

# Natural wine as an expression of sustainability: an exploratory analysis of Italy's restaurant industry

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## Abstract

**Purpose** – Although not yet fully defined, natural wine represents a sector that has gained the widespread attention of final consumers and, therefore, also of the restaurant world, because of its promise of sustainability. The objective of this paper is to understand Italian haute cuisine's interest in natural wine, with the aim of analysing what qualifies this product as sustainable.

**Design/methodology/approach** – After introducing a theoretical framework based on the concept of natural wine, a brief paragraph is dedicated to consumer preferences; subsequently, the analysis focusses on a questionnaire given to restaurateurs to determine the impact that natural wine has had in the Italian context. The results try to identify the importance that restaurateurs give to the characteristics of natural wine and their propensity for using such wine in their own businesses.

**Findings** – The analysis, conducted on a sample of medium-high range restaurants, highlights their strong interest in natural wine, as a result of the final consumers' attitude towards wine with characteristics attributable to sustainability. The positive perception by restaurateurs is similar across Italy, both geographically and in terms of the size of the restaurant.

**Originality/value** – The originality of the work is the focus on the world of restaurants. To date, the literature on natural wine remains embryonic and always refers to the final consumer. This research is the first step in a broader study that will involve a greater number of restaurants, extending beyond Italy to all of Europe, with the aim of understanding the real development potential of natural wine.

**Keywords** Wine, Natural products, Restaurants, Food

**Paper type** Research paper

## 1. Introduction

The vitiviniculture sector, like the agri-food sector as a whole, has experienced a substantial evolution in recent decades, dictated by the emergence of new needs expressed by consumers and the will of producers to guarantee increased sustainability and respect for global ecosystems. During this period, conscious consumption has become the prerogative of a large



part of both the Italian and the world population (Vassallo *et al.*, 2016). Starting with the food sector, it is a need that has developed to counteract the established habits of mass consumption; the request for healthy products has led to the emergence of new categories of consumers who are attentive, informed and interested (Scalvedi *et al.*, 2018). Inevitably, this trend has affected the wine market, which has seen the expansion and differentiation of the types of products offered (Barth *et al.*, 2017). Thus, the wine market today includes different categories that are distinguished on the basis of the techniques and production processes used in both the vineyard and the cellar (Pomarici and Vecchio, 2014; Capitello and Sirieix, 2019; Gazzola *et al.*, 2022).

Before explaining our study, it is important to provide a picture of the country from both the production and the consumer perspectives. Italy is one of the top wine producers in the world, with 44.5 mhl, despite the estimated 9% drop in production from 2020 to 2021 (Corriere Vinicolo, 2022). More than half of Italians (55%; 30 million) consume wine; divided by gender, 60% of males and 40% of females in Italy are wine drinkers (Corriere Vinicolo, 2022). Wine is a very differentiated product (by geographical region, gender and more), whose purchase and consumption process traditionally depends on many variables (Lockshin *et al.*, 2006): the region of production, the brand, the price, the typicality and more. In recent years, alongside these attributes, sustainability has also grown in importance.

The meaning of sustainability in agriculture, including in the world of wine, has been developed based on the Brundtland Report and the UN's Food and Agriculture Organisation (FAO). On the basis of the Brundtland Report and the three pillars of sustainable development—economic, social and environmental—the FAO developed a concept of “sustainable agricultural and rural development” in 1989, which they revised in 1997. This concept takes into account the preservation of soil, water, animal and plant resources; economic viability; and social acceptance. In 2004, the International Organization of Vine and Wine (OIV) defined and provided guidelines for sustainable viticulture and sustain that: “global strategy on the scale of the grape production and processing systems, incorporating at the same time the economic sustainability of structures and territories, producing quality products, considering requirements of precision in sustainable viticulture, risks to the environment, products safety and consumer health and valuing of heritage, historical, cultural, ecological and landscape aspects” (Resolution CST 1/2004).

In 2008, rules were issued regarding production, processing and packaging concerning vineyards and wineries in terms of assessment of the environment (Resolution CST 1/2008 by OIV). In 2016, the General Principles of Sustainable Viticulture took into account the aforementioned factors on a bigger scale, including tradition, reputation and landscape valorisation. Moreover, compared to the past, consumers today integrate environmental and social considerations into their life choices and, consequently, their purchases (Schifani *et al.*, 2016; Migliore *et al.*, 2015). They make choices based not only on the ability of a product to satisfy their need but also, and above all, on how a product impacts society from social, environmental and economic points of view.

This growing attention to sustainability on the part of global organisations and final consumers is leading wineries to incorporate sustainable development into their basic strategies and their core business. Driven by the changed consumption and purchasing needs, many companies are dedicating considerable resources to adapting their production to comply with the principles of sustainability (Galati *et al.*, 2017; Giacomarra *et al.*, 2016; Schimmenti *et al.*, 2016; Vecchio, 2013; Bandinelli *et al.*, 2020). Revisiting products, services and managerial processes to make them more sustainable and developing new socially responsible business models are becoming the key dimensions to create value for both companies and end consumers (Santini *et al.*, 2013). In addition, the sustainable strategies of wine companies are driven not only by changes in consumer behaviour but also, in many cases, by motivations related to the individual choices of the entrepreneur, linked to greater

attention regarding the territory, the environment and working conditions (Rinaldi, 2017; Barth *et al.*, 2017). Although the topic of sustainability is not new, the approach to sustainability in the world of wine is quite recent, as evidenced by the scarce but very recent literature on the subject (Pullman *et al.*, 2010). This recent literature has proposed a variety of sustainability assessment methods for the agricultural sector; however, most focus only on the environmental component of sustainability, while very few attend to the economic and social components (Forbes *et al.*, 2020). Interestingly, one recent study identifies a set of indicators aimed at contemplating all aspects of a sustainable approach (Santiago-Brown *et al.*, 2015).

Amongst the different types of wine that can be qualified as sustainable, this work focusses on so-called “natural wine,” which seems to represent one of the expressions of the meaning of sustainability in the sector in question. In fact, recent data (Mancini and Carrega, 2021) indicate that the general trend amongst consumers in 2020 was to drink less but with a greater interest in the quality and sustainability of the product. There was a real boom in organic wine, with 84% market penetration and an increase in popularity in “green” wines (biodynamic, vegan and natural). “Naturalness” is an attribute that is increasing in importance because growing attention towards the negative effects of traditional agricultural practices, both in environmental and health terms, is producing an increased demand for products with natural contents, which consumers perceive as better, healthier and more respectful of the environment (Caracciolo *et al.*, 2019). In this sense, natural wine represents an emblematic case. Although there is no specific and official definition of natural wine, it represents a product for which human intervention in the production process, from the cultivation of the vine to the processes in the cellar, is minimal. In this way, the final product represents the natural expression of a territory and a vine, with none or very few “artificial interventions”. The sustainability of this product lies in the human ability to link production to the natural evolution of the environment and the seasons in a perfect balance between individual labour and nature in which the individual becomes a sort of guardian of the territory. Thus, this product represents the result of a philosophy of life and of production that respects nature, work and the link with the territory.

In light of these considerations, this research examines the distinctive features of natural wine and then presents a theoretical framework based on of several companies in the haute cuisine sector with the aim of identifying the level of this product’s sustainability and its potential impact on purchasing and consumption choices in the future. Subsequently, the paper focusses on consumers’ preferences in their choice of natural wine. Subsequently, the analysis moves to the side of the restaurateur, where, after a brief theoretical introduction, we analyse, from a quantitative point of view, the results of a questionnaire aimed at identifying the impact that natural wine has had on the Italian restaurant sector. Differentiated according to geography and the size of the restaurant, the results try to determine the importance that restaurateurs give to the characteristics of natural wine and their propensity to use such wines in their own businesses.

## 2. Natural wine: lack of regulation and criticism

In addition to being the target of numerous criticisms, so-called natural wine represents one of the greatest enigmas in the wine sector. There is no single and universally recognised definition of natural wine, but what unites the producers of this category is the absence of chemical additives and that they intervene as little as possible in both the vineyard and the cellar. “The term natural wine refers to a certain category of wines which, in addition to adopting organic farming techniques, do not allow any substance added to the must, therefore no acidity corrector, sulfur dioxide or various adjuvants are used” (Facciolla, 2014; Truant *et al.*, 2020). The natural approach is a kind of return to origins, of genuine contact

between nature, producer and consumer (Fabrizzi *et al.*, 2021). Despite the growing attention to natural wine, no specific regulations regarding its production have been developed. Thus, questions of definition and regulation are very controversial, particularly in terms of verifying the information provided to consumers (Gismondi, 2020). This creates significant limits to the development of the sector, both from a legal and economic point of view, as the lack of complete information is an obstacle to market growth and the attraction of new consumers.

Integrity and labelling are crucial in enabling consumers to make informed purchases (Galati *et al.*, 2021; Kolte *et al.*, 2022). Schimmenti *et al.* (2013) created a model to clarify how these characteristics affect consumer decisions regarding which products to buy. The model specifically incorporates variables like geography, gender, age, education and employment status into such selections. An illustrative example of the difficulties faced by natural wine producers is represented by the fact that in the USA and the European Union all wines containing more than 10 mg of sulphites per litre must declare that on their label. Consequently, since natural wine contains 15 mg of sulphites without any additions, the natural producer is obliged to declare the presence of sulphites in the same way as a conventional producer who adds about 300 mg of sulphites per litre (Legeron, 2018). Moreover, the lack of an official definition of natural wine generates confusion in consumers and increases the possibility that conventional wines will be sold as natural since buying natural products is a trend with positive connotations.

The need to associate the word “wine” with an adjective that identifies its qualities has arisen in recent years, in which we have witnessed the proliferation of numerous categories of wine. Only a few decades ago, questions relating to wine did not include production methods or the use of chemicals, as the common practices of most farmers were taken for granted and accepted (Villanueva-Rey *et al.*, 2014). In this regard, the peculiarities of organic wine and biodynamic wine, which share some similarities with natural wine, are relevant (Legeron, 2018).

Organic wine, which requires a certification in the European market, follows a sustainable approach to the environment. The European Union extended the organic certification from grapes to wine in 2012. European legislation requires that the phrase “organic wine” and the organic wine logo label are reserved for wines made from organic grapes without any oenological practice and without exceeding the established sulphur dioxide limits. An organic winegrower must comply with these specific limitations both in the vineyard phase and the cellar.

There is no regulatory reference for biodynamic wines as there is for organic wines, but there are associations and bodies that have formulated and published specific expectations. Amongst them, the most important and well-known is the Demeter International Association, a private global association of biodynamic producers, that identifies, with a brand, products obtained in compliance with the dictates established by the principles of biodynamic agriculture. While starting from the organic criteria, biodynamic certifications have stricter limits in terms of ingredients and prohibited materials and practices, especially in the processing phase in the cellar.

The term “natural” does not have a univocal interpretation; very often, this adjective is associated with a healthy image, especially in the agri-food sector, although this is not always true. Many winemakers agree that it would be appropriate to simply define “natural wine” as “wine” since, according to the definition of any dictionary, it is fermented grape juice, without any type of additive. Consequently, the real problem is with wine defined as “traditional”, since it differs from the simple definition of wine recognised in the literature. Nevertheless, there have been many attempts aimed at seeking a univocal definition and implementing a process to develop a definition and a certification at the European level. These have led to the

development of associations and consortia of natural wines that aim to define rules to guide and unite the winemakers in their work.

In Italy, the Charter of Intent of Italian Natural wine was presented in Piacenza on 22 February 2016 with the aim of expressing what unites natural winemakers. The Charter of Intent specifies that producers do not use a unique method for making the product precisely because the diversity between the various winemaking methods is to be considered a wealth. The elements that the winemakers have in common are the manual harvesting of the grapes, the limited amount of total sulphur in the bottling phase and the absence of any adjuvant, additive or invasive treatment to modify the wine (Pulliero, 2016). Amongst the main associations in Italy, VinNatur was founded in 2006 with the objective and statutory purpose to promote activities aimed at the cultivation of vines and the production of quality wines according to natural methods linked to the territory and without any technological interference. To date, the association represents over 170 producers from Italy, Austria, Germany, Spain, France, Portugal, the Czech Republic and Slovenia. VinNatur aims to assume the role of guarantor of clarity and transparency for those who choose to drink natural wine. For this reason, the VinNatur wine production regulations that had been in force since 2017 were recently amended and approved. The assembly granted members with two or more years of membership the opportunity to put the VinNatur logo on their label.

Also in Italy, the Consorzio ViniVeri's goal is to "obtain a wine in the absence of accelerations and stabilisations, recovering the best balance between human action and the cycles of nature" (Consorzio Vini Veri, 2018). The rules that the group imposes include cultivation of native vines, manual harvest, exclusive use of indigenous yeasts present on the grapes and in the cellar, fermentation without temperature control and exclusion of any clarifying action or filtration that alters the wine. One of the most widespread criticisms that affect the world of natural wine is linked precisely to the 'natural' adjective, which many argue refers to the products that nature offers, such as fruits and plants, which certainly include grapes, but not wine. The work of man, in fact, is essential to obtain this product. A purely natural good is, for example, a fruit that has not undergone any processing or transformation processes; in contrast, wine needs to be worked. As one of the most famous Italian natural winemakers, Frank Cornelissen, testifies (2022) that wines are born from man, they are not born in nature: wine is not nature, it is culture and, that the role of consumer finds a perfect symbiosis with nature, dominating it we will never get what we want. When it is created a vineyard a part of nature is destroyed or changed and it is there that we need to find a balance of beauty and integration. It is a very fine, difficult and also very personal game.

### *2.1 Natural wine and sustainability*

Representing a concrete example of sustainability in the wine sector, natural wine comes from grapes that are grown with respect for traditional processes and minimal human intervention at all stages of production and vinification, from the vineyard to the cellar (Fabbrizzi *et al.*, 2021). The theory that stands as the foundation of the natural wine movement is the prohibition of chemical factors in the production process, both as regards the commonly used techniques and the components that become part of winemaking. Producers of this particular wine currently use the expression "wine of terroir" to emphasise the wine's respect for the natural phases and its approach of completely following tradition. It is a wine that responds to its own territory, without "shortcuts", and is faithful to the philosophy of the producer and the land. Production respects seasonal fluctuations without resorting to the use of traditional enology techniques to artificially modify, correct or improve the wine. For this reason, natural wines are considered authentic, coming from winemakers who protect their territory and its peculiarities.

The main objective of natural winemakers is to use cultivation methods that allow for the creation of a flora capable of fighting any parasites harmful to the balance of biodiversity, minimising human intervention within this mechanism, which works perfectly from when an alliance is created between the various forms of wildlife, including for example insects and plants. Natural viticulture is founded on care for the soil. Both plants and soils are treated only with natural products, and each process, including the harvest, is carried out by hand by farmers. There is a ban on the use of chemical fertilisers and herbicides, as well as synthetic pesticides (González and Parga\_Dans, 2020). Native vines are another foundation of natural viticulture and are seen as a unique and inimitable expression of the territory in which they are born (Sorgente del Vino, 2022). The same principles apply to the cellar: the use of selected yeasts, additives, concentrators, sterilising microfilters and invasive oenological practices, such as modification of the acid picture is prohibited, and only sulphites with very low or no dosage are permitted. These practices require a great deal of experience and knowledge, as winemakers face risks and complications related to the unpredictability of nature. “Natural wine is made in the vineyard: natural wine comes from grapes grown in the vineyard with traditional methods (treatments reduced to a minimum and used only, if necessary, not previously, with sulfur, copper, possibly from the mine and Bordeaux mixture), organic farming, biodynamic agriculture or other natural methods that exclude the use of synthetic chemistry” (Legeron, 2018). Natural wine, therefore, is produced starting from vineyards located in suitable positions, without artificially forcing the production, stimulating the strength and balance of the plants or working for the fertility of the soil. An important contribution to the theory of human “non-intervention” in agriculture was provided by Masanobu Fukuoka (2009), who, by eliminating phases considered essential in rice production, such as ploughing, irrigation and the use of pesticides, achieved results on par with farmers who used conventional methods. These methodologies, such as the elimination of irrigation, were then replicated by natural winemakers.

In addition to these characteristics, which primarily concern environmental protection, sustainability and safeguarding for future generations, some studies also suggest that the chemical-physical characteristics of natural wine, without additional processing to modify it and make it marketable, make it lighter than conventional wine, affecting the body to a lesser extent and with more controlled effects (Ferrero *et al.*, 2019).

### 3. Natural wine restaurant and consumers' preferences

The general interest of consumers in everything that is natural has contributed to natural wine being actively promoted amongst consumers, who have shown a growing interest in it, despite relatively little knowledge regarding the product (Bonn *et al.*, 2016, 2020). Several recent studies have investigated the relationship between consumption choices and natural wine (Fabbrizzi *et al.*, 2021), highlighting the link between natural wine consumption and sensitivity to sustainability and social responsibility issues (Vecchio *et al.*, 2021). In addition, several studies, as explained in the following paragraphs have shown that consumers tend to associate natural wine with organic and biodynamic wine, suggesting that they are confused about the characteristics of the different categories of wines. Thus, it is important to fully understand how consumers perceive wine and according to what criteria they classify it.

Consumers who show greater interest in natural wines generally buy organic food products with a minimum share of chemicals in them, while they pay less attention to colour, alcohol content and evaluations by critics (Pascual *et al.*, 2017). Naturalness and quality are the most important factors in choosing the product. Empirical analyses have shown that the presence of the words “wine from organic grapes” on the label has a positive impact on consumers' purchasing choices. Furthermore, it has been shown that the use of greater quantities of natural components in wine increases the consumer's perception of the

healthiness of the product (Galati *et al.*, 2019). In perceiving the product as healthy, consumers are willing to pay a premium price to be able to purchase a sulphite-free wine. This feature is of significant importance for consumers who experience discomfort after consuming wines with a high quantity of sulphites (Amato *et al.*, 2017).

Recent studies have shown that an important novelty for the natural wine market is the growing interest on the part of the population between the ages of 20 and 40, who show greater sensitivity to the environmental impact in their choices; moreover, as the level of education increases, the premium price attributed to the purchase of natural wine increases compared to the conventional one (Galati *et al.*, 2019). Furthermore, it has been verified that convivial occasions represent the times when consumers are most willing to consume natural wine. The importance attributed to the information contained on the label is positively related to the willingness to pay a higher price (Vecchio *et al.*, 2021). The magnitude of the price that consumers are willing to pay provides details on the value consumers attach to a given quality of that good (Hamzaoui-Essoussi and Zahaf, 2012); in the last decade, consumers' willingness to pay for natural products has grown in European countries, thus favouring greater flexibility in terms of the price of natural wine.

Finally, it should be noted that the European Commission's proposal to include some nutritional information on the labels of wine and other alcoholic beverages may affect consumers' perception of a certain product. Consumers' distorted perceptions could be linked to their lack of knowledge regarding the nutritional aspects of wine (Annunziata *et al.*, 2016; Alonso-González *et al.*, 2022). Another aspect is related to avoid bias and to provide more information to the consumer, as argued by Bandinelli *et al.* (2017) this aspect is based on the use of NFC technology as anticounterfeiting tool. González *et al.* (2022) suggest that there are three possible scenarios concerning this aspect:

- (1) To involve the abandonment of the vin méthode nature certification after the three-year watch period as established by the French INAO.
- (2) To maintain the certification without official recognition.
- (3) To require the EU-wide establishment of compulsory ingredient labelling for wines.

Production methods are linked to perceptions of pollution, which is associated with pesticides and chemicals, in particular those that endanger biodiversity. Empirical analysis (Pullman *et al.*, 2010) has shown a growing preference for wines produced using sustainable practices both in the vineyard and in the winemaking process, and this can be explained by a strong desire to protect the environment and an interest in involving the environment and the territory in the production of wine.

In the restauration sector, the spread of natural wine represents an important lever to differentiate the offer. However, it should be emphasised that the offer of natural wine can involve some critical issues for the restaurant business (Rinaldi, 2017). Unlike organic wines, there is no specific regulatory reference, but there are, for example, private certification bodies, which establish limitations and boundaries that a producer must respect in order to be able to enjoy the brand.

Natural wines deserve special attention, for which there is not globally accepted and shared definition; this category lends itself to a multiplicity of interpretations, which then translate into wines that are different from each other, unique and that are able to describe a territory. The main problem faced by restaurateurs is the prices charged by producers, who increase the price in consideration of the authenticity of the product (Congiu, 2011; Soregaroli *et al.*, 2021). In terms of the characteristics of the product, restaurateurs must also consider natural wines' duration in the cellar, as it must be different from those produced conventionally. Furthermore, the restaurateurs who choose to offer this type of wine are indirectly responsible for the diffusion of

the culture linked to it, so it is necessary to dedicate space to understanding the production chain, starting from the winemaker and including everything up to the techniques he uses. In fact, only through the real story that accompanies the product is it possible to intrigue the consumer to the point of loyalty to this new trend; communicating with the customer becomes fundamental, and for this it is necessary to have qualified and informed personnel (Barat, 2015). In this context, the role of digitalisation will be more and more fundamental in the future (Khandelwal *et al.*, 2022). When customers order a traditional wine, they expect to recognise similar characteristics in the natural product that corresponds to it; therefore, any defects typical of natural wine need to be explained by a sommelier.

The existing scientific literature is quite fragmented and primarily dedicated to the analysis of the final consumer preferences, with scant references to the food-restaurant market. For this reason, this paper seeks to understand the spread of natural wine and the relevance of its different characteristics on the restaurant supply side. Before dwelling on the variables and the data collected, it is important to provide information related to the restaurant food service sector. This sector is one of the largest components of the European economy. It had a value over 326 billion euros in 2019 with a growth of 3% in the period 2016–2019. Italy is similar; in fact, in 2019 the restaurant sector generated 78 billion euros, with a growth of 0.7% between 2016 and 2019. Due to the restrictions imposed by the lockdowns in 2020, there was a 38% drop in the value of restaurants for Europe and 36% for Italy. However, 2020–21 registered a growth of 23%, with 6.4 million people employed in the sector at the European level. The growth in Italy was similar, but with 62 billion euros in sales and the employment of only one million people, it remained below the pre-pandemic period. There are numerous types of foodservice activities with different characteristics in this sector. Due to the fact that we are considering different realities (as explained in the descriptive statistics section), we decided to focus on two univocal aspects of this activity:

- (1) Size (number of seats)
- (2) Territorial dimension (the Italian region/macro region of the restaurant/foodservice activity)

These two variables are extensively analysed in literature and are useful to highlight similarities and differences in a comparison of these activities [1].

After identifying the main characteristics of natural wine, including its peculiarities, diffusion and the role it plays in the restaurant sector, we want to understand if the importance of the various factors that determine a wine's "naturalness" are considered in the same way by restaurateurs across the Italian territory (with its regional differences). Moreover, we want to analyse the presence (in percentage) of natural wine within their selection. Secondly, we focus our attention on the number of seats as proxy for the restaurant to understand if it is a relevant variable in the importance granted to natural wine and if it influences the presence (in percentage) of natural wine in their offer to customers.

This brings us to our two structured research questions:

- RQs 1.1.* Are there any differences, at a territorial level, in the evaluation of the characteristics of natural wine?
- RQs 1.2.* Are there any differences, in terms of the size of the restaurant, in the evaluation of the characteristics of natural wine?
- RQs 2.1.* Considering the territorial level, are there any differences in the percentage of natural wine offered by the restaurateurs?
- RQs 2.2.* Considering the size of the restaurant, are there any differences in the percentage of natural wine offered by the restaurateurs?

**4. Methodology**

The data derived from a questionnaire addressed to companies in the analysed sector were analysed through descriptive statistics and inferential statistics techniques. Specifically, we used the Shapiro Test to verify the normality of the data, and, since our data were not normally distributed, we decided to use the Kruskal Wallis test and the Mann-U Whitney test (due to the presence of ordinal values from a continuous distribution) [2].

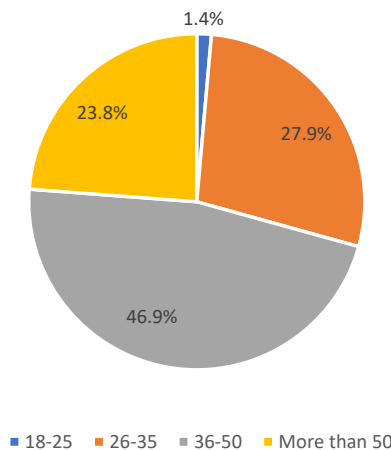
**5. Data and questionnaire**

The first phase of the research began with the formulation of a structured quantitative questionnaire that included 17, mostly multiple-choice questions. The survey was created and subsequently administered online using Qualtrics. The sample of interviewees included owners and employees who operate in the food sector all over Italy. In total, 2,210 questionnaires were sent by email, and the questionnaire was active for 15 days. We collected 445 complete responses; 30 incomplete responses or unfinished questionnaires were not included in the analysis.

The first part of the questionnaire includes two questions to obtain the personal data of the sample. In terms of gender, 18.3% identified as female and 81.7% identified as male. Four primary age groups were identified: a predominance of people belonged to the age category between 36 and 50 (46.9%), followed by the 26–35 category (27.9%) and then over 50 (23.8%). The remaining 1.4% were young restaurateurs between the ages of 18 and 25. The last-mentioned bracket is weak because, despite high youth employment in the sector, few own a business (Figure 1).

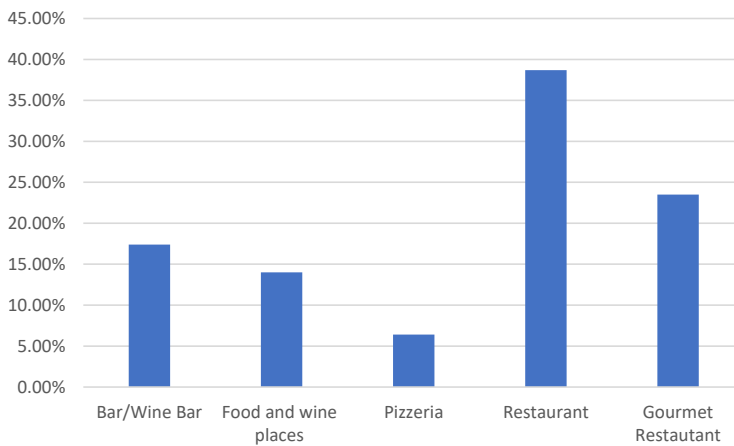
Five questions were asked to acquire information about the venue/kind of restaurant that the sample respondents owned. As shown in Figure 2, restaurants and gourmet restaurants made up 62.2% of the sample, bars/wine bars made up 17.3% and food and wine places are 14%. Finally, pizzerias are the least represented, identified by only 6.4% of the respondents.

The question concerning the opening year of the business activity was aimed at identifying if there was a relationship between the historicity of the place and the presence of natural wines. Almost 50% (49.6%) of the respondents started their business in the last decade, while 24.7% opened in the period between 2000 and 2009. Finally, 25.7% opened



**Figure 1.**  
Sample age

Source(s): Authors work

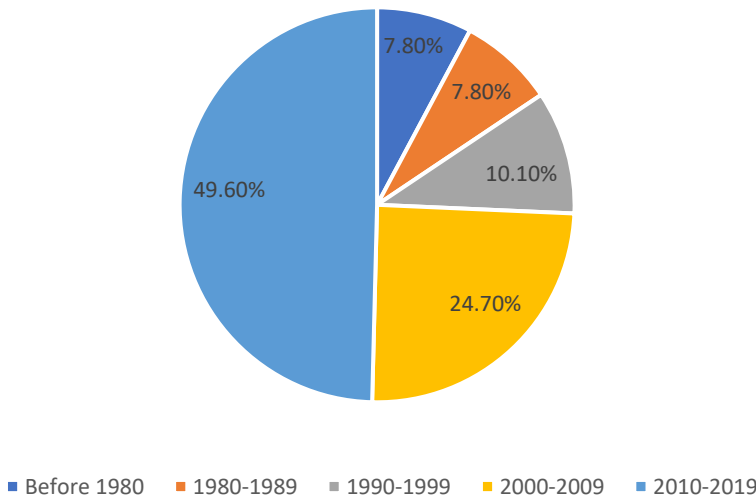


Source(s): Authors work

Figure 2.  
Distribution of food activities

before the 2000s, representing a sector that is constantly evolving to adapt to the needs of the market and to offer a proposal that remains in step with the times. The sample has a relevant percentage of data representing young food activities (Figure 3).

Turning our attention to the geographical location of the restaurant, the greatest number were in Veneto (23.5%), followed by Lombardy (16.5%) and, then, Emilia Romagna (13.3%). According to macro regions (which, in order to have groups of acceptable size to make comparison tests, are the basis of the analysis), 36% were in the Northeast, 26% were in the Northwest, 28% were in Central Italy and 10% were in the South/Insular region. In addition, considering the dimension of the restaurant (based on the number of seats), 41.8%



Source(s): Authors work

Figure 3.  
Opening year per decade

host 26 to 50 customers, 14% host 51 to 75 customers, 28% host up to 25 customers and 16.2% host more than 75 customers.

A further categorisation (on Figure 4) obtained from the questionnaire concerns the average receipt per person in order to ascertain how much, on average, individual consumers spent.

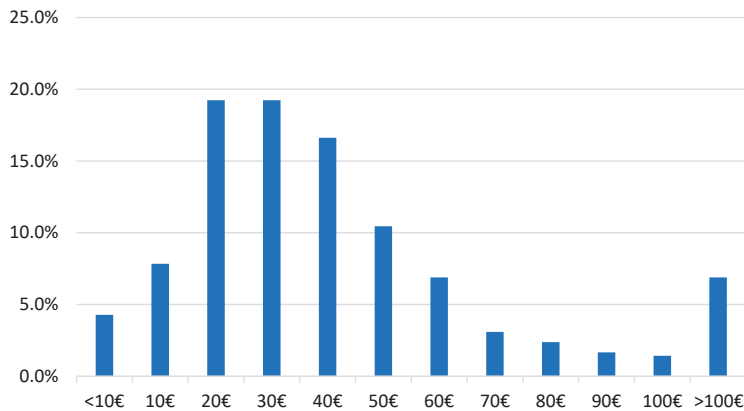
According to responses to this question, 65.5% of the receipts fell between 20 and 50€ per person. Significantly, 6.9% exceeded 100€ per person. Moreover, 78% of the places with receipts over €80 belong to the category of gourmet restaurants.

After questions related to identifying the businesses, the second part of the questionnaire introduced the topic of natural wines. First, we assessed the degree of respondents' knowledge by asking them to attribute a degree of importance (from 1 to 5) to different product characteristics (i.e. native vine; small producer; agriculture without the use of chemicals; no addition of sulphur dioxide; manual processing and recounting; no filtration; organic, biodynamic or vegan certification).

According to the scale (see Figure 5) ranging from unimportant (1) to fundamental (5), 59.38% of the respondents agreed that agriculture without chemicals is fundamental; this is the most relevant characteristic for considering a wine as natural. Harvesting and manual processing was also noted as particularly important, while the presence of a certification was identified as less important. This demonstrates that little consideration is given to recognition brands, while other peculiarities more closely linked to the production process are considered more important. These can be ascertained via direct contact with the producer and visiting the cellar or, if this is not possible, relying on the knowledge of the sellers. As can be seen from graph 5, 38.8% of the population consider small producers and the non-addition of sulphur dioxide and non-filtration most important.

Restaurants' wine lists often offer a wide and varied range of products, of which natural wines represent just one type. For this reason, another question was based on the percentage of natural wines on their wine list. There are two opposite and extreme trends, as shown in Figure 6: 37.3% of the restaurants offer less than 25% natural wines on their wine lists, while 25.9% offer a wide selection, ranging from 76% to 100%.

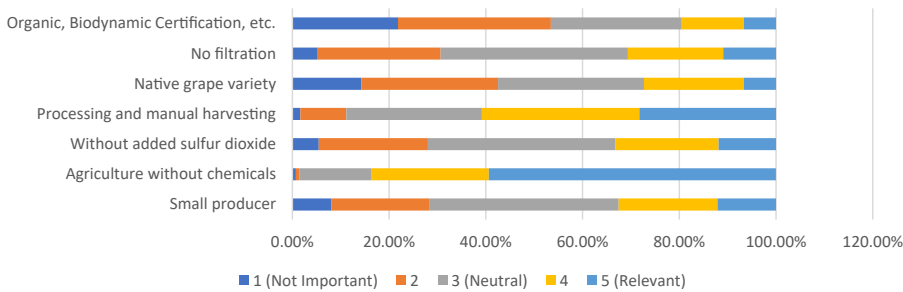
The next question addressed the year that natural wines were included in the restaurant/food activity's wine list. Although most of the respondents started their business in the last two decades (74.3%) and, therefore, included natural wines almost immediately, there has



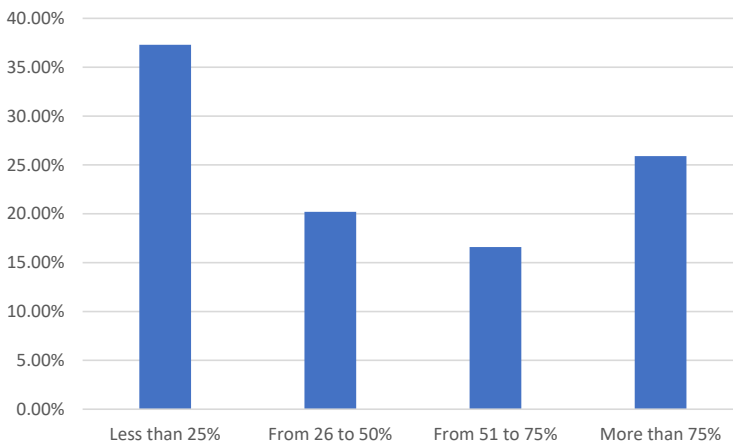
Source(s): Authors work

Figure 4.  
Average receipt

**Figure 5.**  
Natural wine: relevance  
of the features



**Source(s):** Authors work



**Source(s):** Authors work

**Figure 6.**  
Percentage of natural  
wines in the food  
activities wine list

been a surge in the presence of natural wines since 2000. These data underline how the historical restaurant in this sample have a generally good propensity and ability to react to the novelties of the wine sector.

Finally, the reasons that led to the inclusion of natural wines in restaurants were investigated. Based on the proposed options, reasons linked to personal tastes (42.3%) clearly predominate. Ethical-moral concerns that correlate to sustainability and respect for the ecosystem came in second (22.92%), and diversification of the product range (21.61%) was third.

Before carrying out the analysis, it is important to specify that 5.4% of the sample did not offer natural wines on the menu. Although this is not a very representative amount of the sample, their answers to the question aimed at choice are noteworthy. The most important results, derived from the alternatives (max. two per respondent), are as follows:

- (1) 29.2% do not know this wine.
- (2) 33.3% do not like this wine.
- (3) 33.3% prefer to rely on well-known conventional wines.
- (4) 25.1% consider this product to be a fad.

Nonetheless, 45.8% of these respondents declared their inclination to include natural wines in the future, mainly to offer a more diversified range of products to the final customer.

## 6. Results

Subsequent to employing descriptive statistics, hypothesis testing was used to answer the two structured research questions. Whether the geographical dimension and the number of seats (used as a dimensional proxy for the involved business) are distinctive elements for determining the important characteristics of natural wine will be analysed, as will the respondents' (business owners) different perceptions of these characteristics and if they influence the presence (as a percentage of the total) of natural wine in their restaurants/food activities.

In [Table 1](#), the Mann U-Whitney test is used to identify if the geographical dimension is a relevant element for determining the characteristics of natural wine. As previously detailed, macro regions (Northwest, Northeast, Central and South/Insular) are used due to sample numerosity. Using the 20 Italian regions, resulted in the sample numerosity being too small in some cases to perform a significant Mann U-Whitney test.

The results clearly indicate that there are no strong relevance differences for the importance of natural wine characteristics based on geography. However, it is important to point out that four out of seven tested elements are statistically significant results in the confrontation between north-east and central Italy. Meanwhile, considering the seven variables, "Agriculture without chemicals" and "No Filtration" are relevant in two cases on six and in both cases the Northeast region is present.

In [Table 2](#), the Mann U-Whitney test is used to identify if the number of seats in the restaurant (without differentiating by kind of activity) is a relevant element for determining the important characteristics of natural wine.

Considering the results, it seems that the variable "Without added sulfur dioxide" is more important to business owners of the largest size (more than 75 seats) restaurants. Nevertheless, we cannot affirm that there are significant differences regarding business owners' perceptions of the importance of the characteristics of natural wine based on the size of the restaurant.

For these reasons, we cannot accept [RQ 1.1](#) or [RQ 1.2](#), as there is no evidence that respondents from different regions or different size restaurants perceive of natural wine's characteristics differently. Consequently, it is not possible to affirm that the geographical dimension or the size of the restaurant (as expressed in number of seats) influence the perception of the importance of natural wine's characteristics.

To answer to [RQ 2.1](#) and [RQ 2.2](#), we used the Kruskal Wallis Test. The results with *p*-value are in the following tables ([Table 3](#) for the territorial dimension; [Table 4](#) for the size dimension).

It is possible to note some statistical significances in the results. In fact, considering the geographical/territorial dimension, we find that, considering all the groups (the four macro regions) at the same time, there is a statistically significant value. This means that there is a difference in the percentage of natural wines present in the restaurants of the four macro regions. For this purpose, we have already performed the Kruskal test in pairs for each macro-region, comparing them individually. It can be observed that there are two significant pairs (respectively, central vs. northeast and northwest vs. south/insular) that influence the final result. There is an even more important result when observing the size of the restaurant. In fact, the overall test is statistically significant, and, carrying out the Kruskal tests in pairs, it is possible to note that the small size (less than 25 seats) is always statistically significant when compared with the others. Consequently, it is possible to state that there is an important difference in the percentage of natural wines offered in small restaurants compared to the other categories.

Variable	Central vs. northwest	Central vs. northeast	Central vs. south/insular	Northwest vs. south/insular	Northwest vs. northeast	South/Insular vs. northeast
Small producer	W = 7624.5, <i>p</i> -value = 0.1827	W = 10,390, <i>p</i> -value = 0.2215	W = 2934.5, <i>p</i> -value = 0.2599	W = 2644.5, <i>p</i> -value = 0.7118	W = 9253.5, <i>p</i> -value = 0.9667	W = 3365.5, <i>p</i> -value = 0.6462
Agriculture without chemicals	W = 6,896, <i>p</i> -value = 0.8874	W = 10,598, <i>p</i> -value = 0.0953	W = 2900.5, <i>p</i> -value = 0.2681	W = 2814.5, <i>p</i> -value = 0.2459	W = 10,300, <i>p</i> -value = 0.07986	W = 3,497, <i>p</i> -value = 0.9431
Without added sulphur dioxide	W = 7360.5, <i>p</i> -value = 0.427	W = 10,967, <i>p</i> -value = 0.03312	W = 3,055, <i>p</i> -value = 0.1076	W = 2,779, <i>p</i> -value = 0.3703	W = 10,009, <i>p</i> -value = 0.246	W = 3,449, <i>p</i> -value = 0.8314
Processing and manual harvesting	W = 6,155, <i>p</i> -value = 0.1103	W = 8,949, <i>p</i> -value = 0.3111	W = 2635.5, <i>p</i> -value = 0.9876	W = 2800.5, <i>p</i> -value = 0.3242	W = 9,750, <i>p</i> -value = 0.455	W = 3,316, <i>p</i> -value = 0.5409
Native grape variety	W = 8,028, <i>p</i> -value = 0.03524	W = 10,346, <i>p</i> -value = 0.2497	W = 2561.5, <i>p</i> -value = 0.7647	W = 2,138, <i>p</i> -value = 0.1038	W = 8,596, <i>p</i> -value = 0.2809	W = 3851.5, <i>p</i> -value = 0.3255
No filtration	W = 7,358, <i>p</i> -value = 0.4298	W = 11,350, <i>p</i> -value = 0.006179	W = 2,968, <i>p</i> -value = 0.2044	W = 2708.5, <i>p</i> -value = 0.5359	W = 10,330, <i>p</i> -value = 0.09367	W = 3,660, <i>p</i> -value = 0.6728
Organic, Biodynamic Certification, etc.	W = 6,767, <i>p</i> -value = 0.705	W = 8,404, <i>p</i> -value = 0.06598	W = 2,637, <i>p</i> -value = 0.9924	W = 2,620, <i>p</i> -value = 0.7892	W = 8,297, <i>p</i> -value = 0.1204	W = 3,001, <i>p</i> -value = 0.1202

**Source(s):** Authors work

**Table 1.**  
Test per  
geographic area

**Table 2.**  
Test restaurant size

Variable	Less than 25 vs. from 51 to 75	Less than 25 vs. from 26 to 50	Less than 25 vs. more than 75	From 51 to 75 vs. more than 75	From 51 to 75 vs. from 26 to 50	From 26 to 50 vs. more than 75
Small producer	W = 3,594, <i>p</i> -value = 0.5696	W = 11,116, <i>p</i> -value = 0.8187	W = 4,606, <i>p</i> -value = 0.8309	W = 2394.5, <i>p</i> -value = 0.4327	W = 5,759, <i>p</i> -value = 0.6477	W = 6,399, <i>p</i> -value = 0.6326
Agriculture without chemicals	W = 3933.5, <i>p</i> -value = 0.6087	W = 11,984, <i>p</i> -value = 0.2961	W = 4763.5, <i>p</i> -value = 0.4803	W = 2251.5, <i>p</i> -value = 0.9019	W = 5671.5, <i>p</i> -value = 0.7774	W = 6717.5, <i>p</i> -value = 0.8766
Without added sulphur dioxide	W = 3894.5, <i>p</i> -value = 0.7341	W = 10,642, <i>p</i> -value = 0.3782	W = 3,723, <i>p</i> -value = 0.03074	W = 1740, <i>p</i> -value = 0.02324	W = 5,040, <i>p</i> -value = 0.2607	W = 7523.5, <i>p</i> -value = 0.08319
Processing and manual harvesting	W = 4,055, <i>p</i> -value = 0.4082	W = 11,608, <i>p</i> -value = 0.6579	W = 4,996, <i>p</i> -value = 0.2071	W = 2,315, <i>p</i> -value = 0.6813	W = 5,293, <i>p</i> -value = 0.5713	W = 6,073, <i>p</i> -value = 0.2639
Native grape variety	W = 3882.5, <i>p</i> -value = 0.7626	W = 10,733, <i>p</i> -value = 0.4544	W = 4278.5, <i>p</i> -value = 0.5085	W = 2043, <i>p</i> -value = 0.399	W = 5131.5, <i>p</i> -value = 0.3627	W = 6,696, <i>p</i> -value = 0.9189
No filtration	W = 4579.5, <i>p</i> -value = 0.01593	W = 11,966, <i>p</i> -value = 0.3501	W = 4,586, <i>p</i> -value = 0.8718	W = 1696.5, <i>p</i> -value = 0.01284	W = 4608.5, <i>p</i> -value = 0.03863	W = 7015.5, <i>p</i> -value = 0.462
Organic, Biodynamic Certification etc.	W = 3723.5, <i>p</i> -value = 0.8608	W = 10,784, <i>p</i> -value = 0.4969	W = 3862.5, <i>p</i> -value = 0.07661	W = 1938.5, <i>p</i> -value = 0.1853	W = 5,398, <i>p</i> -value = 0.7401	W = 7,326, <i>p</i> -value = 0.1854
<b>Source(s):</b> Authors work						

## 7. Discussion and conclusions

The restaurant industry is closely connected to the wine sector. Indeed, to have a satisfied final customer, a restaurant must approach this universe in the right way. This is a rule that applies to all venues and not just to gourmet or trendy restaurants. Excellent service, which attracts customers and makes them feel at home, includes an intelligent and smart wine choice. Due to the gradual change in consumer preferences, who are increasingly informed and behave accordingly, sustainable practices, from the producers' supply chain up to the act of purchase, are increasingly popular. However, although European law regulates organic and biodynamic wine production on the basis of specific systems of certification and control, natural wine (or wine produced using natural methods) has no shared standard for identifying either the type or the use of the term on the label. In this analysis, we tried to identify the relevance of natural wine in the Italian restaurant scene according to two potentially influential features. Compared to other papers (e.g. Galati *et al.*, 2019; González and Parga-Dans, 2020) we focussed on the restaurateurs, trying to determine their propensity for natural wine and the factors that attract their attention.

The administered questionnaire gave us interesting results, with a moderately good response rate. In terms of the distinctive elements of natural wine, we have not obtained statistically significant results for many of the variables. This means that restaurateurs' perception of relevance is similar in Italy, both geographically and in terms of restaurant size. Therefore, it is possible to conclude that the restaurateur has an interest in the product and has a similar perception throughout the Italian territory, and this preliminary finding is also related when we split the sample per restaurant size, albeit with some small differences. More interesting results, with a higher level of statistical significance, are in the section dedicated to the amount of natural wine offered in the involved food activities. In this case, it is possible to note that there are overall differences that involve all the macro-regions, while at the restaurant size level, a clear trend emerges from the tests that involve small companies. For the latter, in fact, there is a difference in the availability of natural wines, in the offer to customers, compared with larger food activities (specifically: for territorial differences General, Central vs. Northeast

Kruskal test	H statistics	P-value
General	11.338	0.01
Central vs. Northwest	0.012	0.91
Central vs. Northeast	7.94	0.005
Central vs. South/Insular	2.26	0.132
Northwest vs. South/Insular	7.27	0.007
Northwest vs. Northeast	2.3	0.13
South/Insular vs. Northeast	0.057	0.81

Source(s): Authors work

**Table 3.**  
Test for territorial  
differences

Kruskal test	H statistics	P-value
General	9.89	0.02
Less than 25 vs. from 51 to 75	4.59	0.03
Less than 25 vs. from 26 to 50	5.36	0.02
Less than 25 vs. more than 75	7.56	0.006
From 51 to 75 vs. more than 75	0.022	0.64
From 51 to 75 vs. from 26 to 50	1.11	0.29
From 26 to 50 vs. more than 75	0.18	0.68

Source(s): Authors work

**Table 4.**  
Test for restaurant size

## 8. Limitations and future developments

Considering the future development of this topic, it will be interesting to compare different European countries with a relevant history in the cultivation of vines and in the production of natural wine. Using the same factors, useful to describe the relevance of natural wine's characteristics, it will be possible to have a complete picture between different region or countries. Moreover, considering the wine lists of different countries, paying attention to the different socio-gastronomic-cultural facets, it will be possible to analyse the incidence of natural wine in the food sector in Europe. It could be very interesting to verify if countries with a wine culture have different priorities and perceptions regarding natural wine in terms of food service and restaurant offers. Focus the attention on the managerial implications, managers in the food and beverage industry can leverage this trend by promoting natural wine as a key feature of their offerings to attract a new demographic of customers. Moreover, they can identify suppliers who are specialised in natural wine from countries where it is more popular to ensure high-quality products. Another aspect can be represented by the staff training on the production process and flavour profile of natural wine can create a more informed customer base. Finally, the development of menus featuring natural wine alongside complementary dishes can increase the perceived value of menu offerings, in fact promoting sustainable practices associated with natural wine can create a positive brand image and attract customers who value sustainability. In terms of this study, it is important to underline the limitations regarding our sample composition and numerosity. The actual sample is unpaired, and this surely affects the final results of the paper. Finally, a regional comparison with the actual data is not possible because the companies of the north Italy had a much higher response rate.

## Notes

1. For more information and explanations related to the territorial dimension, see [Corno et al. \(2022\)](#) and [Franco and Cicatiello \(2019\)](#). For the reality linked to the number of seats/space in restaurants, see [Yildirim and Akalin-Baskaya \(2007\)](#), [Bañón and Bañón \(2020\)](#) and [Pérez et al. \(2021\)](#).
2. For more information on these tests, see [Nahm \(2016\)](#) and [MacFarland and Yates \(2016\)](#).

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