# Transforming the Italian Wine Sector: A Qualitative Multiple Case Study of Dealcoholised Wine Innovation and Market Positioning

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**Abstract**

The rapid expansion of the no- and low-alcohol (NoLo) segment is reshaping dynamics in mature wine markets. Within this context, dealcoholised wines might represent an emerging strategic opportunity for traditional wine-producing countries. This study examines how Italian wineries respond to the development of the dealcoholised segment, focusing on the interaction between technological constraints, regulatory design, and market positioning.

Using a qualitative multiple case-study approach, the analysis is based on semi-structured interviews with three geographically diverse wineries operating in Northern, Central, and Southern Italy. The study provides one of the first firm-level explorations of how Italian wine producers perceive the opportunities and constraints associated with dealcoholised wine production under the new regulatory framework. The analysis identifies convergent patterns in technological adoption, strategic diversification, and perceived regulatory barriers. The findings indicate that membrane-based dealcoholisation technologies have reached operational feasibility, yet high capital intensity limits widespread internal adoption. Firms frame entry into the segment as a proactive diversification strategy, targeting moderation-oriented consumers, particularly younger cohorts. Regulatory constraints, especially the prohibition of dealcoholisation for Protected Designation of Origin (PDO)/Protected Geographical Indication (PGI) wines, emerge as a critical factor shaping competitive positioning. Sustainability considerations introduce additional trade-offs, given the higher energy and water intensity of current processes. The study contributes to the economic analysis of innovation in mature wine sectors and highlights the role of institutional design in influencing competitive dynamics within emerging product categories.

**Keywords:** Dealcoholised wine; Wine innovation; Regulatory design; No/Low Wine's Market segmentation.

## 1. Introduction

In recent years, the no- and low-alcohol (NoLo) beverage segment, including dealcoholized wines, has undergone rapid expansion, fundamentally reshaping competitive dynamics within the global wine industry. The dealcoholised wine market has emerged as one of the most dynamic oenological innovations, with alcohol-free products projected to achieve an annual growth rate of approximately 7% across major global markets [1].

This evolution is indicative of structural shifts towards health-conscious consumption patterns, largely propelled by Millennials and Gen Z, who collectively account for 60% of global NoLo sales [1], as well as 'sober-curious' cohorts seeking social alternatives devoid of ethanol-related risks [2]. Nevertheless, as highlighted by the perspectives of Italian producers, this expansion is not solely predicated on health-driven motivations; rather, it constitutes a proactive diversification strategy designed to penetrate markets governed by religious prohibitions or ethical restrictions. Such an approach enables the 'Made in Italy' sector to access previously precluded consumption environments while simultaneously addressing increasingly stringent regulatory frameworks regarding drink-driving legislation and occupational safety.

This evolution reflects deeper structural shifts in consumption patterns, rising health awareness, and changing lifestyle preferences [3,4]. For traditional wine-producing countries such as Italy, these developments raise important economic and strategic questions regarding market positioning, regulatory adaptation, and long-term competitiveness.

Recent evidence suggests that the wine sector is facing structural rather than temporary market challenges, creating incentives for firms to explore new product categories and consumer segments [5]. Dealcoholised wines are positioned as complementary to conventional alcoholic wines, extending product portfolios toward consumers oriented to moderated consumption patterns. From a demand perspective, increasing attention to health, well-being, and responsible drinking has begun to reshape alcohol markets [6,7]. Market data indicate that a majority of NoLo consumers cite physical and mental well-being as primary motivations [1], while younger cohorts are driving observable shifts in consumption behaviour [8,9]. In Italy, Millennials and Generation Z already account for a substantial share of alcohol-free wine purchases, signalling the emergence of a distinct demand profile within a traditionally wine-oriented context.

Despite dynamic growth rates, the Italian dealcoholised wine consumption segment remains economically marginal. Although still accounting for only a negligible share of total domestic sales, projections indicate strong medium-term expansion [1]. Distribution remains concentrated in e-commerce channels, while large-scale retail and HoReCa integration proceed more gradually. The segment thus combines high growth potential with structural uncertainty.

From an institutional standpoint, Legislative Decree 672816/2024 marked a significant regulatory milestone, formally recognising dealcoholised wines within the national framework and aligning Italian law with Regulation (EU) 2021/2117[1]. Nonetheless, regulatory divergences across European jurisdictions persist, potentially generating competitive asymmetries. In Italy, restrictions on

[1] European Commission, Regulation (EU) 2021/2117 amending Regulation (EU) No 1308/2013 as regards dealcoholised wines, Off. J. Eur. Union L435 (2021) 262–314.

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PDO/PGI dealcoholisation and mandatory facility separation requirements may influence cost structures and strategic choices.

Dealcoholised wines therefore sit at the intersection of three central dimensions of wine economics: demand transformation, technological adaptation, and regulatory design. While existing research has extensively examined technical aspects of dealcoholisation [10,11], consumer acceptance [7,12], and public health implications of reduced alcohol consumption [6], recent evidence confirms that the literature on dealcoholised wines remains predominantly focused on consumer-related dimensions, including health motivations, sensory acceptance, sustainability perceptions, and willingness to pay [13]. By contrast, considerably less attention has been devoted to how wine producers strategically respond to the emergence of this new product category within specific institutional and regulatory environments [14].

To address this gap, this study adopts a qualitative multiple case-study approach and investigates how Italian wineries perceive and respond to the opportunities and constraints associated with dealcoholised wine production. In particular, it explores how firms evaluate technological options, interpret the current regulatory framework, and position themselves within the emerging dealcoholised wine segment.

By providing firm-level evidence from three Italian wineries operating in different regional contexts, the paper contributes to a better understanding of how technological, regulatory, and market factors jointly shape innovation strategies in the emerging dealcoholised wine market.

The remainder of the paper is structured as follows. Section 2 presents the contextual and regulatory background. Section 3 outlines the methodology. Section 4 reports the empirical findings, Section 5 discusses their implications, and Section 6 concludes.

## 2. Dealcoholised Wines: consumption trends, market development and regulatory approaches

### *2.1 Consumption trends and motivations*

The relationship between alcohol consumption and health has become increasingly prominent in both scientific research and public debate, with direct implications for demand patterns in wine markets. Accumulating epidemiological evidence has influenced dietary guidelines and regulatory frameworks, contributing to evolving consumer preferences. Revisions to Mediterranean Diet guidelines and national dietary recommendations have repositioned wine from a tolerated daily component to a product recommended for occasional consumption. Earlier claims regarding the protective effects of moderate wine intake [15] have been reassessed in light of broader risk analyses [16], while the World Health Organization has emphasised that no safe level of alcohol consumption can be established [6].

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Consumers increasingly integrate health considerations into purchase decisions [7], while psychological factors, habits, and lifestyle orientations also play an important role in shaping preferences for NoLo wines [17]. Younger cohorts, in particular, display greater openness to moderated drinking patterns and situational consumption adjustments [2,8,9]. Reflecting these developments, recent consumer research on dealcoholised wines has increasingly focused on health motivations, sensory acceptance, willingness to pay, and sustainability-related perceptions [13]. Stricter drink-driving regulations have further eroded out-of-home wine consumption, eliminating traditional contexts like workplace canteens, while emerging 'sober-curious' segments, neither abstainers nor heavy drinkers, prioritise moderation for health, ethical, or lifestyle reasons [2]. This shift reflects both partial substitution and the activation of new demand segments.

At the product level, research suggests that dealcoholisation can preserve key polyphenolic components [11], and recent studies highlight quality-oriented strategies involving enhanced phenolic profiles [18]. Recent reviews also emphasise that product acceptance depends on the ability to preserve both sensory quality and perceived health-related benefits throughout the dealcoholisation process. Broader reviews confirm the importance of maintaining a balance between volatile and non-volatile compounds to ensure consumer acceptance [19]. In parallel, viticultural and pre-fermentation strategies aimed at reducing alcohol levels at source have also been explored as complementary approaches to technological dealcoholisation [20]. Together, these findings suggest that dealcoholised wines represent a structured adaptation to evolving consumption norms.

### *2.2 Market development*

At the global level, the no- and low-alcohol (NoLo) beverage sector is experiencing sustained expansion, driven by structural shifts in consumer preferences and increasing health awareness [3]. Dealcoholised wines occupy a relatively concentrated niche within this broader category. Global sales are heavily concentrated in a limited number of countries, including the United States, Germany, and the United Kingdom [1]. Cross-country analyses indicate substantial heterogeneity in consumer perception and satisfaction levels regarding non-alcoholic wine products [21]. In contrast, the Italian market remains nascent, with dealcoholised wines representing a negligible share of total domestic sales despite strong projected growth.

Despite favourable demand dynamics, adoption barriers persist. Previous studies highlight that taste expectations, social norms, perceived authenticity, and product availability remain among the main factors limiting consumer acceptance of dealcoholised wines and other NoLo beverages [2,7,12,23]. Consistent with this evidence, perceived taste limitations, social norms, and limited availability remain key constraints [12,23]. Evidence from Australia further confirms that consumer perception

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of non-alcoholic wine products differs significantly from traditional categories, particularly in relation to taste expectations and social acceptance [~~23~~24]. Limited distribution penetration remains a critical obstacle, particularly in traditional retail channels. At the same time, product innovation and technological improvements are recognised as central to enhancing quality perception and consumer acceptance.

In Italy, supply is dominated by fully dealcoholised wines, with sparkling variants playing a prominent role [1,25]. The segment is often positioned within premium and celebratory consumption contexts, while distribution remains concentrated in online channels and selective HoReCa integration. The Italian case thus reflects a market in early consolidation, characterised by high growth potential but structural constraints.

### *2.3 Regulatory approaches*

Regulation (EU) 2021/2117 formally incorporated de-alcoholised and partially de-alcoholised wines into the EU wine law framework, accommodating process innovation within a traditionally product-centred regulatory model. However, national implementation reveals significant heterogeneity in regulatory interpretation and enforcement.

Italy adopts a more restrictive approach in comparison than other UE partners. In contrast to the more permissive implementation observed among other European Union Member States, the Italian regulatory landscape is characterised by a significantly more rigorous approach, formally codified in Legislative Decree No. 672816 of 20 December 2024. While Regulation (EU) 2021/2117 provides a harmonised framework for the inclusion of de-alcoholised products within the Common Market Organisation, the Italian transposition introduces structural barriers that limit strategic manoeuvrability. Specifically, Article 3 of the national decree mandates a categorical prohibition on the dealcoholisation of PDO, PGI, and organic wines, thereby restricting these innovative processes exclusively to generic table wines. Furthermore, the Italian framework imposes a requirement for physically separate and non-communicating production facilities a stringent mandate absent in the "managed adaptation" models of peers such as Germany and France. While these measures are intended to prioritise denomination integrity and absolute traceability, they inevitably result in prohibitive compliance costs and a marked reduction in technological flexibility. Consequently, such institutional rigidity not only constrains diversification strategies within high-value appellation contexts but also incentivises domestic firms to outsource processing activities to foreign jurisdictions with more favourable regulatory environments, potentially undermining the Italian wine sector's sovereign technological advancement. This model emphasises protection of collective reputation while potentially limiting diversification strategies in high-value appellation contexts.

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Germany and France follow more flexible, EU-aligned approaches. Both permit partial dealcoholisation of GI wines under specific conditions, relying on traceability systems and product specifications rather than mandatory structural separation. This "managed adaptation" framework enables incremental innovation within established denomination systems while maintaining consumer safeguards.

The United Kingdom, operating outside the EU CMO framework, regulates dealcoholised wines primarily through horizontal food law, GI scheme rules, and alcohol duty thresholds. The UK model places greater emphasis on descriptor guidance and fiscal classification, including favourable duty thresholds for beverages below 1.2% ABV.

These divergent regulatory configurations illustrate how institutional design shapes innovation incentives and competitive positioning. Regulatory heterogeneity across jurisdictions may influence production strategies, cross-border processing decisions, and the integration of dealcoholised wines within traditional wine value systems. While Regulation (EU) 2021/2117 harmonised dealcoholised wine recognition, Member States retain discretion, generating competitive distortions: Germany permits full PDO/PGI dealcoholisation (pioneer since 1907); France allows partial (<6% vol.) for PGI (€166M market in 2021); the UK applies ABV-proportional taxation favouring NoLo; Italy bans PDO/PGI/organic dealcoholisation, mandates physical facility separation, and deviates on labelling ('dealcolato' vs. EU 'dealcolizzato'), pending excise decree.

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Table 1. Regulatory Framework for De-Alcoholised Wine in Selected European Jurisdictions[2]

| Regulatory Dimension | Italy | Germany | France | United Kingdom |
|---|---|---|---|---|

[2] Regulation (EU) 2021/2117 amending Regulation (EU) No 1308/2013, Off. J. Eur. Union L435 (2021) 262–314. Italy: Ministerial Decree of 20 December 2024 implementing Regulation (EU) 2021/2117; national provisions on structural separation and labelling (MASAF); Ministerial Decree of 20 December 2024 n. 672816 marks first recognition but imposes rigid constraints absent in peers, exacerbating regulatory delay amid -10% domestic wine volume decline (2019-2024). Germany: Implementation within the German Wine Law (Weingesetz) and related administrative guidance (BMEL). France: Implementation under the Code rural et de la pêche maritime and DGCCRF guidance. United Kingdom: Alcoholic Liquor Duties Act 1979 (as amended); Alcohol Duty reforms (2023). UK GI scheme and general food law provisions; Organic production: Regulation (EU) 2018/848 and subsequent amendments (effective 2025), subject to national implementation; Excise treatment: National excise regimes. UK duty thresholds based on alcohol by volume.

| | | | | |
|---|---|---|---|---|
| PDO/PGI De-alcoholisation | Not permitted for PDO/PGI wines (Ministerial Decree 20 Dec 2024). | Permitted under EU framework: total generally limited to non-GI wines; partial allowed for GI wines subject to specifications. | Consistent with EU framework; total effectively limited to non-GI wines; partial possible depending on appellation rules. | Permitted only if consistent with UK GI product specifications. |
| Permitted Techniques | Annex VIII CMO techniques: vacuum evaporation (partial), membrane processes, distillation; no water/flavourings. | EU-authorised techniques (membranes, vacuum evaporation, distillation). | Same EU-authorised techniques (DGCCRF guidance). | Assessed under general food law and descriptor guidance; no direct CMO incorporation. |
| Labelling | Mandatory 'de-alcoholised' or 'partially de-alcoholised' with equivalent prominence. | 'Entalkoholisierter Wein' (≤0.5%); 'Teilweise entalkoholisierter Wein' (>0.5%). | 'Vin désalcoolisé' / 'Vin partiellement désalcoolisé'; 'sans alcool' if ≤0.5%. | 'Dealcoholised' (≤0.5% ABV); 'low alcohol' (≤1.2% ABV). |
| Organic Production | Permitted under 2025 EU amendment; limited by GI prohibition. | Permitted following EU organic amendment (2025). | Permitted (from March 2025) for authorised techniques. | Governed by UK organic standards and certification bodies. |
| Structural Separation | Mandatory dedicated and physically separate facilities; prior notification; digital registers. | No specific structural separation requirement beyond traceability rules. | No mandatory physical separation; emphasis on traceability. | No specific structural separation requirement; general food business rules apply. |
| Excise Treatment | Wine not subject to excise; recovered alcohol subject to excise regime. | Zero excise rate on wine; customs supervision applies. | Excise according to ABV thresholds under national law. | Alcohol Duty 0% ≤1.2% ABV; duty above threshold. |

Source: Author’s elaboration

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## 3. Methodology

This study adopts a qualitative multiple case-study approach to investigate the development of dealcoholised wines in Italy. Given the emerging and evolving nature of the phenomenon, an exploratory research design was considered appropriate to capture firms' strategic choices, operational practices, and perceptions within a rapidly transforming market environment. The case-study methodology adopts an analytical generalisation approach [22], linking empirical evidence to broader theoretical constructs related to innovation adoption and institutional constraints.

The approach comprises three phases: Phase 1: Desk review of the sectoral regulations (Reg. (EU) 2021/2117, Italian DM 2024/672816, dealcoholisation techniques (vacuum distillation, reverse osmosis/RO, nanofiltration/NF, spinning cone), and market data [1,25]; Phase 2: Case selection: Frizero (Veneto, North), Cantina Colli Ripani (Marche, Centre), Varvaglione 1921 (Puglia, South) for size/history heterogeneity; Phase 3: Semi-structured interviews across 12 areas (history, entry drivers, tech, regulation, etc.), blending open/Likert (1-5) items via online/visits/email.

Data were collected through semi-structured interviews with key decision-makers in three wineries. Interviews were conducted via a combination of online meetings, on-site visits, and follow-up email exchanges, enabling methodological triangulation and enhancing contextual reliability. The interview protocol was structured around twelve thematic areas covering the production and commercial chain of dealcoholised wines, including technological choices, market motivations, regulatory compliance, sustainability practices, communication strategies, partnerships, and perceived barriers.

The instrument combined open-ended questions, designed to elicit qualitative insights and strategic reasoning, with Likert-scale items (1-5) assessing the perceived relevance of four key dimensions such as technological innovation, regulatory constraints, sustainability, and distribution channels. Likert-scale responses are reported descriptively in the Results section to complement qualitative interpretation. This mixed qualitative–structured format facilitated cross-case comparability while preserving analytical depth, in line with established approaches to theory-building from case studies [26].

The sample was selected according to a criterion of geographical heterogeneity, including one winery from Northern, Central, and Southern Italy. The firms differ in organisational structure, size, production philosophy, and degree of engagement with dealcoholised production, enabling the identification of structural variation across cases. In effect, while Frizero was established as a dedicated startup exclusively focused on this product category, Cantina Colli Ripani and Varvaglione 1921 have incorporated dealcoholised variants as strategic portfolio extensions. Nonetheless, due to the high capital intensity associated with advanced dealcoholisation infrastructure and the stringent

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regulatory constraints imposed by the Italian Legislative Decree 672816/2024, most notably the mandate for physically separate production facilities, these firms have opted to outsource the physical extraction of ethanol to specialised third-party providers, often located in foreign jurisdictions.

Interview transcripts were analysed using a thematic comparative approach. Coding proceeded in two stages: a within-case analysis to identify firm-specific strategic patterns, followed by a cross-case comparison to detect convergences, divergences, and structural trade-offs across the three wineries.

To enhance analytical transparency, Table 2 reports the mapping between the twelve thematic areas included in the interview protocol and the four aggregated analytical dimensions adopted in the Results section. The aggregation was conducted iteratively, grouping related interview topics into higher-level categories reflecting recurring empirical patterns [27]. The item “firm history and structure” is treated as a contextual element supporting cross-case comparison rather than as a separate analytical dimension.

Finally, the empirical findings were interpreted in light of existing literature on innovation in agri-food systems, institutional economics, market segmentation, and sustainability transitions, ensuring theoretical alignment between empirical evidence and discussion.

Table 2. From First-Order Interview Themes to Second-Order Analytical Dimensions

| Interview Thematic Areas (12) | Description (Interview Focus) | Aggregated Analytical Dimension (Results Section) |
|---|---|---|
| 1. Entry motivations into dealcoholised segment | Strategic drivers, diversification rationale | Market Drivers and Competitive Positioning |
| 2 Distribution channels | HoReCa, e-commerce, retail integration | |
| 3. Target consumers and demand perception | Generational shifts, health orientation, and export demand | |
| 4. Technological choices | Adopted dealcoholisation techniques (RO, NF, vacuum) | Technological Constraints and Innovation Pathways |
| 5. Technology satisfaction | Perceived quality preservation and technical performance | |
| 6. Investment and outsourcing decisions | Capex constraints, third-party processing | |
| 7. Regulatory awareness | Knowledge of the EU and Italian regulatory framework | |

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|---|---|---|
| 8. Perceived regulatory barriers | PDO/PGI prohibition, facility separation | Regulatory Misalignment and Institutional Barriers |
| 9. Labelling and compliance practices | Legal classification, interpretative uncertainty | |
| 10. Distribution channels | HoReCa, e-commerce, retail integration | Strategic Positioning, Sustainability, and Structural Challenges |
| 11. Communication strategies | Branding, messaging, digital channels | |
| 12. Sustainability practices | Energy use, water intensity, transport impacts | |

Source: Author's elaboration

## 4. Results

This section presents the empirical evidence structured around the four analytical dimensions identified in the coding process.

### *4.1 Technological Constraints and Innovation Pathways*

All three firms rely primarily on membrane-based dealcoholisation techniques, particularly reverse osmosis and selective permeability systems. These technologies are preferred because they operate at controlled temperatures and are perceived as better preserving the original wine's aromatic and structural characteristics. Overall satisfaction with the currently adopted technologies is high. Respondents indicate that product quality is generally acceptable and commercially viable: membrane techniques (RO, NF) dominate for low-temperature aroma preservation (satisfaction 4-5/5). However, important operational constraints persist.

The most relevant constraint concerns the high capital intensity of advanced dealcoholisation equipment. Investment costs are considered prohibitive for small and medium-sized wineries, leading several firms to outsource the dealcoholisation process to specialised third-party providers. In some cases, processing is carried out in other EU countries where regulatory and infrastructural conditions are more favourable.

Outsourcing reduces upfront investment but increases logistical complexity and dependence. Firms also report residual sensory alterations, although these are described as significantly reduced compared to earlier technological stages.

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All interviewed firms emphasise the strategic relevance of technological innovation for the segment's future development. In particular, firms emphasise the need for improvements in cost efficiency, energy consumption, and sensory optimisation.

### *4.2 Market Drivers and Competitive Positioning*

Firms frame entry into the dealcoholised segment as a proactive diversification strategy. Interviewees identify sustained international demand growth in markets such as Germany, the United States, and the United Kingdom as a key investment signal, viewing these trends as structural and long-term. Respondents indicate that regulatory tightening in areas such as drink-driving limits has contributed to changes in consumption contexts, reducing alcohol consumption in specific social and professional settings. Dealcoholised wines are therefore seen as enabling access to new consumption occasions.
Producers report that the segment allows access to distribution channels not traditionally available to conventional wines, particularly in health-oriented and alcohol-restricted contexts. Competition is perceived as relatively limited compared to the traditional wine market, although respondents highlight growing pressure from lower-priced foreign producers.
Firms consistently emphasise a mid-to-premium positioning strategy. Higher production costs are cited as the main justification for avoiding price-based competition. Product quality, brand coherence, and alignment with company identity are described as central positioning elements.
In some export markets, producers note that fiscal regimes differ according to alcohol content. Interviewees report that lower alcohol taxation thresholds may create commercial opportunities in specific jurisdictions.

### *4.3 Regulatory Misalignment and Institutional Barriers*

The 2024 Italian decree is described by respondents as having reduced legal uncertainty and provided formal recognition to the dealcoholised wine category. Firms report that this regulatory clarification has facilitated planning and investment decisions. However, the prohibition of dealcoholisation for PDO/PGI wines is identified as the most significant regulatory constraint. All interviewed firms indicate that this limitation restricts their ability to apply dealcoholisation processes to high-value appellation wines.
Respondents also highlight the obligation to maintain physically separate facilities for dealcoholisation and traditional vinification as a cost-increasing factor. Several firms report that this requirement contributes to the decision to outsource processing to external providers.
Additional constraints mentioned include limitations on post-dealcoholisation processing activities and interpretative uncertainty regarding the regulatory classification of dealcoholised wines.

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Producers express the need for greater regulatory alignment across EU Member States to ensure comparable competitive conditions.

*4.4 Strategic Positioning, Sustainability, and Structural Challenges*

Communication is described by all firms as a critical factor for market development. Respondents indicate that dealcoholised wines require differentiated messaging compared to traditional wine products. Digital channels, including social media and e-commerce platforms, are identified as particularly important for reaching younger consumers. The HoReCa channel is considered strategically relevant, especially in premium restaurants and alcohol-free mixology contexts. However, interviewees report limited penetration in large-scale retail distribution: rated priority 4-5/5, distinct from traditional wine; key channels: Vinitaly fairs, digital/e-commerce, HoReCa mixology; storytelling/visuals justify premium pricing amid cultural resistance (top barrier).

Sustainability is consistently rated as highly relevant. Firms report that dealcoholisation processes require additional energy and water inputs compared to traditional vinification. When outsourcing is involved, transport-related emissions are identified as an additional concern.

Cultural resistance is described as a significant barrier, particularly among older consumers and within traditionally wine-oriented environments. In contrast, younger cohorts are reported to display greater openness to experimentation.

Respondents describe the segment as being at an early stage of development, with consolidation dependent on sustained investment in communication, consumer education, and credibility-building over time.

Descriptive Likert-scale assessments across cases are summarised in Table 3 to complement the qualitative findings.

Table 3. Likert-Scale Assessments by Analytical Dimension (Mean Scores, 1-5)

| **Analytical Dimension** | **Item Assessed** | **Mean Score (1–5)** | **Interpretative Note** |
|---|---|---|---|
| Technological Constraints and Innovation Pathways | Technological innovation relevance | 5.0 | Core driver of segment development across all cases |
| Technological Constraints and Innovation Pathways | High investment costs | 4.0 | Capital intensity limits internal adoption, especially for SMEs |

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|---|---|---|---|
| Technological Constraints and Innovation Pathways | Sensory quality limitations | 3.0 | Secondary concern compared to structural and regulatory constraints |
| Market Drivers and Competitive Positioning | Market opportunities | 4.0 | Recognised growth potential, though market consolidation remains limited |
| Market Drivers and Competitive Positioning | Distribution channel importance | 4.0 | Strategic relevance of HoReCa and digital channels; limited retail penetration |
| Market Drivers and Competitive Positioning | Cultural resistance | 4.5 | Significant barrier linked to traditional consumption norms |
| Regulatory Misalignment and Institutional Barriers | Regulatory framework importance | 5.0 | Decisive factor shaping strategic feasibility and competitive positioning |
| Regulatory Misalignment and Institutional Barriers | Regulatory constraints relevance | 4.5 | High impact on operational flexibility and product scope (PDO/PGI limits) |
| Regulatory Misalignment and Institutional Barriers | Regulatory restrictions (PDO/PGI, facility separation) | 4.5 | Structural constraint affecting high-value product positioning |
| Strategic Positioning, Sustainability, and Structural Challenges | Environmental impacts and sustainability importance | 4.0 | Strategically relevant but associated with energy and water trade-offs |
| Strategic Positioning, Sustainability, and Structural Challenges | Sustainability-related barriers | 4.5 | Environmental costs perceived as significant for long-term viability |
| Strategic Positioning, Sustainability, and Structural Challenges | Communication importance | 4.0 | Essential for legitimacy-building and generational market expansion |

Source: Author's elaboration

A structured summary of the main firm-level findings is provided in Table 4.

**Table 4. Key Firm-Level Findings on Dealcoholised Wines in Italy**

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| Dimension | Core Findings from Interviews | Implications |
|---|---|---|
| Technology | High innovation relevance; membrane-based techniques widely adopted; outsourcing due to capital intensity | Scale barriers limit internalisation; need for cost-efficient domestic solutions |
| Market | Strategic diversification; premium positioning; limited but growing demand; foreign price competition | Differentiation critical in early-stage segment |
| Regulation | 2024 decree increased clarity; PDO/PGI prohibition and facility separation seen as key constraints | Regulatory design shapes competitiveness and innovation incentives |
| Sustainability | High priority; higher energy and water use; outsourcing increases transport emissions | Technological improvements needed to align environmental and economic performance |
| Culture | Younger cohorts receptive; resistance among traditional consumers | Legitimacy-building and gradual market consolidation required |

Source: Author’s elaboration

## 5 Discussion

### *5.1 Technological feasibility versus economic scalability*

The findings suggest that the development of dealcoholised wines in Italy reflects a structurally conditioned innovation process, in which technological feasibility, institutional design, and cost constraints jointly shape firms’ strategic responses. Interview evidence indicates that the availability of technically reliable membrane-based systems has reached a level of technical maturity that allows wineries to produce commercially viable products while preserving key sensory characteristics. This result is broadly consistent with previous studies highlighting the progress achieved in dealcoholisation technologies and their ability to maintain acceptable quality standards [10,11,19]. However, technological feasibility does not automatically translate into widespread diffusion. High investment requirements continue to restrict internal adoption, particularly among small and medium-

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sized firms. Similar patterns have been observed in other agri-food sectors, where process innovation is adopted unevenly across firms of different sizes and organisational structures [28,29]. In the cases examined here, wineries tend to rely on outsourcing or collaborative arrangements with specialised providers, often located outside Italy, in order to overcome the substantial capital requirements associated with dealcoholisation equipment. This finding suggests that the main challenge facing the Italian dealcoholised wine segment is no longer technological viability, but rather economic scalability. While the available technologies allow firms to enter the market, the associated investment costs create significant barriers to wider diffusion. As a result, innovation adoption tends to occur through hybrid organisational solutions, combining internal strategic control with external processing services, a configuration that is consistent with the governance arrangements often observed in emerging agri-food innovations [30]. The results also highlight an important sustainability dimension. Although dealcoholised wines are frequently associated with responsible consumption, their production currently requires higher energy and water inputs than traditional vinification. Similar tensions between health-oriented innovation and environmental performance have been identified in broader agri-food transitions [31,32]. Technological progress will therefore be crucial if environmental objectives are to align with product innovation.

Overall, the evidence suggests that technological innovation is a necessary but not sufficient condition for the development of the dealcoholised wine segment. The future expansion of the market will depend less on the technical feasibility of dealcoholisation itself and more on the ability of firms to access economically viable, scalable, and environmentally sustainable production solutions.

### *5.2 Regulation as a determinant of innovation trajectories*

The findings indicate that regulatory design plays a central role in shaping the development of the dealcoholised wine segment in Italy. While technological feasibility and market opportunities are important drivers of innovation, firms consistently identified the regulatory framework as one of the most influential factors affecting strategic decisions, investment choices, and competitive positioning. Interviewees recognised that the 2024 Italian decree has reduced legal uncertainty by formally recognising dealcoholised wines within the national regulatory framework. Regulatory clarification is perceived as an important precondition for investment and market development, providing firms with greater certainty regarding production processes, labelling requirements, and commercialisation opportunities. This finding is consistent with the broader innovation literature, which emphasises the role of institutions in reducing uncertainty and facilitating innovation-related investments [33].

At the same time, respondents highlighted several regulatory provisions that may constrain the development of the sector. In particular, the prohibition of dealcoholisation for PDO and PGI wines emerged as the most significant limitation. All interviewed firms indicated that this restriction reduces their ability to extend dealcoholisation strategies to products associated with the highest levels of quality differentiation and value creation. Given the historical importance of geographical indications in supporting reputation, product differentiation, and territorial value creation within the wine sector [34,35], these restrictions may limit the strategic use of dealcoholisation within premium market segments.

A second critical issue concerns the obligation to maintain physically separate facilities for dealcoholised and conventional wine production. Respondents described this requirement as a source of additional costs and operational complexity, often contributing to the outsourcing of dealcoholisation activities to specialised providers, including facilities located outside Italy.

The findings also highlight the relevance of regulatory heterogeneity across European wine-producing countries. While Italy has adopted a relatively restrictive approach, other major producers such as Germany and France have implemented more flexible frameworks. In this context, differences in regulatory design can shape the incentives and opportunities available to firms, and consequently their ability to compete in this specific market segment.

### *5.3 Dealcoholised wine as a strategic diversification pathway*

The demand-side evidence suggests that dealcoholised wines are increasingly perceived by wineries as a strategic diversification opportunity rather than simply a response to health-oriented consumption trends. While interviewees acknowledged the growing importance of health awareness and changing drinking habits among younger consumers, they also emphasised the potential of dealcoholised products to access new market segments and consumption occasions that are traditionally unavailable to conventional wines. This finding aligns with documented structural changes in wine consumption patterns, particularly among younger generations [8,9]. However, the cases analysed suggest that firms interpret these changes not only as a challenge but also as an opportunity to expand their product portfolios and reach consumers seeking moderation, alternative lifestyles, or alcohol-free options. In this respect, dealcoholised wines appear to complement rather than directly substitute conventional wine products. Several respondents also highlighted the importance of international markets, particularly where cultural, religious, or regulatory factors limit alcohol consumption. This suggests that the development of dealcoholised wines may represent a mechanism through which traditional wine-producing regions can access new demand spaces while maintaining their presence in increasingly competitive global markets. As suggested by Mueller Loose and Del Rey [5], the international wine sector is currently facing structural rather than temporary challenges, increasing the need for strategic adaptation and market diversification.

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At the same time, the interviews reveal that market expansion remains constrained by cultural resistance and consumer perceptions. The persistence of scepticism towards dealcoholised wines highlights the embedded nature of wine in national identity and social practices [34,36]. This finding is also consistent with recent consumer research showing that perceptions of authenticity, taste expectations, and established consumption norms remain among the main barriers to the acceptance of dealcoholised wines and other NoLo beverages [2,12,24]. The generational divide observed across the cases suggests that diffusion is likely to proceed gradually, consistent with innovation adoption dynamics described by Rogers [37].

Overall, the evidence indicates that the future development of the dealcoholised wine segment will depend not only on technological progress and regulatory adaptation, but also on the ability of firms to position these products as legitimate and complementary components of contemporary wine consumption. From this perspective, dealcoholised wines appear less as a niche innovation and more as part of a broader process of strategic adaptation within a changing wine industry.

## 6. Conclusions

This study provides firm-level evidence on the emergence of dealcoholised wines in Italy, showing how technological constraints, regulatory design, and changing consumption pattern jointly shape the development of this emerging segment. Drawing on a qualitative multiple case-study approach, the analysis highlights how wineries perceive and respond to the opportunities and challenges associated with dealcoholised wine production within a rapidly evolving market and institutional environment.

The findings suggest that technological feasibility is no longer the main obstacle to the development of dealcoholised wines. Membrane-based processes have reached a level of maturity that allows firms to produce commercially viable products while preserving acceptable quality standards. However, high investment costs continue to limit widespread adoption, particularly among smaller wineries, making economic scalability a critical challenge for the future expansion of the segment.

The study also highlights the central role of regulatory design. While the recent Italian regulatory framework has reduced the legal uncertains, restrictions concerning facility separation requirements continue to influence firms' strategic choices and investment decisions. More broadly, the evidence suggests that regulation does not merely affect compliance costs but actively shapes innovation trajectories and competitive positioning within the wine sector and between other producers countries.

From a market perspective, dealcoholised wines are perceived less as a niche product and more as a strategic diversification pathway. Firms view the segment as an opportunity to access new consumer groups, new consumption occasions, and international markets characterised by different cultural, regulatory, or lifestyle constraints. At the same time, cultural resistance and concerns regarding authenticity remain important barriers to wider market acceptance.

Beyond the specific case of Italy, the study contributes to the growing literature on dealcoholised wines by shifting attention from consumers and product characteristics to firms' strategic responses, innovation decisions, and regulatory adaptation. In doing so, it provides insights into how traditional wine-producing regions respond to changing consumption patterns and emerging market opportunities associated with the NoLo transition.

The study is limited by its qualitative scope, its focus on a single national context, and the small number of firms analysed. Nevertheless, the selected wineries reflect three different organisational models and are located in major wine-producing areas of Northern, Central, and Southern Italy, providing a heterogeneous representation of the current development paths observed within the Italian dealcoholised wine segment. While the findings cannot be considered statistically representative of the entire sector, they offer analytically generalisable insights into the opportunities and constraints associated with dealcoholised wine production.

Future research could further investigate the economic viability of dealcoholised wine production, consumers' willingness to pay, and substitution dynamics between conventional and dealcoholised wines. Comparative analyses across countries would help clarify how different regulatory frameworks influence innovation strategies and competitive outcomes. Finally, greater attention should be devoted to the environmental performance of dealcoholisation processes and to the long-term strategic implications of NoLo products for traditional wine-producing regions.

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