43	1.00
SOST ₁	Adopting sustainability strategies leads to better resource management	4.02	1.04
SOST ₂	Adopting sustainability strategies makes a company more competitive in the market	3.92	0.99
SOST ₃	All companies must commit to adopting sustainability strategies	4.15	1.04
SOST ₄	The best way to promote sustainability is to act collectively	4.22	1.04
SOST ₅	Sustainability and innovation are two closely related concepts.	4.24	0.84
INT ₁	Within the next 3 years, I intend to join one (or more) sustainability certification schemes	3.26	1.08
INT ₂	I plan to join one (or more) sustainability certification schemes within the next 3 years	3.05	1.13
INT ₃	Within the next 3 years, I will join one (or more) sustainability certification schemes	3.05	1.05

Abbreviations: ATT, attitude; B, benefits; INT, intention; PBC, perceived behavioral control; SN, subjective norms; SOST, sustainability.

average scores were observed for items related to sustainability values, while the intention to adhere to certification systems showed moderate levels of agreement.

In Table 4, the results of the PLS-SEM measurement model are reported, with the internal consistency (Cronbach's alpha), indicator reliability (rho A), and convergent validity (AVE) values indicated at the bottom of the table. The results demonstrated strong psychometric properties. All constructs reported acceptable to excellent internal consistency, with Cronbach's alpha values ranging from 0.699 (PBC) to 0.937 (INT) and rho_A values all above the threshold of 0.7. The convergent validity of the model was confirmed, as the average extracted variance (AVE) exceeded 0.5. All item loadings were above 0.6, further confirming the reliability of the indicator. Consequently, the measurement model is regarded as both robust and suitable for structural analysis. Discriminant validity was assessed using the Fornell–Larcker criterion. As reported in Table 5, the square root of the average variance extracted (AVE) for each construct exceeds the corresponding inter-construct correlations. This indicates that

each latent construct shares more variance with its associated indicators than with other constructs included in the model, thereby supporting the discriminant validity of the measurement model.

The structural model was assessed using bootstrapping with 5000 resamples. As reported in Table 6, the model explains 43.7% of the variance in behavioural intention (INT) ($R^2 = 0.437$; adjusted $R^2 = 0.407$). Attitude is positively associated with intention ($\beta = 0.258$, $p = 0.028$, 95% BC CI [0.029, 0.493]), supporting H1. Similarly, perceived behavioural control significantly is positively and significantly associated with intention ($\beta = 0.218$, $p = 0.016$, 95% BC CI [0.039, 0.390]), confirming H3. By contrast, subjective norms ($\beta = 0.154$, $p = 0.198$, 95% BC CI [−0.068, 0.404]), perceived benefits ($\beta = 0.129$, $p = 0.393$, 95% BC CI [−0.166, 0.424]), and sustainability orientation ($\beta = 0.069$, $p = 0.446$, 95% BC CI [−0.128, 0.233]) were not statistically significant. These findings suggest that strategic evaluation and perceived feasibility are more closely associated with certification intention than normative pressure or broader sustainability-related orientations.

TABLE 4 | Measurement model of the PLS-SEM.

Item/ construct	ATT	SN	PBC	B	SOST	INT
ATT ₁	0.871					
ATT ₂	0.851					
ATT ₃	0.724					
SN ₁		0.821				
SN ₂		0.827				
SN ₃		0.808				
SN ₄		0.805				
PBC ₁			0.850			
PBC ₂			0.675			
PBC ₃			0.837			
B ₁				0.850		
B ₂				0.768		
B ₃				0.839		
SOST ₁					0.878	
SOST ₂					0.807	
SOST ₃					0.907	
SOST ₄					0.614	
SOST ₅					0.606	
INT ₁						0.923
INT ₂						0.953
INT ₃						0.951
Cronbach α	0.763	0.834	0.699	0.754	0.830	0.937
rho_A	0.824	0.845	0.727	0.754	0.889	0.937
AVE	0.669	0.665	0.626	0.672	0.598	0.888

Abbreviations: ATT, attitude; B, benefits; INT, intention; PBC, perceived behavioral control; SN, subjective norms; SOST, sustainability.

Table 7 reports the variance inflation factor (VIF) values for the predictor constructs included in the structural model. All VIF values are below the recommended threshold, indicating that multicollinearity does not represent a concern in the interpretation of the estimated structural relationships.

4 | Discussion

The present study aimed to analyse Sicilian wineries' intention to comply with sustainability certification schemes by applying an extended TPB model. This section discusses how the TPB constructs are associated with the intention to join sustainability certification systems, highlighting the role of cognitive and motivational factors in explaining respondents' evaluations. The results obtained provide partial support for the research hypotheses. Specifically, the findings show that ATT and PBC are significantly associated with intention, supporting H1 and H3. Conversely, SN, B, and SOST were not significantly associated with intention in the structural model, leading to the rejection of H2, H4, and H5. With regard to H1, the results suggest that ATT is positively associated with the intention to adhere to certification schemes.

TABLE 5 | Discriminant validity with the Fornell–Larcker criterion.

Construct	ATT	SN	PBC	B	SOST	INT
ATT	0.818					
SN	0.635	0.816				
PBC	0.428	0.420	0.791			
B	0.742	0.674	0.489	0.820		
SOST	0.432	0.461	0.453	0.416	0.773	
INT	0.575	0.528	0.488	0.559	0.405	0.942

Note: Diagonal elements in bold report the square root of the average variance extracted (AVE), while off-diagonal elements represent inter-construct correlations. Discriminant validity is supported when the square root of AVE for each construct exceeds its correlations with the other constructs.

Abbreviations: ATT, attitude; B, benefits; INT, intention; PBC, perceived behavioral control; SN, subjective norms; SOST, sustainability.

The results suggest that respondents' favourable evaluations of certification schemes significantly contribute to strengthening their behavioural intention to adopt them, confirming the central role of attitudinal factors in sustainability-related decision-making processes.

This is consistent with extant research investigating farmers' adoption of sustainability-oriented practices and innovations within the agri-food sector. In particular, the study by Rezaei et al. (2018), who examined farmers' intentions to engage in on-farm food safety practices through an extension of the TPB. Their findings demonstrated that attitude represented one of the strongest predictors of behavioural intention, indicating that farmers who perceived food safety practices as beneficial and valuable were more likely to adopt them. The study therefore highlighted the importance of positive attitudinal beliefs in shaping farmers' behavioural intentions. In a similar vein, the findings of the present study suggest that positive attitudes towards sustainability certification schemes can foster adoption intentions within the viticulture and wine sector. The results are also consistent with the systematic literature review conducted by Rizzo et al. (2024), which identified positive attitudes toward sustainable innovations as one of the most recurrent and influential determinants of adoption behaviour among farmers. Their review highlighted that perceived economic and environmental benefits associated with sustainable innovations play a crucial role in encouraging adoption decisions across the agri-food sector. Furthermore, the authors stressed that farmers are more likely to adopt sustainability-oriented innovations when they perceive clear advantages in terms of competitiveness, long-term farm performance, and social recognition. In line with these findings, the present study suggests that favourable attitudes toward certification schemes significantly contribute to shaping wineries' and viticulturists' intention to adhere to sustainability standards, reinforcing the relevance of attitudinal dimensions in explaining sustainable behavioural intentions within the agri-food system.

The present findings suggest that respondents perceive sustainability certification not only as a compliance-oriented tool, but also as a strategic and image-enhancing investment capable of generating long-term value for viticulture businesses and wineries. In particular, the results imply that behavioural intention is more strongly influenced by perceived strategic value and

TABLE 6 | Structural model results.

Hypothesis	Path	β	p	95% BC CI	Result
H1	ATT → INT	0.258	0.028	[0.029, 0.493]	Supported
H2	SN → INT	0.154	0.198	[−0.068, 0.404]	Not supported
H3	PBC → INT	0.218	0.016	[0.039, 0.390]	Supported
H4	B → INT	0.129	0.393	[−0.166, 0.424]	Not supported
H5	SOST → INT	0.069	0.446	[−0.128, 0.233]	Not supported

Note: R^2 (INT) = 0.437; adjusted R^2 = 0.407. BC CI = bias-corrected bootstrap confidence interval based on 5000 resamples.

TABLE 7 | Structural model—multicollinearity check (variance inflated factors—VIFs).

	INT
ATT	2.451
SN	2.092
PBC	1.465
B	2.759
SOST	1.447

Note: Values below 3.3 indicate an acceptable level of correlation among constructs. Abbreviations: ATT, attitude; B, benefits; INT, intention; PBC, perceived behavioral control; SN, subjective norms; SOST, sustainability.

expected benefits than by external pressures or institutional constraints.

These results are consistent with the findings of Xiang and Guo (2023), who demonstrated that attitude and perceived usefulness are among the most significant determinants of farmers' intentions to adopt green control techniques within sustainable agriculture systems. Their integrated model, combining the TPB with other behavioural frameworks, showed that farmers are more likely to adopt sustainable practices when they perceive tangible advantages in terms of efficiency and farm performance. In particular, perceived usefulness emerged as a key predictor of adoption intention, reinforcing the idea that positive evaluations of expected benefits play a central role in shaping sustainability-oriented behaviours. Therefore, present findings extend this evidence to the agri-food certification context, suggesting that wineries' intentions to adhere to sustainability certification schemes are similarly influenced by perceptions of strategic utility and competitive differentiation.

The results also align with the study by Swami and Parthasarathy (2024), which emphasised the importance of intrinsic motivational factors in the adoption of sustainable agricultural practices. Their findings highlighted that farmers' environmental commitment, awareness, and personal motivations play an important role in shaping adoption behaviour alongside institutional supports. Moreover, the authors highlighted that communication, awareness, and farmers' internal commitment to sustainability positively influenced adoption behaviour, whereas some policy-related mechanisms showed limited effectiveness. In line with these findings, the current study suggests that wineries' behavioural intentions toward sustainability certification are mainly rooted in internally perceived strategic benefits, rather than in compliance-driven motivations or external

pressures. This reinforces the relevance of attitudinal and motivational dimensions in explaining sustainability-oriented decision-making within the agri-food sector.

Moreover, the results show that PBC is positively and significantly associated with intention, thus providing empirical support for Hypothesis H3. This finding underscores the importance of organisations' perceptions of their own capabilities in shaping decisions related to sustainability certification. This outcome aligns with previous studies suggesting that farmers who feel empowered and perceive fewer operational barriers tend to show greater willingness to adopt sustainable technologies or standards.

The significance of PBC results particularly relevant also in relation to certification schemes because it often involves substantial commitments in terms of documentation, monitoring procedures, compliance with standards, staff training, and financial investments. Consequently, organisations may evaluate not only the expected benefits of certification but also their ability to cope with the practical challenges involved. The present findings suggest that the perception of having sufficient control over these challenges can substantially enhance organisations' willingness to engage in sustainability initiatives. Therefore, the consideration could be that wineries are more likely to engage with sustainability certification schemes when they perceive themselves as capable of managing the associated requirements and organisational challenges.

This result is consistent with recent literature; Leduc and Hansson (2024) found that Swedish farmers' intentions to adopt agroforestry practices were significantly influenced by behavioural factors associated with perceived control. Their study demonstrated that farmers who felt confident in managing the knowledge requirements, labour demands, and operational complexity associated with agroforestry systems were more likely to consider adopting agroforestry practices. Conversely, uncertainty regarding implementation difficulties and resource constraints tended to reduce adoption intentions.

Moreover, Selvaggi et al. (2024) found that farmers' intentions to adopt precision livestock farming tools were strongly linked to their perceptions of being able to effectively integrate the technology into existing production systems. Factors such as technical competence, familiarity with digital tools, and access to organisational and financial resources emerged as important determinants of adoption intentions. Their findings indicate that perceived behavioural control extends beyond the simple availability of resources and encompasses confidence in managing

technological change and adapting existing organisational routines. This interpretation is also relevant in the case of sustainability certification, where organisations may need to modify procedures, collect additional information, and coordinate multiple actors throughout the certification process.

Furthermore, Yuan et al. (2025) results confirmed that perceived behavioural control was among the strongest predictors of adoption intention, highlighting that farmers are more willing to implement environmentally beneficial technologies when they perceive the adoption process as manageable and within their capabilities. They also stated that even when environmental awareness and personal norms are strong, behavioural intentions may remain limited if individuals perceive substantial technical, financial, or operational barriers. This finding further reinforces the interpretation that perceptions of control represent a critical bridge between pro-sustainability motivations and actual behavioural intentions.

The descriptive statistics highlight salient aspects: while respondents believe they have sufficient resources and control, the lowest-scoring PBC item concerns the ease of adhering to certification schemes (mean: 3.00). This may indicate perceived complexity or bureaucratic burden associated with certification, thereby supporting the relevance of PBC in explaining certification intention.

In contrast, SN was not significantly associated with intention, leading to the rejection of H2. This finding contrasts with the results of several studies conducted in agricultural contexts, in which social pressure, or the perceived expectations of peers, consumers, and consultants, frequently plays a relevant role in behavioural intention. Qiu et al. (2021) found that perceived social norms significantly influenced farmers' land protection behaviours, suggesting that expectations from relevant social groups can strongly affect individual decision-making. According to their findings, farmers are often motivated by the desire to conform to socially accepted practices and respond to pressures originating from their community and institutional environment.

Similarly, Leduc and Hansson (2024) included subjective norms among the behavioural factors potentially influencing agroforestry practices, together with attitudes and perceived behavioural control, highlighting the multifaceted nature of farmers' decision-making processes. Therefore, while the results of the present paper found a stronger role of perceived implementation challenges in shaping certification intentions, the latter authors considered subjective norms as a relevant component of the behavioural framework explaining agroforestry adoption.

In this case, although the mean values for subjective norm items are high, suggesting that respondents believe their stakeholders would approve sustainability certification, these perceptions were not significantly associated with stronger intention in the structural model. This finding may suggest that, in the present sample, individual strategic considerations and organisational autonomy are more closely related to certification intention than conformity to external expectations. A possible interpretative element is the high prevalence of already certified wineries in the sample (77% of respondents already certified), which may have contributed to the normalisation of certification practices

and, consequently, to the weaker role of normative pressure in explaining further intention. An additional interpretative element concerns the composition of the sample. Since 77 out of 100 respondents already held at least one sustainability certification, the analysed population is composed of firms that are already familiar with sustainability-related standards and practices. This aspect has important implications for the interpretation of the structural results.

The exploratory comparison between certified and non-certified wineries showed that certified firms reported significantly higher scores in attitude, subjective norms, perceived behavioural control, perceived benefits, and behavioural intention, whereas sustainability orientation did not differ significantly between the two groups. This pattern helps refine the interpretation of the non-significant structural relationships associated with Benefits and Sustainability Orientation.

More specifically, the absence of significant differences in sustainability orientation suggests that pro-sustainability values may be widespread across the sample and may therefore have limited discriminating power in explaining certification intention. In this sense, sustainability orientation may operate more as a shared background condition than as a direct explanatory factor of intention in this specific empirical context.

By contrast, perceived benefits did differ significantly between certified and non-certified wineries, indicating that this construct is not simply a uniformly shared baseline condition. Rather, perceived benefits appear to remain strategically relevant, but may not show an autonomous direct association with intention once more proximal constructs, such as attitude and perceived behavioural control, are considered in the structural model.

Accordingly, the non-significance of B and SOST should not be interpreted as evidence of their irrelevance. Instead, the present findings more cautiously suggest that these constructs may have limited direct explanatory power within a sample characterised by a high prevalence of already certified wineries, while their role may differ in nature: sustainability orientation appears to function as a broadly shared background condition, whereas perceived benefits seem to be associated with prior certification experience and may be linked to intention through more proximal attitudinal mechanisms (Dessart et al. 2019; Byfuglien et al. 2025). Future research should investigate these relationships more explicitly.

From a broader perspective, these findings suggest that psychological constructs remain important for explaining wineries' intentions, although their relative relevance varies. Attitudes and perceived control were identified as the constructs most strongly associated with intention, thereby underscoring the centrality of strategic vision and operational capability in deciding whether to adopt certification schemes. Conversely, normative pressures, expected benefits, and sustainability-oriented mindsets, although positively perceived, were not significantly associated with intention in the structural model. This finding suggests that interventions aimed at supporting certification adoption could concentrate on reinforcing both the personal convictions regarding the strategic significance of certification and the perceived

accessibility of the certification process. From an operational standpoint, these findings offer relevant implications for both firms and the broader agri-food system. At firm level, the prominence of perceived behavioural control highlights the importance of reducing organisational and administrative barriers associated with certification, through simplified procedures, clearer guidelines, and targeted technical assistance. In this sense, the results suggest that firms' ability to engage in sustainability transitions is linked to the availability of practical support instruments and implementation-oriented resources, rather than to motivational factors alone.

At system level, the limited association between subjective norms and intention suggests that further diffusion of sustainability certification may not be achieved through awareness-raising campaigns or normative pressure alone. Instead, the evidence suggests the relevance of institutional arrangements capable of embedding certification within broader coordination mechanisms, where sectoral institutions, consortia, and public bodies support firms by integrating standards with technical assistance, market access, and value-chain coordination tools.

In particular, the implementation of training programmes, the streamlining of procedures, and the provision of enhanced technical support may assist in reinforcing the perceived sense of control and reducing the complexity associated with certification. Furthermore, given the limited effect of normative influences, communication strategies should prioritise demonstrating the tangible managerial and competitive advantages of certification's adoption rather than leveraging social pressure.

In conclusion, the extended TPB model employed in this study offers relevant insights into the decision-making processes of Sicilian viticultures and wineries. The significant associations observed for attitudes and perceived behavioural control suggest that policy measures and technical assistance should prioritise enhancing perceptions of usefulness and reducing perceived barriers. While sustainability orientation and perceived benefits remain significant components of strategic positioning, their lack of significant direct association with intention suggests that certification intention is more closely related to strategic evaluations and perceived capability than to general pro-sustainability values. These considerations are of crucial importance in the design of targeted strategies to promote the adoption of sustainability certifications, thereby supporting both environmental responsibility and long-term competitiveness in the Sicilian wine sector.

5 | Conclusion

This study contributes to the understanding of the behavioural factors shaping Sicilian wineries' intentions to engage with sustainability certification by applying an extended TPB. Overall, the results confirm the suitability of the TPB for analysing firm-level decision-making processes related to sustainability certification in the wine sector.

The findings highlight the central role of attitudinal evaluations and perceived behavioural control in shaping behavioural

intention. A favourable attitude towards sustainability certification emerges as a significant driver, suggesting that wineries are more inclined to engage with certification schemes when they recognise their value and usefulness. At the same time, perceived behavioural control plays a key role, indicating that intention is strongly influenced by wineries' perceptions of having adequate technical, organisational, and financial capabilities to comply with certification requirements.

Subjective norms do not exert a significant influence on behavioural intention, suggesting that external social pressure from relevant stakeholders plays a limited role in this context. Similarly, sustainability orientation and perceived benefits, while acknowledged by wineries, do not directly translate into stronger intentions to adopt certification unless they are supported by favourable attitudes and a clear perception of feasibility.

These results suggest that sustainability certification is primarily approached as a strategic and operational decision rather than as a purely normative commitment. From a practical perspective, the findings underline the importance of reducing perceived barriers and strengthening wineries' organisational capacity through targeted support measures, training initiatives, and institutional assistance.

A limitation of the present study concerns the composition of the sample, which included a high proportion of already certified wineries. While this feature reflects the growing diffusion of sustainability-related practices in the Sicilian wine sector, it may also have constrained the variability of some certification-related constructs. Future research should therefore compare certified and non-certified wineries more explicitly to assess whether the determinants of intention differ according to firms' prior certification status.

A further limitation concerns the non-probability sampling approach adopted in the study. Since the questionnaire was distributed through multiple overlapping channels, a precise response rate could not be calculated, and the findings should therefore be interpreted as analytically informative rather than statistically representative of the entire Sicilian winery population.

The potential endogeneity of some relationships among self-perceived constructs could represent another possible limitation. Since the study relies on cross-sectional survey data, omitted variables, simultaneity, or reverse causality cannot be entirely excluded. Therefore, the structural relationships should be interpreted as predictive associations rather than definitive causal effects. Future research could address this issue through longitudinal designs, experimental or quasi-experimental approaches, or instrumental-variable strategies where valid instruments are available.

Finally, this study provides a basis for future research aimed at assessing the impacts of specific sustainability certification schemes in the wine sector, with particular attention to firms' motivations for participation, the challenges associated with compliance, and the tangible benefits derived from certification adoption.

Author Contributions

Alessandro Scuderi: project administration, resources, funding acquisition, conceptualization, supervision, visualization, validation. **Gaetano Chinnici:** conceptualization, methodology, software, data curation, validation, formal analysis, supervision, writing – original draft, writing – review and editing, visualization. **Roberta Maria Gravagno:** conceptualization, methodology, software, data curation, investigation, formal analysis, writing – original draft. **Giulio Cascone:** conceptualization, methodology, software, data curation, investigation, formal analysis, writing – original draft, writing – review and editing, visualization. **Carla Zarbà:** conceptualization, methodology, software, data curation, investigation, formal analysis, supervision, writing – original draft, visualization, writing – review and editing, validation.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Appendix A

TABLE A1 | Results of Harman's single-factor test for common method variance.

Factor	Eigenvalue	Proportion of variance explained	Cumulative proportion
Factor 1	8.425	0.4012	0.4012
Factor 2	2.080	0.0991	0.5002
Factor 3	1.835	0.0874	0.5876
Factor 4	1.599	0.0761	0.6638
Factor 5	1.173	0.0559	0.7196

TABLE A2 | Full collinearity assessment at the construct level.

Dependent construct	Mean VIF	Maximum VIF
ATT	1.76	2.16
SN	1.92	2.57
PBC	2.07	2.71
B	1.7	1.95
SOST	2.11	2.82
INT	2.04	2.77