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Natural Wine: An Evaluation using the Price Sensitivity Meter and Contingent Valuation

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Abstract

Natural wines have garnered increasing attention from health-conscious and environmentally aware consumers, thereby carving out a distinct niche within the broader wine market. This study adopts the Contingent Valuation method and the Van Westendorp Price Sensitivity Meter to explore consumer willingness to pay and the acceptable price range for natural wine (hereinafter: NW), verify the convergence of results, and investigate which consumer attributes influence the economic appreciation for this beverage. An online survey was conducted on a sample of 370 Italian wine enthusiasts and experts. The results indicate a reasonable level of consumer awareness of the economic value of the NW, despite their willingness to pay a lower price for this beverage. Age, individuals' income status and product market price have a positive impact on the willingness to pay for NW. Conversely, the effects of the level of education, naturalness attitude, and wine consumption habits are not significant. The results could support the efforts of the wineries to develop adequate pricing strategies for gaining a competitive advantage and expanding their market share.

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Introduction

Understanding consumer behaviour and preferences is crucial for producers and marketers in the wine industry, especially considering the rapidly evolving segments of Natural Wines (hereinafter: NW) and low- or no-alcohol wines (Alonso González & Parga-Dans, 2020). While the definition of NW remains ambiguous among consumers due to the lack of clear and regulated definitions (Parga-Dans *et al.*, 2023; Vecchio *et al.*, 2023), NW has gained increasing attention from health and environmentally conscious consumers, thereby carving out an interesting niche within the broader wine market (Galati *et al.*, 2019).

Studies indicate heterogeneity in consumer perceptions of wine's naturalness (Vecchio *et al.*, 2023). For example, investigating the social representation of wines produced by various methods, Urdapilleta *et al.* (2021) observed that French consumers perceive NWs as healthier and more eco-friendly because they lack chemicals, whereas New Zealand consumers perceive them as lower-quality products. Italian consumers consider NW products to be environmentally friendly, additive-free, and handcrafted (Vecchio *et al.*, 2021). Swiss and Australian consumers perceive wines as "*more natural*" when produced without added sugar, sulfites, or selected yeasts, and with winemaking practices such as mechanical filtration (Staub *et al.*, 2020). Again, organic and biodynamic winegrowing practices are frequently associated with NW (Delmas & Lessem, 2017; Sogari *et al.*, 2016).

Characterised by minimal intervention in the winemaking process and a strong emphasis on ecological sustainability, NW production requires answering two key questions: How do wineries signal their commitment to customers? What is the consumers' willingness to pay (hereinafter: WTP) for the NW? The first question highlights the need to effectively bridge the gap between wineries and consumers by providing reliable information on the natural qualities of wine, such as those promoted by the NW protocol of the Italian association Vinnatur®. Indeed, Ginon *et al.* (2014) noted that most logos are not able to convey a message of environmental sustainability effectively. The second question sheds light on the economic effectiveness of labelling a wine as "*natural*". According to Bazzani *et al.* (2024), consumers value specific winemaking techniques and ecological certifications more than the general NW claim, underscoring the importance of conveying specific natural features rather than a natural label to enhance consumer perception of naturalness and WTP.

Given the growing appeal of natural products (Galati *et al.*, 2019; Migliore *et al.*, 2020), investigating consumers' WTP for NW and identifying the socio-demographic and attitudinal aspects that might influence it is crucial for uncovering new insights into a key trend in the wine market and to identify

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suitable price marketing strategies for wineries. Although less precise than direct incentive-compatible methods such as experimental auctions (Steiner & Hendus, 2012), the Contingent Valuation Method (hereinafter: CVM) and the Van Westendorp Price Sensitivity Meter (hereinafter: VW-PSM) (Van Westendorp, 1976) prove to be reliable yet relatively cheaper and simpler methods to assess the price that respondents are willing to pay for a product. Even if the CVM is questioned for hypothetical responses that overestimate WTP (Lusk & Schroeder, 2004), recent literature suggests that biases are less significant for low-priced private goods (Vecchiato *et al.*, 2021). Furthermore, as noted by Steiner and Hendus (2012), the VW-PSM is considered the most widely used method firms employ to measure WTP when establishing pricing strategies, thereby bridging the gap between academic theorisation and the pragmatism of managerial action.

Pricing a new product or service is one of the most crucial decisions a winery must undertake. This need arises during the development of a new product or the introduction of an existing product in a new geographical area or distribution channel. As such, this study employs CVM and VW-PSM to investigate consumer WTP and prices for NW, thereby verifying the convergence of results and examining which consumer attributes influence economic appreciation. From a theoretical perspective, this research broadens the current understanding of consumers' pricing and economic valuation of NW. From a managerial standpoint, the findings provide actionable insights for producers and retailers. The remainder of this article is organised as follows: the hypotheses at the core of this study are presented, along with a review of scholarly literature on consumer attitudes and preferences for NW. Subsequently, the research data and methods are presented, followed by results, discussion, conclusions, and implications for research and business.

1. Background and research hypotheses

According to Meiselman (1995), launching a new product is undoubtedly a considerable challenge that necessitates understanding in advance whether it aligns with customers' perceived monetary values, beyond sensorial appreciation. Additionally, consumer prices can be examined by considering how specific socio-demographic and attitudinal factors may influence perceptions of a product's value (Costa & Jongen, 2006). Thus, understanding the socio-demographic and attitudinal drivers of consumer WTP in the niche market of NW seems essential for wineries and marketers aiming to segment and target potential buyers effectively. Considering that every food product's success can also be related to specific pricing strategies targeted for consumer segments, these research questions arise: Are WTP's central estimates and

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confidence intervals significantly different between CVM and VW-PSM price thresholds? (RQ1) Are customers' socio-demographic aspects and food naturalness attitude relevant to their WTP for NW? Which of them prevails, if any? In which measure? (RQ2).

Convergence of WTP measurement results

Among the various approaches to investigating consumers' WTP, the CVM is a stated-preference, survey-based method for determining the value of non-market goods and services. This method involves constructing a hypothetical market in which respondents are asked to state their monetary valuation (Bateman, 2002). It is grounded in welfare economic studies to measure the total economic value of non-market goods, including use and non-use values. Despite its versatility and its use for market goods, the CVM has been subject to critical scrutiny, particularly regarding hypothetical bias that tends to overestimate WTP (Lusk & Schroeder, 2004). On the other hand, focusing on the consumer preferences for tinned chianina meat, Vecchiato *et al.* (2021) recently suggested that these biases are less significant for low-priced private goods. The CVM has gained prominence in the food science literature as a valuable tool for determining consumer preferences and the WTP for various beverages. For example, in their study exploring the factors affecting consumers' WTP for ready-to-drink fruit drinks, Vorasayan *et al.* (2018) concluded that the CVM can effectively capture consumer WTP in the food and beverage industry. Staples (2024) employs the CVM to evaluate consumer preferences for cannabis-infused beverages and the WTP for different beverage categories, providing valuable market insights. Again, Ruggeri *et al.* (2022) adopted the CVM to define Italian wine consumers' preferences and WTP for canned wine.

The VW-PSM, on the other hand, is a heuristic pricing tool widely used to assess consumer price perceptions and WTP. The goal is to evaluate the optimal price range for marketing a specific, usually new, product (Paczkowski, 2019). Despite its widespread corporate use, the VW-PSM has also proven particularly useful in research spanning several contexts, such as the measurement of WTP for on-demand software services (Harmon *et al.*, 2007), 4G in India (Khandker & Joshi, 2019), lion protection fees in several African countries (Moorhouse *et al.*, 2023), on-farm processed skimmed yoghurt (Gellynck & Viaene, 2002), microalgae meat substitutes in Germany (Weinrich & Gassler, 2021), German husbandry labels (Kühl *et al.*, 2024), and fish fed with insects (Arru *et al.*, 2022). A few insightful examples also encompass the evaluation of optimal price ranges for alcoholic and non-alcoholic beverages. Kim *et al.* (2012) employed the VW-PSM method to

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estimate the impact of observing the process of squeezing fresh oranges on consumers' WTP for a glass of fresh juice. A two-sample t-test essentially highlighted a non-significant effect on the price of a glass of orange juice. Moving to alcoholic beverages, Szakál *et al.* (2023) employed the VW-PSM method to assess the optimal price, in a Van Westendorp sense, of three wine varieties, namely Irsai Olivér, Rosé and Merlot-Shiraz, under three different labels in Hungary. The analysis allowed to assess which label was the most profitable for each kind of wine. Recently, Calvia *et al.* (2025) used the VW-PSM to determine the WTP for the attribute "*precision viticulture*" of the Italian wine "*Falanghina del Sannio*", thus providing a valuable benchmark for its potential market pricing. Despite the studies mentioned above confirming the suitability of the VW-PSM method for generating compelling results at moderate cost, the findings might be biased, leading to an underestimation of the WTP value. Indeed, although both the CVM and VW-PSM methods for determining WTP are affordable, the lower monetary valuations produced by the VW-PSM method seem to stem from differences in cognitive framing and methodological design. The VW-PSM method, in fact, encourages individuals to evaluate price perception directly, thereby activating "*value-for-money thinking*", which refers to the consumer's overall assessment of a product's utility based on perceptions of what is received and what is given (Zeithaml, 1988). The CVM, on the other hand, encourages respondents to consider both personal utility and social/environmental value, thereby capturing a total economic value and eliciting a higher WTP. Thus, considering the points mentioned above, the following hypothesis was tested:

Hypothesis 1 (H1): The price estimated for a 0.75 L bottle of NW using the Van Westendorp Price Sensitivity Meter is significantly lower than the WTP estimated using the Contingent Valuation Method.

Naturalness attitude

Consistent with the existing literature, information about wine ingredients, such as sulphites, may affect consumers' WTP due to their perception of naturalness. In a study investigating perceptions of sulfites and WTP for non-sulfited wines, Costanigro *et al.* (2014) found that US consumers are willing to pay a premium for non-sulfited wines. In the same vein, D'Amico *et al.* (2016) found that naturalness is an attribute of organic wines positively related to the probability of paying a premium price for wine with no added sulfites. In a study aimed to assess consumers' WTP for wine bearing a sulphite-free label in Italy and Spain, Amato *et al.* (2017) show that consumers who associate the headaches with drinking wines with

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sulphites are also willing to pay a premium price for no-sulphite wine. More recently, Chikumbi *et al.* (2021), in a study investigating perceptions and preferences for several wine attributes among South African consumers, found that they are willing to pay at least three times more to replace sulphur-based preservatives with a natural alternative. Therefore, in this context, the following hypothesis was examined:

Hypothesis 2 (H2): The perception of a product's naturalness positively influences individuals' WTP for NW.

Age

Previous studies have investigated the socio-demographic aspects affecting consumers' wine WTP. Age, among other factors, appears to be a significant driver of attitudes and of individual WTP for wine, including NW. Younger consumers, such as Millennials and Gen Z, tend to exhibit greater openness toward sustainable and unconventional products, including NW (Forbes *et al.*, 2009; Gow *et al.*, 2024; Migliore *et al.*, 2020), probably due to their most pronounced inclination to value authenticity and seek food and beverage products that align with their lifestyles and ideal values. Galati *et al.* (2019), in a study aimed at identifying which consumers are willing to pay for NW, found that the probability of higher WTP for NW increases among young consumers. Thus, the following hypothesis was tested:

Hypothesis 3 (H3): An increase in respondents' age negatively affects WTP for NW.

Gender

Furthermore, the existing literature suggests that there are gender differences in wine consumption behaviour. Studies indicate that women may be more sensitive to health-related attributes and environmental concerns when selecting wines, which could positively influence their interest in NW and their WTP (Sogari *et al.*, 2016; Vecchio, 2013). Conversely, men are often perceived as being more brand- and price-aware, which may influence their WTP for NW. Therefore, the following hypothesis was tested:

Hypothesis 4 (H4): Women have higher WTP for NW than men.

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Education Level

Regarding socio-demographic wine consumption patterns, the existing literature suggests that higher education levels are consistently linked with greater awareness of sustainable food and beverage trends (D'Amico *et al.*, 2016), including NW. Educated consumers are more likely to read labels, understand certifications, and show interest in production processes. They may also be better able to navigate the ambiguity surrounding definitions of "natural," which remains controversial (Mann *et al.*, 2012). Thus, this trait might enhance the likelihood of purchasing NW and increase the WTP for it. The following hypothesis was subsequently tested:

Hypothesis 5 (H5): Educated consumers have higher WTP for NW than less educated consumers.

Income

Consistent with the existing literature, higher income levels are positively correlated with both purchase frequency and WTP for wine, particularly for sustainably produced wines (Mauracher *et al.*, 2019; Modica *et al.*, 2025; Polzin *et al.*, 2023; Pomarici *et al.*, 2016; Valenzuela *et al.*, 2022, among others). In analysing the WTP for a sustainable wine, Sellers-Rubio & Nicolau-Gonzalbez (2016) found that higher income is associated with a higher propensity to pay a premium price. Affluent consumers may also be more engaged in exploratory consumption, perceiving NW as a cultural or experiential product rather than a commodity, and therefore willing to pay a premium price for it. In light of this evidence, the following hypothesis was tested:

Hypothesis 6 (H6): Affluent consumers have higher WTP for NW.

Wine consumption frequency

Extant research provides slightly contradictory findings regarding the effect of consumption habits on the WTP for sustainable wines, including NW. According to recent investigations, the frequency of wine consumption may positively influence consumers' WTP. Migliore *et al.* (2020), for example, examined which consumer habits affect WTP for a premium-priced bottle of NW in Italy. The findings indicated that drinking frequency is positively associated with a higher WTP. While Vecchio *et al.* (2021)

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demonstrate that the frequency of wine consumption affects the consumption of NW, Vecchio *et al.* (2023) added that wine drinking frequency is a relevant driver of the WTP for NW. On the other hand, while Mauracher *et al.* (2019) showed that low wine consumption frequency increases WTP for organic wines, Moscovici *et al.* (2020) discovered that consumers purchasing wine for a special occasion, i.e., not frequently, are more likely to pay higher prices for sustainable wine compared to more regular buyers. Despite these contradictory findings, the following hypothesis was tested:

Hypothesis 7 (H7): Higher wine consumption frequency is associated with higher WTP for NW.

Price

The relevance of the relationship between wine pricing and consumers' WTP for wine has been recognised by scholars in the field. According to Lewis *et al.* (2014), price is a component of customers' perceived utility and is closely related to WTP. In particular, the study, based on a wine-tasting experiment, reveals that consumers' WTP is significantly influenced by the price presented, which potentially acts as a proxy for product quality, especially for consumers with less wine expertise. Similarly, Goldstein *et al.* (2008) pointed out that price is a proxy for the quality of wine that influences the individual's WTP, this result holding in particular for non-expert consumers. In light of this evidence, it was predicted that:

Hypothesis 8 (H8): The proposed price during the contingent valuation experiment positively influences the individuals' WTP for NW.

2. Materials and methods

Participants

This study employed a non-probabilistic sampling design, utilising data collected between December 2023 and February 2024. Three hundred seventy participants were recruited through social media network platforms, specifically thematic groups on Facebook for Italian wine enthusiasts and LinkedIn for Italian wine experts, through snowball sampling. Although snowball sampling does not ensure representativeness, it allows researchers to reach targeted populations (i.e., wine enthusiasts) that would otherwise be difficult to survey, thereby offering valuable exploratory insights into the behavioural determinants under examination. The post provided a brief

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description of the study and included a link to the questionnaire on the Qualtrics® platform.

The target of an even gender distribution was closely achieved, with 52.3% of the respondents being men and 47.3% being women. The respondents' ages ranged from 21 to 75, with a mean of 42.9 and a standard deviation of 12.2. A total of 54.2% (N = 110) of respondents held an academic degree, 78.8% (N = 160) were employed, 7.9% (N = 16) were students, and 5.9% (N = 12) were seeking employment. A total of 7.4% (N = 15) of respondents were retired. 55.2% of respondents live in North-West Italy, 17.5% in North-East Italy, 13.9% in Central Italy, and 12.6% in South Italy or the Italian islands, while 0.8% live abroad. Furthermore, 38.6% of interviewees stated that they have no financial problems at all, and when they feel like buying something, they do so. Despite having enough to get by, 47.1% of respondents rarely allow themselves any luxuries. Meanwhile, 14.3% of individuals pay close attention to their spending and sometimes find their income insufficient for essential purchases.

Questionnaire and Measurement Scales

The questionnaire was divided into five sections. The first part included a preliminary overview of the study's aim and a question regarding consent to participate. If the interviewee agreed to participate, drinking frequency was measured by a single item that asked, "*On the day you drink wine, how many glasses of wine do you typically drink during meals?*", consistent with a similar item that Goldsmith & d'Hauteville's (1998) operationalised as a measure of wine drinking frequency in their study. Responses were recorded on a 5-point scale (1 = Nothing, 2 = one or less than one glass, 3 = two or three glasses, 4 = four or five glasses, 5 = more than five glasses). The survey ended if respondents reported not drinking wine during the meals.

In a second section, attitude for natural food/beverage was assessed using the Preference for Natural Food and the Risk Perception of Addictive subscales adopted in Dickson-Spillmann *et al.*'s (2011) study and two items adapted from the Natural Products subscale proposed by Dantec *et al.* (2025) (Table 1). All items were measured on a 5-point scale (1 = Strongly Disagree and 5 = Strongly Agree), offering the respondents the opportunity to manifest their neutrality and introduce each sentence with the question "*How much do you agree with the following statements concerning the product you eat or drink?*".

In the third section of the questionnaire, respondents' price acceptance and sensitivity were measured using Van Westendorp's Price Sensitivity Meter approach (Van Westendorp, 1976). To identify four price levels, respondents were asked: i. "*At what price would a 0.75 L bottle of natural wine be so expensive that you would not buy it?* (Too expensive); ii. "*At what price*

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would a 0.75 L bottle of natural wine be expensive, but you would still buy it?" (Expensive); iii. "*At what price would a 0.75 L bottle of natural wine be cheap enough to consider it a good bargain?*" (Cheap); iv. "*At what price would a 0.75 L bottle of natural wine be so cheap that you would doubt its quality and therefore decide not to buy it?*" (Too cheap).

Table 1 - Items and factor statistics for the preference for natural food and beverage (n = 203)

Item number	Median	Mean	SD	α-item	*H*-coeff	*Factor loading*
1. I try to buy foods and beverages without artificial ingredients[(a)]	5	3.87	1.06	0.87	0.56	0.76
2. I avoid foods and beverages containing preservatives[(a)]	4	3.51	1.10	0.87	0.57	0.77
3. I avoid foods and beverages containing additives[(a)]	4	3.63	1.06	0.86	0.61	0.81
4. I avoid consuming foods and beverages that have artificial colours[(b)]	4	3.84	1.09	0.87	0.57	0.77
5. I am worried for hormones, pesticides and chemical residues in foods and beverages[(a)]	5	4.29	0.83	0.88	0.54	0.66
6. I avoid foods produced with OGM[(a)]	4	3.76	1.25	0.88	0.49	0.65
7. I do not eat processed foods, because I do not know what they contain[(a)]	4	3.92	1.04	0.87	0.54	0.69
8. I believe consuming natural foods and beverages is healthier than consuming highly processed foods[(b)]	4	4.08	0.98	0.89	0.44	0.61

Notes: [(a)] Adapted from Dickson-Spillmann *et al.* (2011) [(b)] Adapted from Dantec *et al.* (2025).

The fourth section of the questionnaire, which involved the economic valuation of 0.75 L of NW, was conducted using the CVM via Double-Bounded Dichotomous Choice for its efficiency in WTP estimation (Hanemann *et al*., 1991). Furthermore, from a behavioural economics perspective, this format reflects how individuals establish their valuations in real-world contexts, i.e., the initial reactions (first bid) are adjusted after reflection or exposure to a slightly modified reference price (second bid). Two consecutive questions (Q1 and Q2) asked whether respondents would buy a 0.75 L bottle of NW at a given selling price. Based on dichotomous "buy" or "do not buy" responses, this method identified the upper and lower bounds of respondents' willingness-to-pay (WTP). During Q1, respondents were initially presented with a randomly selected price (P_0). The price was chosen randomly from €10.00 to €30.00 in Q1. The price range was based on the

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selling prices in Tannico (Tannico S.r.l., 2024), one of Italy's leading online wine shops specialising in Italian and international wines, champagnes, and spirits. By offering a wide selection of both traditional and NW across various price ranges and regions, Tannico acts as a consistent benchmark for assessing market prices in the Italian wine industry. Additionally, using a single, well-established platform ensured data consistency and comparability. Depending on the yes/no response to Q1, a 50% price increase (P_h) or a 50% discount (P_l) was considered in Q2. Thus, from the combination of responses to Q1 and Q2, four paired outcomes were possible: (1) no-no; (2) no-yes; (3) yes-no; (4) yes-yes. Thus, the respondents' WTP for a 0.75 L bottle of NW will fit into one of four intervals: (-∞; P_l), (P_l, P_0), (P_0, P_h) and (P_h, +∞), and the discrete outcomes of the bidding process (D) are defined as follows:

$$D = \begin{cases} 1 & WTP \leq P_l \quad (No - No\ responses) \\ 2 & P_l \leq WTP \leq P_0 \quad (No - Yes\ responses) \\ 3 & P_0 \leq WTP \leq P_h \quad (Yes - No\ responses) \\ 4 & P_h \leq WTP \quad (Yes - Yes\ responses) \end{cases} \tag{1}$$

Thus, the survey data were classified as left-censored for "no-no" responses, right-censored for "yes-yes" responses, and interval-censored for "no-yes" and "yes-no" responses given by each respondent.

The questionnaire concluded with a section collecting participants' socio-demographic characteristics, including sex, level of education, age, and income status. Current income status-related data was obtained through a checklist, which had three options among which respondents were able to choose only one of the following statements: "*I am very careful about what I spend; sometimes my income is not enough for necessary purchases*", "*I have enough to get by; I rarely allow myself any luxuries*", and "*I have no financial problems; when I feel like buying something I do so*".

Empirical model and data analysis

In this study, it is assumed that each respondent *i* had a WTP for a 0.75 L bottle of NW (WTP_i^*), that is to say, the latent variable in equation (2) below:

$$WTP_i^* = \beta X_i + \varepsilon_i \tag{2}$$

where β is a vector of coefficients, X_i is a vector of the WTP determinants (i.e., attitudes towards natural products, age, gender, income status and wine drinking frequency) and the error term ε_i is assumed to have a mean of zero and be normally distributed. Thus, WTP_i^* is unobserved. Still, it remains

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within the range of the lower bound (L_i) to the upper bound (U_i), consistent with the right-censored and interval-censored data collected. If a respondent has a "yes-no" response, the probability of the true $WTP \subset [P_0, P_h]$ could be represented by equation 3:

$$Pr(P_0 \leq WTP \leq P_h) \tag{3}$$

whereas if the respondent has a "yes-yes" response, the probability of the true $WTP \subset [P_h, \infty]$ is:

$$Pr(P_h \leq WTP) \tag{4}$$

The same rule could be applied to the two WTP values in interval data referred to as "no-yes" and "no-no" responses. Since the dependent variable WTP is in the interval and involves (right/left) censored data, the information collected through the double-bounded contingent valuation online survey was analysed employing an interval regression model (Cawley, 2008) in STATA 18 (StataCorp LLC, 2024) via the interval regression command "*intreg*". This helped estimate the factors influencing the WTP of Italian respondents for a 0.75 L bottle of NW. The initial bidding price (P_0) value was included into the empirical model to detect the bias of the anchoring effect, while the categories "*I am very careful about what I spend; sometimes my income is not enough for necessary purchases*" and "*1 = Nothing*", were respectively adopted as a reference for the variables "*Income status*" and "*Wine consumption frequency*". Data cleaning was previously performed to delete the answers that included missing values.

To assess the interviewees' attitudes towards the natural food/beverage construct, the items' properties were evaluated using the "*validscale*" command in STATA 18 (Perrot *et al.*, 2018). Internal consistency and scalability were evaluated using Cronbach's α and Loevinger's *H* coefficients; the acceptable thresholds were 0.70 for Cronbach's α and 0.30 for Loevinger's *H*. Specifically, Cronbach's α assesses how well items measure the same underlying construct, while Loevinger's H coefficient shows the strength of the hierarchical structure of the items.

Construct validity was tested using confirmatory factor analysis (CFA) and goodness-of-fit indices. The adequacy of the statistical model was assessed using RMSEA and CFI indices. An RMSEA < 0.10 and a CFI > 0.90 are generally considered to indicate a good model fit (Hu & Bentler, 1999). The z-scores resulting from the factor analysis of the items were used in the interval regression analysis, along with the initial bidding price (P_0), to test for anchoring. To illustrate the relative importance of the WTP determinants, the Shorrocks-Shapley decomposition of the *R*-squared obtained after conducting

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ordinary least squares regression using a WTP midpoint value was applied (Shorrocks, 2013). This approach allows us to assign a proportion of variance explained to each explanatory variable, providing a more precise measure of their relative importance than simple regression coefficients. The predicted latent WTP from the interval regression was used to plot the distribution of latent WTP for 0.75 L of NW across the sample and to compare convergence with the VW-PSM price-sensitivity model results visually.

The Van Westendorp Price Sensitivity Meter was used to identify significant price points of interest. The proportions of each response to the four pricing inquiries were plotted: Too Cheap, Cheap, Expensive, and Too Expensive. The intersection of the plotted lines labelled "*Expensive*" and "*Too Cheap*" is defined as the Point of Marginal Cheapness (PMC). Conversely, the Point of Marginal Expensiveness (PME) is defined as the intersection of lines labelled "*Cheap*" and "*Too Expensive*". These two points define the Pricing Options Range (POR), that is, the best range of prices from which the seller should choose the actual price. Indeed, for prices outside this range, customers generally seek a replacement product or service. The Optimal Price Point (OPP), i.e., the crossing of the "*Too Cheap*" and "*Too Expensive*" lines, can be interpreted as the point where purchase resistance is at its lowest, in that it reflects the lowest percentage of consumers that would not buy a certain product because they find it too cheap or too expensive. In other words, the majority of customers would find that price acceptable if not optimal.

On the other hand, the indifference point (IPP), i.e., the intersection of the "*Cheap*" and "*Expensive*" lines, is the point at which a relatively large percentage of consumers would judge the NW as relatively ordinary, i.e., a good bargain, in terms of price. In other words, the PP is the price at which the maximum share of potential buyers can be reached (Arru *et al.*, 2022) and, as such, it can be considered as the normal market price (Harmon *et al.*, 2007). The Stress Factor (SF) is also measured as

$$SF = \frac{(IPP - OPP)}{(PME - PMC)} 100 \tag{5}$$

which can be interpreted as the percentage level of price stress attributable to the spread between OPP and IPP over the Pricing Options Range. In other words, a large discrepancy between the amount consumers consider a good deal (IPP) and the price most respondents would like to pay (OPP) reflects a greater degree of stress, leading to consequent price movements. On the other hand, the more similar the OPP and the IPP, the lower the market price stress for that product, reflecting higher price stability (Paczkowski, 2019).

The points mentioned above and the related ranges identified by the VW-PSM procedure were identified rearranging the original dataset according to

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a two-steps procedure: first, all the answers to the "*Too expensive*" question with a value larger or equal than €250 have been deleted since they basically represent outliers; second, only the logically as consistent responses were kept, which comply with the logical rule Too cheap Cheap Expensive Too Expensive (Paczkowski, 2019). According to this procedure, the results of the VW-PSM analysis are based on 198 observations.

3. Results

Validation of the preference for natural food subscale

Internal consistency and scalability were adequate to support the consideration of the unidimensionality of the consumer attitude towards the natural food construct. The loadings of all eight items are equal to or exceed 0.6 (Table 1), indicating that the variables employed can measure the same concept. Cronbach α for the dimension investigated was 0.89, while $\chi^2(20) = 65.45$, $p = 0.000$, RMSEA (0.101), SRMR (0.052), and CFI (0.939) suggest an acceptable fit of this construct.

WTP estimation model

The fit of the regression model is relatively moderate, as indicated by the McKelvey & Zavoina *R*-squared test (Table 2), which is widely regarded as one of the most appropriate R^2 equivalents for models with limited dependent variables (McKelvey & Zavoina, 1975). This suggests that while socio-demographic and attitudinal variables were included in the model, additional psychological and contextual factors not captured in the dataset likely account for further variation in consumers' WTP for NW.

Analysing the results of the estimates reveals that the anchoring effect variables are significantly linked to the WTP ($p < 0.01$) and explain the majority of the model's *R*-squared (65.46%). This result may be attributed to respondents anchoring their WTP to the first bid presented by interviewers they perceived as trustworthy, rather than to ambiguity or limited familiarity with the valued scenarios, given the recruitment strategy of contacting wine enthusiasts and experts.

The second most significant factor influencing consumers' WTP for NW is the age of the interviewees (% R2 = 8.12; $\beta = -0.21$; $p < 0.05$), indicating that younger consumers are more likely to pay for NW, with no significant difference observed between men's and women's WTP (Figure 1). As expected, higher income status was associated with significantly greater

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WTP, despite the model's low *R*-squared (1.45%). Compared with respondents who declared a low income status, those without financial problems were willing to pay an additional 9.62€ ($p < 0.01$). The coefficients for "*Gender*" (% R^2 = 6.97%) and "*Education*" (% R^2 = 6.02%) were positive, suggesting a potentially positive relationship with WTP. However, the impact of these determinants was not statistically significant ($p > 0.1$). Therefore, this result should be interpreted with caution.

Based on interval regression estimates, the mean predicted WTP was €29.07 (95% CI: €26.54 – €31.61), indicating a good economic appreciation for a 0.75L bottle of NW.

Table 2 - Determinants of respondents' WTP for natural wine (interval regression outcomes; n = 203)

Variables	**Hypotheses**	*β*	**(SE)**	***p*-value**	***[95% CI]***	***%R2***
Food naturalness	H_2	0.56	1.34	0.68[(b)]	–2.13,3.24	5.80
Age	H_3	–0.21**	0.10	0.03[(b)]	–0.40,0.02	8.12
Gender	H_4					6.97
– Female[(a)]		–	–	–		
– Male		2.89	2.36	0.22	–7.52,1.73	
Education	H_5					6.02
– No academic degree[(a)]		–	–	–		
– Academic degree		1.38	2.23	0.54	–3.00,5.75	
Income status	H_6					1.45
– IS-1[(a)]		–	–	–		
– IS-2		1.48	3.16	0.64	–4.71,7.68	
– IS-3		9.62***	3.52	0.01	2.72,16.52	
Wine drinking frequency	H_7					6.12
– 1[(a)]		–	–	–		
– 2-3		3.67	2.51	0.14	–1.26,8.60	
– 4-5		9.38	7.16	0.19	–4.66,23.41	
– >5		12.67	11.00	0.25	–8.89,34.24	
Anchoring effect (P_0)	H_8	0.53**	0.22	0.01	0.11,0.96	65.46
_cons		22.14***	6.70	0.01	9.00,35.28	
Sigma		13.58	0.89			
McKelvey & Zavoina's R^2	0.18					

Notes: *** p<.01, ** p<.05, * p<.1; [(a)] Reference category; [(b)] Hypothesis rejected; [(c)] Hypothesis accepted; IS-1="I am very careful about what I spend; sometimes my income is not enough for necessary purchases"; IS-2="I have enough to get by; I rarely allow myself any luxuries"; IS-3="I have no financial problems; when I feel like buying something I do so".

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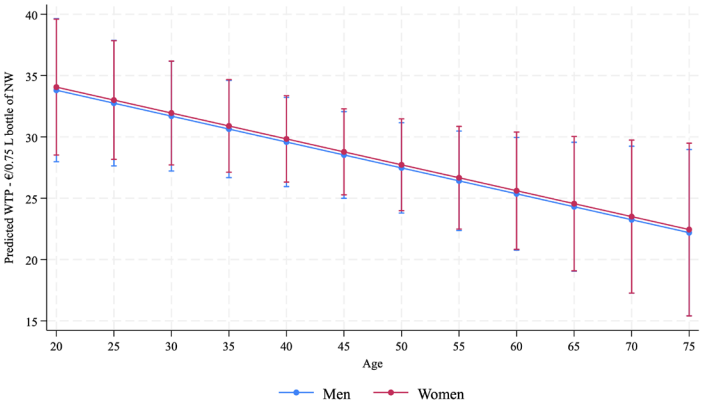
Figure 1 - Predicted WTP for a 0.75 L bottle of natural wine by age and gender



Van Westendorp Price Sensitivity Meter

As shown in Table 3 and Figure 2, the VW-PSM analysis indicates a meaningful price range of €10.12-€17.00 for 0.75 L of NW. Only a minority of respondents (9.92%) find the price of €10.64 (OPP) too extreme, suggesting that this could be an excellent price to attract a relatively large number of potential customers. On the other hand, a relatively larger number of customers (29.80%) find €15.60 (IPP) an acceptable price for 0.75L of NW. Finally, an SF of 70.09% is measured, indicating a relatively high level of price stress and, consequently, a potential source of price dynamics in the NW market. Figure 3 illustrates a disconnection between perceived and latent price preferences (i.e., VW-PSM vs CVM). The Van Westendorp thresholds (€10.12 – €17.00/0.75L of NW) are completely detached from the density curve peak. Respondents report a lower acceptable price despite their higher economic valuation of NW (i.e., WTP), thereby indicating consumer surplus. Another hypothesis is that interviewees may undervalue the NW when responding to questions about price sensitivity.

Table 3 - Van Westendorp price points for 0.75L of natural wine (n = 198)

VW's price points	**Price [€/0.75 L of NW]**	**Respondents [cum. %]**
Point of marginal cheapness (PMC)	10.12	16.22
Point of marginal expensiveness (PME)	17.00	19.70
Optimal price point (OPP)	10.64	9.92
Indifference price point (IPP)	15.60	29.80
Range of acceptable pricing (ARP)	10.12-17.00	–

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Figure 2 - Van Westendorp price sensitivity plot for natural wine (n = 198)

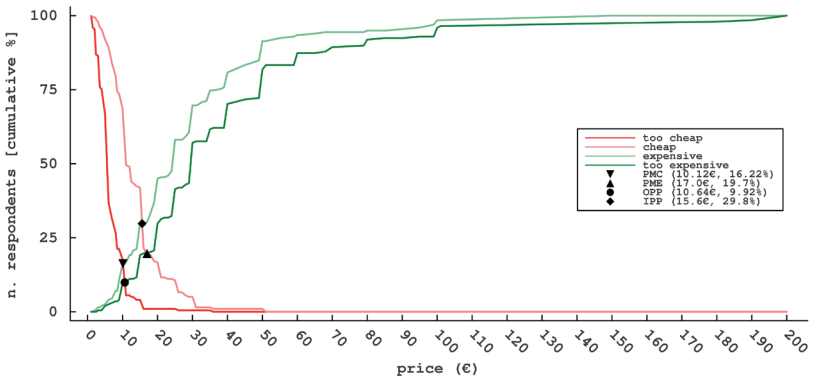
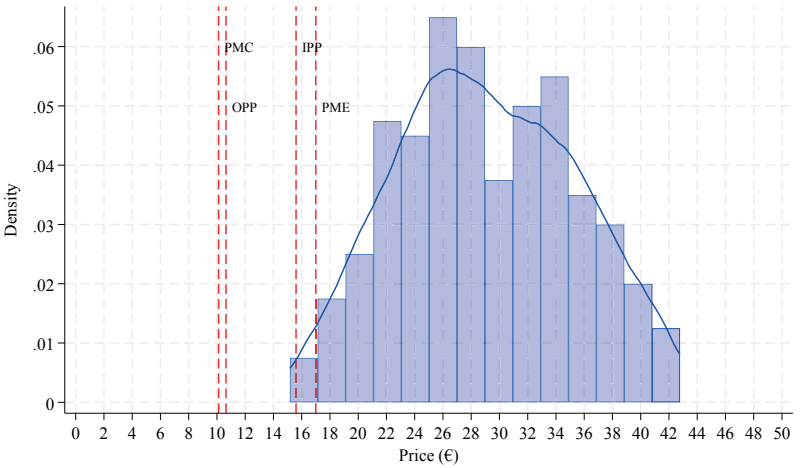


Figure 3 - Interval Regression vs. Van Westendorp Thresholds for natural wine (H1)



4. Discussions

The study aimed to analyse the convergence of consumers' WTP for a 0.75 L bottle of NW using the CVM, alongside pricing findings from the VW-PSM method. Additionally, we examined which consumer attributes affect the perceived economic value of this beverage. In this context, eight hypotheses were tested. The results make a valuable contribution to the literature on economic appreciation and pricing strategies within the broader wine market niche, particularly those related to NW.

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The monetary valuation produced by the VW-PSM method is considerably lower than the WTP calculated by the CVM, prompting us to accept **Hypothesis 1**. This result aligns with the findings of Kim *et al.* (2012) and seems to stem from a lack of incentive compatibility in the VW-PSM method as well. As noted by Mitchell and Carson (2013), in the VW-PSM method, respondents may express low price thresholds without consequences, relying on personal reference prices, social norms, mental shortcuts, or decision rules, rather than on external cues, which tend to undervalue the product. In line with Zeithaml (1988), the VW-PSM method appears to activate the so-called "*value-for-money thinking*" by asking respondents to reflect on acceptable versus unacceptable prices, rather than their maximum WTP, as some customers possess high price awareness (PME) but prefer a lower price (PMC). Conversely, the CVM, as developed by Mitchell & Carson (2013), is intended to measure both use and non-use values, thereby estimating the total economic value for a 0.75L bottle of NW. It elicited a higher WTP due to its incentive-compatible design, which presents interviewees with a hypothetical market transaction through a specific scenario using the question: "*Would you be willing to pay €X for a bottle of 0.75L of natural wine?*". According to Carson and Groves (2007), the use of direct questions and initial reference prices may lead to an overestimation of the WTP. However, in this study, we minimised these potential distortions by providing interviewees with a clear, neutral description of the good being evaluated and by randomising the initial bids. Accordingly, while we acknowledge these limitations, we consider the CVM approach appropriate for capturing the NW's comprehensive economic value. Thus, the findings shed light on the interaction between the economic value of NW and the price consumers are willing to pay for it. Given that the perceived range values exceed the acceptable pricing range established by the VW-PSM method (i.e., the Kernel density curve is to the right of the ARP limits), this can reasonably be attributed to consumer surplus, which could generate and reinforce strong purchasing power motivation. One rationale for this evidence is the hypothesis that consumers may underestimate the direct monetary efforts or minor financial gains associated with the natural winemaking process, despite recognising the product's implicit value. In any case, we intend to explore this assertion further in future research.

Contrary to the hypothesis, the consumer's attitude towards natural food and beverages does not significantly influence interviewees' WTP for a 0.75 L bottle of NW, thereby rejecting **Hypothesis 2**. This outcome could be attributed to multifaceted motivations. One such motivation may arise from the adopted construct, which generally refers to freshness, minimal processing, and the absence of artificial additives and chemical residues. Conversely, NW may involve specific winemaking techniques and the absence of certain chemicals, such as sulphites, gelatin, or added sugar (Staub

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et al., 2020). These factors require further consideration and exploration to define the referenced construct more accurately. This discrepancy in the conceptualisation of the construct may have hindered the likelihood that a positive attitude towards food naturalness will directly translate into a higher WTP for NW. Furthermore, as noted by Vermeir and Verbeke (2006), positive attitudes towards naturalness alone are insufficient to overcome the economic barriers associated with premium pricing, highlighting an "*attitude-behavioural intention*" gap. Again, according to Vecchio *et al.* (2021) and Gazzola *et al.* (2023), Italian consumers still have limited knowledge and awareness of NW, often confusing it with organic or biodynamic wines. Consequently, the lack of familiarity with NW, combined with the absence of unified certification, may hinder consumers' ability to relate to naturalness when assessing it. This could lead to a weak or non-existent connection between this attitude and their WTP for a premium price for NW, as observed in this study.

As hypothesised (i.e., **Hypothesis 3**), the negative and significant relationship between age and WTP aligns with the findings of Galati *et al.* (2019), which suggests that younger consumers are more likely to exhibit a higher WTP for NW. This result supports the evidence that young consumers are more interested in the sustainability aspects of food products than older consumers (Sogari *et al.*, 2016). Contrary to expectations, there is insufficient evidence to suggest that gender and customers' level of education influence their WTP for NW, thereby rejecting **Hypotheses 4 and 5**. Despite research suggesting that gender and level of education are consistently linked with greater awareness of sustainable food and beverage trends, including NW (Sogari *et al.*, 2016; Vecchio *et al.*, 2021, 2023), in line with the findings of Gow *et al.* (2024), our study reveals that gender and education were not the most significant drivers of WTP. A potential motivation may stem from the observation that personal values, rather than demographic traits, could influence WTP for NW more significantly. In any case, we aim to explore this affirmation in more depth in future research.

Our study reveals that income status significantly impacts customers' WTP for NW; specifically, affluent consumers are more willing to pay for this beverage, thereby confirming our conjecture (i.e., **Hypothesis 6**). This result contrasts with the recent findings of Gow *et al.* (2024), who report that income did not have a positive influence on the WTP for a premium price for sustainably produced wines among Italian consumers. This discrepancy may be due to the target product investigated, considering that our study focuses explicitly on the NW.

Unlike our initial theoretical framework, consumers' wine-drinking habits did not significantly affect their WTP for NW, leading us to reject **Hypothesis 7**. From our perspective, this result may be interpreted in light

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of the conflicting findings in the literature. In some studies, the frequency of wine consumption is a relevant driver of wine WTP (Migliore *et al.*, 2020; Pomarici *et al.*, 2016, among others), whereas in others, low-frequency drinkers exhibit higher WTP (Mauracher *et al.*, 2019). Considering our findings, these contrasting results support the evidence that frequent wine drinkers are not necessarily more informed or engaged with NW as a category and, consequently, are not willing to pay for it.

In line with the existing literature, this study's results confirm that the CVM inflates the resulting WTP due to anchoring and the adjustment process, even without prior personal information about the product being valued (Ariely *et al.*, 2003). The proposed price during the contingent valuation experiment has a positive influence on individuals' WTP for NW, leading us to accept **Hypothesis 8**. This suggests that market-driven factors may significantly affect customers' WTP for NW, as external cues can serve as reference points (i.e., P_0).

The findings from the VW-PSM price sensitivity meter enabled us to identify price points that indicate price sensitivity levels in the niche market of NW. Specifically, the OPP (€10.64), i.e., the price a relative majority of consumers would like to purchase the NW (as opposite to a relative minority of them considering it too extreme), is lower than the IPP (€15.60), i.e., the price at which a relatively large percentage of respondents perceives the product as a bargain (IPP). This translates into a high stress factor (70.09%), which denotes a relatively high probability of downward price dynamics involving the NW. Both OPP and IPP are included in the interval of actual market prices for NW found in Tannico S.r.l. (2024); however, prices larger than €17.00 might realistically discourage consumers from purchasing NW.

In addition, the price at which NW is perceived as too cheap – meaning the price customers consider too low to instil doubt about the product's quality – is lower than the anchor market price range used in this study. This aspect highlights that for NW, low prices do not necessarily lead consumers to question the quality to the extent that it prevents them from making a purchase. One rationale for this evidence is the hypothesis that customers may underestimate the direct monetary efforts or the minor monetary gains associated with the natural winemaking process. Furthermore, this situation may be related to consumers associating NW with product quality (Alonso González & Parga-Dans, 2020; Migliore *et al.*, 2020), even if it is offered at a low price. This evidence can also stem from the high economic value perception identified by the CVM and the lower acceptance price levels defined by the VW-PSM method. In addition, the wider acceptance price ranges for NW may reflect low familiarity with the product among interviewees in terms of market price and/or brand knowledge and, in line with Lewis *et al.*'s (2014) findings, this result corroborates the verified

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hypothesis that price significantly influences the economic appreciation of the NW.

Conclusion, limitations and outlook

Given that pricing is a crucial element in the wine market, it seems particularly pertinent in niche markets like those in the NW. Setting the right prices for wineries and retailers is essential to gaining a competitive advantage and expanding market share. In this context, this study integrated NW research streams with consumers' WTP and price-sensitivity measures, offering the following implications.

From a theoretical standpoint, this research expands existing knowledge on consumers' pricing and economic valuation of NW. Previous research has mainly examined consumers' awareness, attitudes, and motivations towards natural or sustainable wines, but has offered limited evidence on how these factors affect economic value. By combining the CVM with the VW-PSM, this study captures both consumers' stated preferences and perceived acceptable prices. This approach advances behavioural economics of credence goods by showing that consumers' focus on cues such as naturalness and sustainability influences their WTP through mechanisms such as anchoring and price-quality inference. The findings deepen understanding of how attention-based evaluations affect economic decisions in niche markets like NW. This study identifies the factors most strongly associated with consumers' WTP for this beverage, thereby supporting the decision-making process and providing a critical lens for examining consumer behaviour towards NW. According to Lewis *et al*. (2014), the expansion of the wine industry was generally achieved by adopting a strategy of buying market share through price, thus offering a wine for which the WTP was initially high at a "*value-for-money*" price. For non-expert wine consumers who struggle to assess a wine's intrinsic quality accurately, a low price may be perceived as an indicator of low quality. Thus, this situation can induce a systematic and progressive decline in customers' WTP, leading wine industries to fall into what D'Aveni (2010) defines as the "*commoditisation trap*" to maintain their market share. From this perspective, the combined use of CVM and VW-PSM methods provides a dual lens that yields valuable insights for more effectively defining a product's collocation in its economic life cycle, assisting wineries and retailers in developing efficient market pricing strategies without falling into the commoditisation trap.

From a managerial perspective, the results offer actionable insights for producers and retailers, highlighting a reasonable level of consumer awareness of the economic value of NW (i.e., the mean predicted WTP is

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€29.07 for a 0.75L bottle of NW) and an optimal price point of €10.64 (OPP). Hence, wineries should use the OPP price as a reference average starting point for a 0.75L bottle of NW. Products with intrinsic and extrinsic attributes that make them above average should be priced higher, and vice versa. In this light, the POR values (€10.12-€17.00) for a 0.75L bottle of NW could serve as a guide. Furthermore, since the Kernel density curve of the WTP for a 0.75L bottle of NW lies to the right of the ARP limits, this might suggest that the consumer sample undervalues the product. This could be due to the lack of familiarity with NW, the absence of a unified certification, and the possible anchoring effect that ties consumers to their personal reference prices. The study's findings suggest that external cues can significantly serve as reference points for customers. This situation might enable the use of a strategy with higher reference prices in communications. This could include introducing specific premium cues (e.g., storytelling, packaging, awards) to shift consumer reference price points upward, along with a gradually increasing pricing strategy. Furthermore, employing a market segmentation approach based on the evidence from this study allows for adopting an entry price slightly above the IPP or PME for value-seeking consumers, or offering a premium version of the product near the peak of the CV density.

From a methodological perspective, because WTP measures may be influenced by overestimation bias arising from the CVM, it would be beneficial to calculate them using non-hypothetical, incentive-compatible evaluative methods. This would provide a more accurate overview of the extent to which price and WTP ranges overlap, allowing for better identification of the product's stage in its economic life cycle and potential pricing strategies.

The study suffers from obvious limitations. The inability to generalise the results due to the convenience sample, which used the snowball sampling method, forces us to replicate the study on a larger, carefully defined population, including other factors that might affect price sensitivity and consumers' WTP. Moreover, future studies may focus on exploring factors that can widen the range of acceptable pricing and reduce the stress associated with it. Furthermore, extending the questionnaire to other countries would be interesting to explore cultural differences in terms of NW price sensitivity and economic appreciation.

Ethics statement

Before beginning data collection, participants were informed of the purpose and the subsequent statistical analysis. Participation in the study was completely voluntary and anonymous, and individuals could

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withdraw from the survey at any time and for any reason. Respondents were required to sign a privacy and consent policy form in advance, which outlined how their data would be collected and processed, in accordance with the Italian Data Protection Law (Legislative Decree 101/2018) and the European Commission's General Data Protection Regulation (679/2016). The investigation was conducted in line with the principles outlined in the 1975 Declaration of Helsinki (World Medical Association, 2013). As this research did not involve any invasive procedures or laboratory assessments and did not induce any lifestyle changes, ethical review and approval were waived.

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