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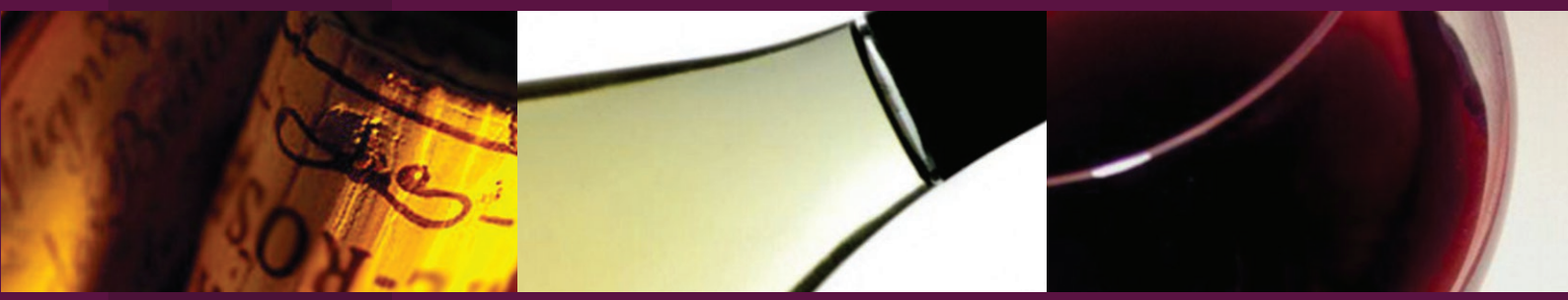

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Old and new challenges in the wine business: what lies ahead for Wine Economics and Policy

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Abstract. The wine sector, as all the other businesses, is facing the effects of the recent global pandemic and of the energy price crisis, but at the same time the research has not finished dealing with old/new challenges in the field of sustainability and innovation. And probably never will, as these issues represent an underlying constant in the debate. As the wine world continues to change, our Journal changes: eleven years after the publication of the first Issue, it is time to take stock of the situation and discuss what lies ahead.

Keywords: wine, business, research, innovation, sustainability.

Dear readers,
when this Journal came to life with the publication of its first issue in 2012, it is no secret that there was some sort of scepticism about it. Some said that there was no need for another wine journal and that the topic was so specialised that a market for it would be very narrow. Now, after eleven years and twenty-two Issues, that scepticism seems to be vanished. Wine Economics and Policy (WEP) proved to be successful, in spite of the hardships that any new publication needs to face at first, and the reasons for this success are very simple:

- a solid backbone: WEP is an emanation of the University of Florence, that has a long and layered history of wine research and education. UniCeSV, the University Centre for the Development of the Wine Sector, pools the best resources internally and connects them with the rest of the Wine Academia and the business;
- a prestigious and active editorial board: in particular, the idea to have Editors for specific geographical areas eased the appeal of the Journal worldwide and facilitated the submissions from very different and very specific realities of the wine world;
- a fruitful cooperation with the publishers: Elsevier at first and now Firenze University Press (FUP) gave the Journal all the means necessary for establishing a visible presence in the competitive world of academic journals;

- the idea behind it: from the start, WEP was never intended to be "just another journal about wine". The topics we tried to cover ranged from the traditional ones like consumer behaviour and business analysis to newer ones, with a particular attention on interdisciplinary aspects. Moreover, the Journal was never intended to be addressed only to Academia and has always maintained a space for policy analysis and discussion and for the direct voice of the business sector.

When I was asked to take over the role of Editor in chief from Prof. Silvio Menghini, I admit I had some doubts, and these doubts came from the fact that I thought it would be impossible to continue to achieve all that was achieved under Prof. Menghini's guidance. Silvio started the Journal and led it where it is now with the help of the rest of the Editorial Board and the referees who contributed with their availability and expertise: I will not mention the numbers related to the Journal's performance, because they are visible on our cover and our website, but we can affirm that WEP is recognised as a prestigious publication for its reach and for the standards that researchers require when deciding where to direct their work.

So, first of all, I would like to thank Prof. Silvio Menghini and promise that I will do my best to keep up the excellent work. It is a challenge, though, because we move through a world that is constantly changing and compels us to rethink, reassess and redirect our work all the time.

Where to now, then? We just came out (maybe) of a pandemic that hit hard, not only in terms of health and social welfare, but also in economic and behavioural terms. The wine world has been affected by it as all the other sectors and many studies have already been published addressing the effects of the pandemic for the business. New behavioural and purchasing patterns emerge and need to be further analysed to assess their relevance and their persistence in the wine market and to supply producers with clearer indications. These new patterns stem from the reshaping of our social life during lockdowns but also from the economic impact this period had on society, and this leads us to face the other issues that affect the post-pandemic world economy, i.e. the energy crisis we are going through now in many parts of the world.

But the challenges for the future do not stop here. There are some "old" challenges that still need to be addressed completely or, better, we need to continue addressing: the climate crisis calls for a renewed look at sustainable production and consumption with a particular attention to circular economy models that many governments seem to be aiming at with the support of new, changing policies.

Another "old" challenge regards the wide spectrum of *digitalisation*. The term is so broad that it does not implicitly determine its object, so it can be applied to pretty much everything: from online new media for the communication and distribution of wineries to the use of blockchain, the creation of new accounting software and more. A lot of work was done on many aspects of it but we are certainly not done with it, considering that, generally, technology is progressing at a faster pace than economic and market research.

One last thing, that is directly linked to the mission of the Journal: we should never forget about the dynamic between Academia and business. The research world is often biased towards a self-referencing approach that sometimes springs up in research… for the sake of research. This is something that I, as new Editor in chief of this Journal, will try to avoid at all costs. I am well aware of the needs and demands of academic research, but there is no need for it unless it has a concrete impact in the *real* world.

Here's to another eleven years (and beyond) of Wine Economics and Policy.

Wine Economics and Policy

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Virtual wine experiences: is covid extending the boundaries of wine tourism?

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Abstract. Wine tourism has long been a strategic tool for Italian wineries. The Covid-19 outbreak jeopardised its dynamics on multiple levels, creating physical (e.g., social distancing, travel bans) and psychological barriers. Online wine experiences constitute one of the key resilience strategies adopted by wine tourism actors, being still a relatively unexplored phenomenon in the scientific literature. The current study tackles this gap by analysing the drivers of interest in online wine experiences on the demand side, i.e. among a sample of Italian wine tourists (n=408), through Structural Equation Modelling (SEM). Notably, the model considers long-term (involvement with wine) and short-term (Covid-19 fear and anxiety) factors, digitalisation and willingness to support local wineries by partaking in wine tourism. Results highlight that the interest in online wine experiences is driven by context-dependent factors like fear and anxiety linked to Covid-19, and the involvement with wine. Diversely, willingness to go on a wine holiday is not a significant antecedent, even with Covid-19 fear and anxiety as limiting factors. Practical and managerial implications are discussed.

Keywords: virtual wine tourism, online experience, Covid-19.

1. INTRODUCTION

The Covid-19 pandemic has profoundly impacted the tourism sector's dynamics, including rural and wine tourism. Notably, restrictions applied to slow down the diffusion of the virus, e.g., mobility bans and social distancing, revealed the sector's susceptibility [1]. The United Nations World Tourism Organization (UNWTO)[1] reported that within a very short time, 2020 international tourist arrivals in Europe fell to their lowest level since the 1950s (-70% compared to 2019). This was mainly due to the prolonged international travel and hotel closures limitations.

The Italian wine tourism sector suffered the Covid-19 effects, although some key characteristics helped its resilience to the pandemic. For instance,

[1] UNWTO (2021). https://www.unwto.org/covid-19-and-tourism-2020

proximity to the place of residence has long been identified as a success factor in wine tourism [2], as visitors of wine regions are found to be largely domestic tourists. Indeed, except during the lockdown phase, Italian wine tourists were allowed to circulate within the country. Additionally, wine tourism usually takes place in rural areas, resulting in a higher perceived safety of this form of tourism in the case of threats (e.g., terrorist attacks) than urban destinations [3]. Nevertheless, international tourism flows have gained increasing importance for many Italian wine regions: see, for instance, the Prosecco Region (worldwide known for sparkling wine production), where almost 50% of tourists in 2019 were travelling from other countries [4]. International tourism flows, though, were jeopardised by the Covid-19 outbreak. The pandemic prompted the diffusion of fear and anxiety among the population [5,6,7] which contributed to changing tourists' travel patterns, including wine tourists. In 2019, Italy recorded 15 million wine tourists (+9% over the previous year), for a total turnover of 2.65 billion euros [8,9]. A recent study by Garibaldi et al. [9] highlighted that 44% of Italian wineries declared an overall financial loss between 10% and 50% following the Covid-19 outbreak. The loss for wine tourism activities reached -70% for almost 35% of the sample, raising concerns about the time needed to restore to the pre-covid performance of the sector.

Given that wine tourism is widely recognised as a core marketing channel for the wine sector [10], many wineries and oeno-gastronomic tourism providers found alternative ways to bridge the gap between producers and the final consumers (i.e., wine tourists) created by mobility restrictions and social distancing measures. In this context, online oeno-gastronomic experiences emerged as a strategic tool for remote communication and marketing to retain existing customers and attract new ones. Currently, this new trend is expanding from single wineries to consortia, which are offering virtual wine tastings as a territorial marketing tool. Indeed, Italian consortia (or *Consorzi di Tutela*), are associations of producers and processors in charge of governing, protecting and promoting Geographical Indications.

Thus, virtual wine tourism became a tool to overcome the deep uncertainty generated by the Covid outbreak, which after two years is still undefeated, and to boost the resilience of wine tourism actors. However, whereas the producer side of online wine experiences has been addressed [11], their attractiveness is currently unexplored from a wine tourist perspective.

As a novel contribution, this study allows this gap to be filled by exploring the interest in online wine tourism experiences (INTOWE) and examining its long-term and short-term potential predictors while focusing on Italy, where wine tourism represents a stable and consolidated reality.

This research is of interest to the academic world as it represents the first attempt to investigate this emerging topic in the literature, providing interesting insights for future research. Finally, this study is helpful to understand whether online oeno-gastronomic experiences' attractiveness is short term and context-dependent or if it leaves room for long-term wineries planning. In this regard, the information provided can support wineries, stakeholders, and regulators in making strategic decisions and developing online wine experiences.

The paper is structured as follows: the first section proposes a review of the extant literature on the main antecedents of wine tourism intentions and presents the research hypotheses, while the following sections describe data and methods (second section), the results (third section), and the discussion and conclusions (last section).

2. THE COVID OUTBREAK AND THE MAIN ANTECEDENTS OF WINE TOURISM INTENTIONS

Over the last decades, wine tourism has become an important segment of the wine industry [12, 13]. Wine tourism experiences are indeed strategic marketing tools for wineries to establish a direct relationship with consumers (and customers), also at international level, gaining long-term benefits in terms of wine sales, customer education and loyalty creation [14, 15, 16]. Also, wine can be an essential way of presenting the identity and local culture of many destinations [17], and wine tourism can contribute to a wine region's economic development [18].

The Covid-19 outbreak caused significant impediments to both wineries (e.g., limiting their operating space) and wine tourists, who were impacted physically (e.g., the pandemic prevented wine tourists from travelling) and psychologically. In this extraordinary context, virtual experiences started to spread representing an essential tool for wine tourism stakeholders.

Intended as virtual tours of the winery, wine tastings, and food and wine events, online wine experiences imply consumers' engagement with wine and winemaking. For this reason, they fall under the definition of wine tourism [19]. People partaking in wine tourism activities are also involved with the product and presumably possess a pre-existing intention to go on a wine holiday. Traditional wine tourism activities are enjoyed by tourists looking for an immersive activity and with

the broader aim to experience the wine region as a whole, including landscape traditions, culture, and heritage [2, 20].

Accordingly, the literature generally identifies wine tourists as a heterogeneous group of people pursuing the full enjoyment from different aspects of a wine tourism experience [12, 21], and characterised by a different level of involvement with wine [22, 23].

The following paragraphs provide an overview of the main antecedents of wine tourism intention and factors that can impact the interest in online wine tourism experiences. Based on this, we present the hypotheses that the study intends to test. Due to the pandemic's extraordinary circumstances, we also test some hypotheses for exploratory purposes, as the role of fear and anxiety linked to Covid-19 in (wine) travel intentions.

2.1 Profile of wine tourists

Hall et al. [14] citing Johnson [24, p. 19], report that wine tourists are "visitors to vineyards, wineries, wine festivals, and wine shows for the purpose of recreation". As highlighted by past studies [12, 20, 22], they also possess a certain level of knowledge about wine. However, they are mainly wine consumers looking for pleasant and relaxing sensations to fulfil a total experience in the so-called "winescape" – that is "the place where wine tourism activities take place" [20]. Also, they are characterised by the need to connect with the origin of the product and visiting the wine region where a specific wine is produced [25]. Wine tourism represents a social leisure activity [2, 26, 27, 28], as tourists who engage in this are often accompanied by other people (e.g., spouse, partner, family members, close friends) [22, 29]. Scholars found that wine tourists profile can be characterized through both socio demographic and psychographic traits [14]. Among others, relevant factors are gender, age, education, wine consumption habits, financial status, lifestyle, motivation, and involvement [14, 25, 28].

2.2 Involvement with wine

The literature extensively reported that one of the main antecedents of wine tourism intentions is the product involvement, or involvement with wine (WI) [30, 31]. The concept of involvement refers to "a person's perceived relevance of an object based on inherent needs, values, and interests" [32, p. 342]. For leisure activities as wine tourism, it is appropriate to consider ego-involvement, i.e., the "unobservable state of motivation, arousal or interest toward a recreational activity or associated product, evoked by a particular stimulus or situation, and which has drive properties" [33, p. 216]. Indeed, Sparks [34] argued that ego-involvement might play a key role, acting as a motivator in wine tourism.

Brown et al. [35] further conceptualised ego-involvement in wine tourism in a wine involvement (WI) scale, that is a 3-dimensional tool embodying symbolic centrality, enjoyment, and expertise, adapted from the Consumer Involvement Profile scale by Laurent and Kapferer [36].

Furthermore, Zatori et al. [37] developed the concept of experience-involvement referring to the real-time involvement that creates while undergoing a given experience. In fact, the most powerful phase in the formation of the tourist experience is the on-site experience, as some experiences might be highly involving and unleash positive emotions. Moreover, scholars found that involvement with certain activities or products also increases involvement with the related services [38, 39]. Previous studies demonstrated the positive relationship between product involvement and destination image [38, 40]. Additionally, WI proved to consumers motivations, the perceived importance of wine sensory characteristics like bouquet and appearance [41] as well as residents perceived relevance of the local production [42]. Since wine tourism activities revolve around wine tastings and wine experiences, it follows that WI is paramount to the sector. Coherently, involvement is of particular importance for hedonic products like wine, which consumption is complex and entails cognitive, affective and sensory dimensions that may assume a different relevance based on personal involvement levels [43].

Given the above and following the literature, WI may directly or indirectly affect consumers' wine tourism intentions [40, 44, 45] positively impacting on future travel intentions [38]. Given the key role of WI in determining wine tourism intentions, we expect the same relationship exists between WI and interest for online wine experiences and we test the following hypotheses:

H1: Involvement with wine (WI) positively affects the interest in online wine tourism.
H2: Involvement with wine (WI) positively affects future wine tourism intentions.

2.3 Willingness to support local wineries

The Covid-pandemic and the resulting socio-economic crisis have potentially induced people to become more sensitive to society's problems [46]. Therefore, willingness to support local wine producers may play a role in making wine tourists inclined to both online and offline

wine tourism. Several studies [47, 48, 49] highlight how consumers often perceive locally produced food or buying directly from the farmer (e.g., direct selling at the farm) as a means to support local farmers and communities. In this sense, tourists contribute to the value creation and economic sustainability of the territories [50]. In line with this, several authors [51, 52] argue that the direct interaction between producers and consumers creates or reinforces sentiments of trust and mutual regard, leading to a sense of commitment and solidarity. In this sense, tourists can concretely support the local producers. In this context, online wine tourism experiences can be practical tools when in-person meetings are not possible and/or challenging to achieve, as during the pandemic. The desire to support a winery during the pandemic might thus arise from a pre-existing interaction with the winery, since the product experience is a fundamental component of loyalty to a brand [53].

Moreover, the literature highlights that developing experiences that combine oeno-gastronomic traditions in wine tourism destinations generate positive emotions [9, 54], and create a sense of familiarity [55]. Familiarity is, indeed, the result of previous experiences (experiential familiarity), the extent of information used (informational familiarity), and how people self-perceive their familiarity with a place (self-rated familiarity), and it is affected by the perceived quality of a tourism experience [56]. According to Baloglu [57], building an emotional connection with a place can influence future behavioural intentions (i.e., future wine tourism visits). After the visit, online wine tourism experiences can help wine tourism actors (producers or wineries) build long-term relationships with their customers through long-distance actions that trigger trust and destination attachment [58]. From this perspective, in a highly competitive sector such as wine tourism in Italy, counting 408 wine Protected Designations of Origin, online experiences can be a strategic tool to establish new emotional bonds or reinforce existing ones, also stimulating future wine tourism intentions. Following this, we test the following hypotheses:

H3: Willingness to support local wineries (SUPLOCW) positively affects the interest in online wine tourism.
H4: Willingness to support local wineries (SUPLOCW) positively affects future wine tourism intentions.

2.4 Covid related fear and anxiety

Other than causing severe impediments to international mobility, the pandemic generated significant psychological discomforts: these are connected to the ease of transmission of the virus and the severity of the Sars-Cov-2 illness [59], and tend to be extensive and long-lasting [60].

The virus outbreak caused a general state of fear and anxiety [61]. Mainly, fear reflects in the individual awareness of a danger arising from pain and/or harm [5, 62], while anxiety represents a response to fear [63]. The recent psychological literature proposes several tools to capture individuals' fear of Covid-19 [see, for instance, 7]. Arpaci et al. [59] developed the first self-diagnostic tool to detect the presence of both fear and anxiety towards the virus, the Covid-19 Phobia Scale (C19P-S). Notably, the original C19P-S comprises four dimensions: economic (i.e., related to food security), psychological, psychosomatic, and social (i.e., referring to social relationships).

Since travelling implies a risk of contagion due to uncontrolled social contact with other people, which is the leading way the virus spreads [64], it may represent a dangerous activity. In this sense, the fear of Covid-19 contagion might push scared tourists to participate in an online wine tourism experience as a safer option. Therefore, we formulate the following hypotheses:

H5: Covid-related fear and anxiety (CPH) positively affect the interest in online wine tourism.
H6: Covid-related fear and anxiety (CPH) mediate the relationship between future wine tourism intentions and the interest in online wine tourism.

2.5 Interest in online wine tourism experience

As mentioned, online wine tourism experiences (e.g., virtual tours of the winery, wine tastings, and food and wine events) imply consumers' engagement with wine and winemaking just like in-presence wine tourism activities. Therefore, wine tourists are likely to be interested in joining them, especially if pushed by Covid-19 restrictions. Research highlighted that Virtual Reality (VR) is a valid marketing tool for tourism destinations, since it allows consumers to experience a destination without physically visiting it, creating embodiment in the consumer, and acting as a trigger for wine tourism development [16, 65]. Petit et al. [66, p. 42] argue that digital interacting technologies are helpful tools for creating the "webmosphere", that is "the conscious designing of web environments to create positive effects". Recently, Wen and Leung [16] conducted a lab experiment exploring the effects of virtual reality (VR) and traditional videos of wineries and wine tours on young consumers' purchasing behaviour, based on the theory

of embodied cognition. The authors found that VR wine tours foster stronger purchase intentions and a higher willingness to pay for wine by knowledgeable consumers, especially when information on wine's sensory characteristics is provided.

Regarding wine digitalisation, it is reasonable to believe that wine tourists familiar with digital wine tools like wine e-shops and wine apps are more prone to approach online wine experiences as well. Notably, the literature highlights that highly involved wine consumers who consider themselves wine experts are more prone to use technology for purchasing wine [67]. As aforementioned, high wine involvement is a common trait of wine tourists, and highly involved wine consumers tend to be men (see, for example, [82]). Furthermore, since younger consumers of generations Y and Z are particularly familiar with these technologies [16, 68], they could be assumed to be more receptive to online wine experiences.

Therefore, we control for gender and age effects on INTOWE and postulate that strongly motivated wine tourists and digitalised wine consumers are reasonably more motivated to participate in an online wine tourism experience. Specifically, we develop the following hypotheses:

H7: Having an app on wine/wine tourism on the smartphone (WAPP) positively affects the interest in online wine experiences (INTOWE)
H8: Purchasing wine online (BUYWONLINE) positively impacts the interest in online wine experiences (INTOWE)
H9: Future intention to go on a wine holiday (FUTWTINT) positively affects interest in online wine experiences (INTOWE)

3 METHODOLOGY

3.1 Structural Equation Modelling

To test the abovementioned hypotheses we used Structural Equation Modelling (SEM), since it is commonly used in the literature. Indeed, this multivariate analysis allows for the simultaneous relationships between different exogenous and endogenous variables, as hypothesised. In particular, a preliminary exploratory factor analysis of the whole measurement model (MM) was conducted through SPSS software, while confirmatory factor analysis (CFA) and the Structural Equation Model (SEM) were performed with AMOS software. To provide preliminary evidence of the discriminatory power of the MM, an EFA with maximum likelihood as extraction method and oblique rotation was run on all items of our latent constructs, i.e., CPH, WI, FUTWTINT, SUPLOCW, and INTOWE, to provide further evidence of the items representing separate constructs.. Moreover, mediation is analysed through bootstrapping (1000 bootstrapping intervals) with bias-corrected confidence intervals (95%). This technique provides estimates without relying on distribution, and it therefore constitutes a reliable tool to test for indirect effects [69]. Specifically, mediation is present when the relationship between two observed variables or constructs (A and B) is affected by a third one (Z), resulting in the presence of a significant indirect effect. Relationships to be tested for mediation are first run without including the mediator in the model to assess A->B path's significance. Subsequently, the mediator is introduced in the model and the direct and indirect effects of A on B are estimated. Two types of mediation can occur in SEM: complete mediation, when only the indirect effect between A and B is significant while the direct effect is not; and partial mediation, in which both effects (direct and indirect) are significant. In case of complete mediation, the third construct (Z) fully explains the relationship between A and B [70].

3.2 Data collection

Data were collected through an online survey administered on a sample of Italian wine tourists that were reached through snowball sampling via social networks and world of mouth. This sampling technique, which is common in the social sciences, requires that participants share the questionnaire (link) with other individuals. This allows for data collection in a short amount of time, and it is effective for surveys in a rapidly changing environment like the Covid pandemic [71]. Specifically, over 40 Facebook groups dealing with wine, food and travel were involved, jointly with actors from the Italian wine sector, to target the segments of interest despite the extraordinary circumstances of the Covid-19 pandemic. Data collection took place in Italy between June and July 2020. We collected 515 questionnaires, but retained only complete ones from wine tourists, restricting the final sample to 408 valid observations. The present study considered wine tourists as people who visited a wine-producing region and/or participated in a wine festival in the last three years before the pandemic. For this purpose, we adapted the statement from Brown et al. [35]. To the best of our knowledge, there is no unique definition of wine tourist in the literature. Therefore, in this paper we considered a broader group than cellar door visitors (who are generally considered wine

tourists) by selecting people who recently engaged with wine-related events, visits to wine festivals, and wine holidays. This choice allowed us to collect reliable data from consumers who are potentially interested in this new service, i.e. online wine tourism, and thus constitute an eligible target market.

The survey investigates the following questions and factors: socio-demographics, wine digitalisation, willingness to support local wineries (SUPLOCW), involvement with wine (WI), covid phobia (CPH), future wine tourism intentions (FUTWTINT), and interest in online wine tourism experiences (INTOWE).

More specifically, WI is captured through an adapted version WI scale by Brown et al. [35], referring to ego-involvement. In particular, the Exploratory Factor Analysis (EFA) and Reliability analysis (Cronbach's alpha) are run on each scale separately, with principal component as extraction method and oblique rotation. EFA results on the WI scale led to dropping the 6 items representing symbolic centrality as, alike previous studies [35], they were not consistent with the rest of the scale. Reliability statistics restrict the final scale to 7 items, which were measured on a 7-point Likert scale where 1 = totally disagree and 7= totally agree (Cronbach's alpha = .96).

Fear and anxiety towards Covid (hereafter referred to as CPH) are captured through an adapted version of C19P-S from Arpaci et al. [59]. Mainly, this paper includes the psychological and social dimensions of the original C19P-S (Cronbach's alpha = .91) to assess the impact of Covid-related fear and anxiety on the individual interest in online wine experiences (INTOWE). The latter dimension is particularly relevant as travelling is a social activity implying several and often uncontrolled social interactions, the primary source of infection. Based on Cronbach's alpha, one extra item was dropped, and the final CPH scale includes five items measured on a 7-points Likert scale (1 = totally disagree; 7 = totally agree).

Future wine tourism intentions (FUTWTINT) are captured through a single item adapted from Sparks [34] and measuring the willingness to take a wine trip in a future holiday on a 7-points agree-disagree Likert scale.

Interest in online wine tourism experiences (INTOWE) is also measured through two 7-points Likert scale items (1 = totally disagree to 7= totally agree), capturing interest the most common types of online wine experiences (i.e., wine tastings – INTOWE1, and food and wine events – INTOWE2).

Finally, one item measured on a 7-points Likert scale (1 = totally disagree, 7= totally agree) captures the willingness to support local wineries by partaking in wine tourism (SUPLOCW).

3.3 Descriptive statistics of the sample

As described in Table 1, men and women are almost equally represented within the sample. The respondents are mainly aged between 30-50 (55%), and all age groups are adequately represented in the sample except the over 60s (7%), presumably because data collection primarily relied on social media. In line with past research [72, 73], most respondents are highly educated, and have a university degree (49%). Moreover, the average family income is either sufficient (48%) or good (43%), highlighting that most of the respondents enjoy an either acceptable or good economic situation. Half of the sample is either married or in a couple. The level of digitalisation is remarkable, with over half of the sample (52%) having an app dedicated to wine or wine tourism on their smartphone (WAPP), and a relevant share (45%) buying wine online (BUYWONLINE). The level of involvement with wine (WI) is rather high, albeit close to the mean value of the scale (sample mean = 5). Both future intentions to partake in wine tourism (FUTWTINT) and the willingness to support local wineries (SUPLOCW) record significant mean ratings (both around 6). Interestingly, fear and anxiety towards Covid (CPH) and interest in online wine tourism experiences (INTOWE) show low mean values (3.6 and 3, respectively).

4. RESULTS

As regards the measurement model, EFA confirmed the items of the 3 latent constructs load on different factors. The two items of the INTOWE scale are significantly correlated between them [r = 0.84; 71], while being uncorrelated with all other items in the MM. Table 2 shows the results of the CFA on the whole sample. Construct Reliability (CR) and Average Variance Extracted (AVE) are above the recommended thresholds for all latent constructs [70, 75], and all the standardised factor loadings are significant and above the ideal threshold (0.7). Therefore, convergent validity for each scale is confirmed. Discriminant validity is supported by AVE exceeding inter-construct correlations [70].

Single item measures like SUPLOCW and FUTWTINT are included in the model as latent constructs measured by one item in order to account for measurement error. Notably, factor loading is fixed at the square root of 1 minus the best guess reliability (0.85), and error variance is computed subtracting the best-guess reliability to 1 [70]. Diversely, age, gender, and wine digitalization (BUYWONLINE; WAPP) are treated as

Table 1 Descriptive statistics of the sample (n=408).

	Frequency	%
Age (years)		
18-29	74	18.1
30-40	121	29.7
41-50	102	25.0
51-60	82	20.1
≥61	29	7.1
Education		
High school	12	2.9
College	127	31.1
University	198	48.5
PostGraduate	71	17.4
Gender		
Males	191	46.8
Females	217	53.2
Marital Status		
Married-cohabiting	107	26.2
Single	139	34.1
In a couple	96	23.5
Separated-divorced	57	14
Widowed	7	1.7
Other	2	0.5
Income		
Insufficient	3	0.7
Just sufficient	34	8.3
Sufficient	194	47.5
Good	177	43.4

	Frequency	%
WAPP		
No	197	48.3
Yes	211	51.7
BUYWONLINE		
No	225	55.1
Yes	183	44.9

	Mean	St.Dev
WI	5.2	1.65
CPH	3.6	1.66
INTOWE	3.0	1.39

	Strongly disagree						Strongly agree	Mean	St.Dev.
	1	**2**	**3**	**4**	**5**	**6**	**7**		
FUTWTINT	0.7	1.5	2	6.6	8.8	16.2	64.2	6.3	1.23
SUPLOCW	1.2	1.7	3.7	9.3	15.4	18.9	49.8	5.9	1.39

observed variables. As regards INTOWE, a composite score of the two items is computed (parcel) and used as indicator of this construct with factor loading fixed at 1 and error variance calculated as follows:

$$\theta\varepsilon = (1-\alpha) \times s^2$$

where α represents the construct reliability for INTOWE and s^2 is the observed variance of the composite score [76]. Goodness-of-fit (GOF) of the MM is evaluated through Root Mean Square Error of Approximation (RMSEA) and Standardised Root Mean Residual (SRMR) for absolute fit, and Tucker Lewis Index (TLI) and Comparative Fit Index (CFI) for incremental fit. Overall GOF of the MM is acceptable ($\chi2$ (408) = 494.47; df = 111; $p < 0.001$; $\chi2/df = 4.4$; RMSEA = .09; CFI = .92; TLI = .90; SRMR = .05). According to Hair et al. [68], the significance of $\chi2$ is expected due to both the large sample size (n = 408) and number of observed variables (m = 22). RMSEA is also acceptable [77].

The structural model (SM) is presented in Figure 1. GOF indices suggest an overall good fit ($\chi2$ (408) = 389.33; df = 130; $p < .001$; $\chi2/df = 2.99$; RMSEA = .07; CFI = .95; TLI = .93; SRMR = .05) and the model explains 22% of the variance of INTOWE and 49% of FUTWTINT. Results highlight that interest in online wine tourism experiences is positively affected by gender. Specifically, female respondents seem to be more interested in online wine experiences than male ones ($\beta = .11$; $p = .03$). Respondent's familiarity with digital wine tools also emerged as a significant antecedent (H7: $\beta = .12$, $p = .03$; H8: $\beta = .13$; $p = .02$). Unexpect-

Table 2. Factor loadings and reliability of the measurement model.

	Factor loading [a]	Average Variance extracted (AVE)[b]	Construct Reliability (CR)[c]
Fear and Anxiety towards Covid (CPH)			
CPH1	0.90	82.8%	0.95
CPH2	0.84		
CPH3	0.86		
CPH4	0.82		
CPH5	0.75		
Involvement with wine (WI)			
WI1	0.83	73.2%	0.95
WI2	0.89		
WI3	0.89		
WI4	0.90		
WI5	0.87		
WI6	0.85		
WI7	0.76		

Note: [a] Based on standardised regression weights from AMOS. [b] AVE was computed based on the formula from Hair et al. [68] as an indicator of convergent validity. [c] CR was computed based on Hair et al. [68].

edly, the effect of age on INTOWE is not significant (β = - .04; p = .44). WI represents a significant predictor of both future wine tourism intentions (H2; β = .62; p < .001) and INTOWE, although the effect on the latter is smaller in size (H1: β = .22; p = .003). Interestingly, FUTWTINT does not significantly predict INTOWE (H9: β = .05; p = .47), while the direct effect of fear and anxiety towards the virus (CPH) is significantly positive (H5: β = .18; p < .001). Instead, CPH does not mediate the relationship between FUTWTINT and INTOWE since the indirect effect between the two variables is not significant (H6: β = .05; p = .22). Finally, willingness to support local wineries (SUPLOCW) has a significant positive effect on both INTOWE (H3: β = .12; p = .02) and FUTWTINT (H4: β = .20; p < .001).

5. DISCUSSION AND CONCLUSIONS

This exploratory study provides relevant information for a better understanding of people's interest in online wine tourism experiences, which has become a strategic tool for wineries in times of pandemic. In the last decade, wine tourism gained increasing relevance for Italian wine regions, but recently the Covid outbreak jeopardised its dynamics, pushing its actors (e.g., wineries) to find alternative solutions to overcome the new barriers. The digitalisation of wine tourism experiences is one of these solutions. Nevertheless, designing similar experiences requires the proper infrastructure and knowledge of virtual platforms and video making, and financial investments to adopt this innovation. Therefore, there is an urge to explore the extent to which interest in such experiences is driven by context-dependent factors, and if there is potential for future developments. In the latter case, online wine experiences can become a strategic marketing and communication tool for wineries and wine regions to enhance their visibility.

Although other attempts have been made to explore wine consumers' perception of online wine tastings [78], this paper is among the first to examine the determinants of online wine tourism attractiveness based on an extensive sample of wine tourists. Therefore, its findings provide interesting hints for both actors of the wine sector and policymakers.

Descriptive statistics reveal that the profile of the wine tourists in our sample, mainly women, highly educated and with a good income level, is in line with other studies [19, 72, 79, 80, 81, 82, 83]. As for the involvement with wine, it is above the average but not remarkably high, stressing the point that wine tourists are not necessarily wine lovers [20].

While future wine tourism intentions (FUTWTINT) are strong, the average interest in online wine tourism in the analysed sample is lower. A plausible explanation to this latter evidence can be the fact that online wine tourism experiences represented an innovative product at the time of data collection, namely the timeframe immedi-

Table 3 Correlation matrix.

	INTOWE	CPH	WI	WTINT	SUPLOCW
INTOWE	3.0 (1.89)				
CPH	0.195	3.6 (1.66)			
WI	0.376	0.024	5.2 (1.65)		
WTINT	0.312	0.064	0.669	6.3 (1.23)	
SUPLOCW	0.153	0.055	0.069	0.261	5.9 (1.39)

Note: Mean (Std. Deviation) of each variable are reported in the diagonal.

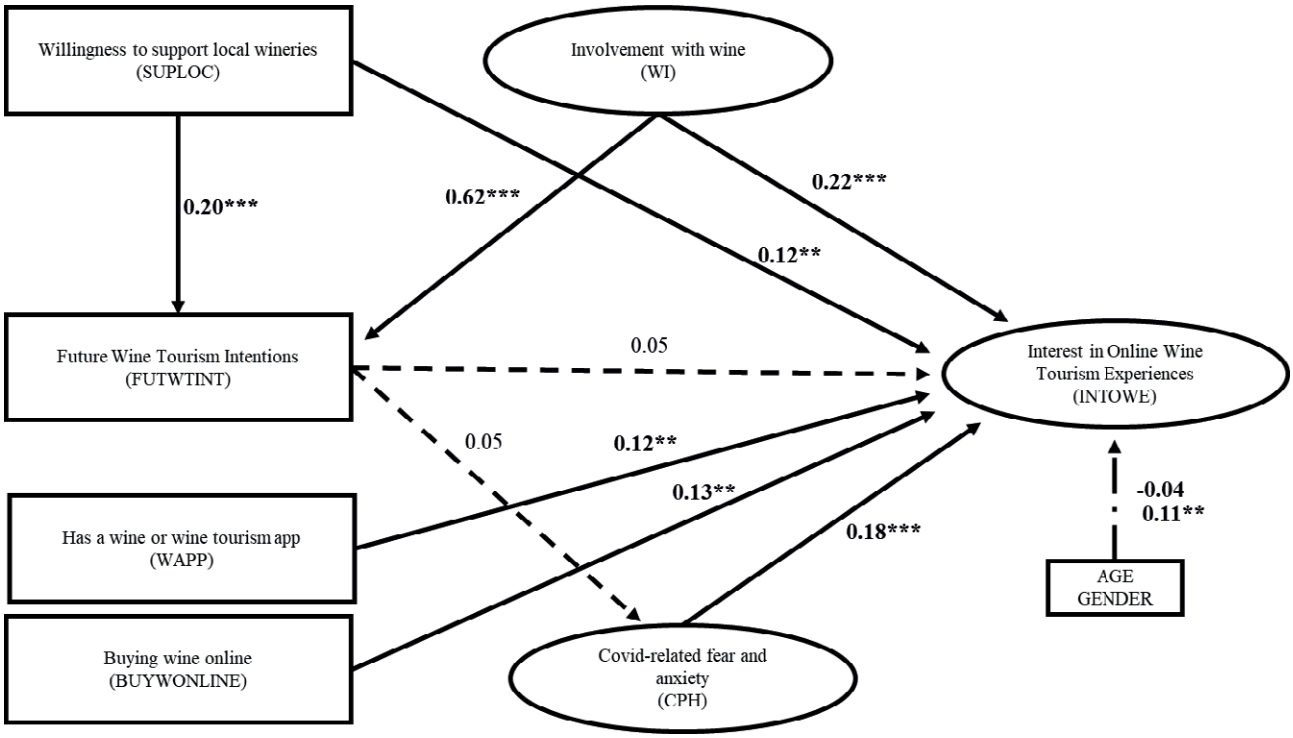

Figure 1. Results of the SEM analysis. Note: *** p < .01; ** p < .05.

ately after the so-called "first wave" of Covid infection in Italy (from March 2020 to May 2020). Due to this, it would be interesting to collect new data to explore how the wine tourists' interest towards such innovative products has evolved with the progress of the pandemic.

The primary result from this pioneering study is that the interest in online wine tourism experiences (INTOWE) is apparently affected by several factors, and not all of them are related to the context of the pandemic. Notably, interest in online wine tourism is the result of a combination between general fear and anxiety of the virus (CPH) and a long-lasting involvement with wine (WI). Indeed, although WI shows a greater effect on FUTWTINT, it also constitutes the major antecedent of INTOWE among those analysed.

Surprisingly, the effect of FUTWTINT on INTOWE is not significant, meaning that the interest in joining an online wine tourism experience like an online wine tasting is not necessarily consequent to the individual willing to go on a wine holiday in the near future. Moreover, the relationship between the two constructs is not mediated by Covid-related fear and anxiety (CPH). This result reveals that interest in virtual wine tastings and oenogastronomic events does not arise in substitution of conventional wine tourism when a greater fear and anxiety of Covid-19 is present.

Since INTOWE is predicted by WI but is not a result of FUTWINT (i.e., intention to visit a wine region in a future holiday), online wine tourism products may attract involved wine consumers who are not (yet) regular wine tourists, and the two activities may be seen as two separate products by consumers. Future analyses should segment virtual wine experiences consumers based on their personal involvement with wine to explore potential group differences in their intentions and behaviour towards OWEs, the winery offering the experience, and the related wine region.

As previously reported, CPH also directly impacts INTOWE with an effect size comparable to WI. This effect can reasonably be linked to a higher perceived safety connected to online experiences since the Covid-19 outbreak, especially in light of the negative effect of Covid-19 fear and anxiety emerging in tourism-related studies referring to conventional travels [e.g. 5]. Variables referring to wine digitalisation (WAPP and BUYWONLINE) have a significant impact on INTOWE, confirming that being familiar with wine-related digital tools significantly increases interest in online wine tourism. This finding suggests wine apps may be an effective channel to advertise online wine tourism experiences and target potential consumers. In this respect, age does not seem to play a significant role, while gender differ-

ences are present. Finally, willingness to support local wineries predicts both FUTWTINT and INTOWE. The latter constitutes an encouraging signal for wine tourism stakeholders, who might emphasise this aspect in their communication strategies to improve their effectiveness.

Results of the present study refer exclusively to online wine tastings and oeno-gastronomic experiences, while virtual wine tours seem to constitute a separate subject and represent an interesting topic for future research. As previously mentioned, new data could assess changes in the relevance of context-related antecedents with the pandemic's evolution.

The choice of snowball sampling has been widely applied to tourism and social science studies [84, 85], and like Villacé-Molinero et al. [86] is deemed the appropriate technique in light of the urge to collect data on a rapidly evolving phenomenon under unprecedented circumstances (i.e., the Covid-19 pandemic). However, it comes with limitations such as self-selection bias, over-representation of subgroups having similar characteristics [87], and thus lack representativeness. In this study, data have been collected online through social media and via email to personal contacts, with no compensation for respondents: this feature may have led to pre-selecting respondents who are familiar with digital tools and are interested in the topic. As a consequence, respondents' age in our sample is slightly skewed towards younger wine tourists. The large sample size and the socio-demographical diversity of respondents contribute to overcoming these limitations, although further research is needed to assess the generalisability of our findings.

To sum up, our exploratory study suggests the presence of both a long- and short- term motivational force behind the interest in online wine tourist experiences, which is not exclusively driven by fear of the virus but is also connected to long-term product involvement. Therefore, the study leaves room for future developments in the online wine experiences market. It also suggests this kind of product should not be seen as a substitute for regular wine tourism but rather as a marketing tool to keep connections with existing consumers alive or attract new ones. Indeed, online wine tourism experiences can bring several advantages for wineries: first, they can overcome spatial barriers, reach a broader audience of potential consumers, and boost the international diffusion of wine and wine regions. Second, unlike other digital marketing actions, they preserve the possibility to establish direct contact with the final consumer as happens with in-presence visits. Finally, virtual wine tourism activities can also be provided during the low season, thus becoming a tool to attract tourists during the pre-decisional and pre-actional stages of travelling [88]. In the latter case, the benefits of online wine experiences can extend to the whole destination.

With this in mind, the actors of the wine tourism sector should try to implement and promote an offer of virtual wine tastings and food and wine events having a long-term perspective in view. Indeed, online wine experiences offer greater opportunities than just allowing to cope with Covid restrictions. On their end, policymakers could facilitate farmers to overcome the objective technological boundaries characterising the sector, both at a national and firm-level. Particularly, both financial and technical support are crucial to implement broadband infrastructures, jointly with specialised training for wineries and small-medium wine tourism enterprises (e.g., farms), to level up their digitalisation. Wineries' digitalisation and proximity tourism, intended as travels close to tourists' place of residence, are indeed two significant steps fuelled by Covid-19 that can have considerable repercussions on future sector dynamics, especially for pursuing sustainability goals.

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Re-visiting the concept of winescape through netnography: "A tale of two cities"

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Abstract. Winescape is a central concept in wine tourism studies but is still under-researched, especially when package tours are concerned. This study has a two-fold objective: 1) to identify the winescape attributes of an emergent wine destination (Bulgaria) as perceived by organized wine tourists and compare them to a well-established Old-World wine region (Italy), and 2) to unveil the links between winescape attributes and servicescape dimensions. To this end, we employed a netnographic approach through the application of content analysis of TripAdvisor reviews and a combination of closed and open coding. Seven categories of winescape were identified, which almost completely coincide with the results of previous research. At the same time, some differences were found, mainly in the salience of the individual elements, which suggests a different composition of the winescape depending on several factors, among which the characteristics of the destination and the specifics of the tour operator. The study complements existing knowledge by validating a previously proposed model, and at the same time showcasing the context-dependent differences in attribute salience for two different types of destinations. In addition, it is the first to identify the links between the traditional supply-driven winescape models and the more holistic concept of experienscape.

Keywords: winescape, wine tours, qualitative research, netnography, Bulgaria.

1. INTRODUCTION

Wine tourism is often defined as a sub-type of gastronomy tourism 'whose purpose is visiting vineyards, wineries, tasting, consuming and/or purchasing wine, often at or near the source' [1, p. 44]. Consuming a product at the place it was produced enables the visitor to connect to the territory and its culture. The complex blend of a destination's landscapes, culture, food and wine products, and the techniques employed for producing them shape its identity and are perceived as 'the foundation of the DNA of the tourism experience' [2, p. 9]. It is therefore no surprise that wine tourism is seen not merely as a wine-related activity, but an immersion into the winescape [3].

The concept of winescape is gaining increasing attention in the field of wine tourism. There are several reasons for this - on the one hand, it is broad enough to cover almost all aspects of this type of tourism product, and on

the other - it is often used as a basis for analyzing the image of wine tourism destinations [4], wine tourism experiences [5], or customer satisfaction [6]. At the same time, its conceptualization is still considered to be in its nascent stage [7].

In purely technical terms, wine tourism is usually perceived as a visit to wineries and vineyards, but in fact its scope is far wider. In recent years, visits to wine bars and tastings in major urban centres have become increasingly popular, as well as the participation in various wine-related events - wine exhibitions, wine festivals etc. Apart from that, wine tourism can be practiced both individually and in the form of an organized trip. Research on winescape has been mainly focused on the micro (winery) and macro (wine region) level, while studies on wine tours and wine events remain scarce [8].

Servicescape is perceived as the major source for constructing personally significant experiences [9]. Thus, it is directly linked to customer satisfaction [10] and perceived service quality [11]. Being a particular case of servicescape, winescape is sometimes defined as the environment where wine tourism experiences occur [7], [8] and the numerous institutional arrangements and values in this context play a significant role in deriving the benefits wine tourists pursue [5]. With this in mind, knowledge of the winescape attributes and how they are perceived and appreciated by tourists is essential for the successful operation of the winery and the wine destination. In this respect, the following three trends have been observed in recent years – 1) a holistic approach, including analysis of as many stakeholders as possible [12]; 2) an emic rather than an etic approach, where the study does not employ ready-made, predefined models, but is informed by consumer-driven data [4]; 3) an increasing variety of methods used to collect and process information [7], [9]. In line with the above trends, this article focuses on a hitherto neglected stakeholder in wine tourism - wine tour providers. Despite using a previously proposed model, the approach is predominantly emic - in addition to validating the model for a different context, the study is open to updating and supplementing it based on consumer perceptions.

The winescape reflects the objective resources and features of a given wine establishment or a wine region and it can be therefore presumed that different contexts will present varying configurations at least in the salience of individual attributes. There has been a call for studies on the way tourists assess winescape attributes in a specific wine region, which can also be done from the perspective of package tours [13]. This study provides insight on the way winescape is perceived by organized wine tourists in Bulgaria – a wine region, which is worth studying because of its interesting pattern of development as a wine producer and because of the fact that it is exemplary for an emergent wine destination from an understudied region – South-Eastern Europe. Once among the top wine exporters in the world, the country had to totally rearrange its viticultural sector and start its development from a very unfavourable base [14]. Taking Bulgaria as a basis for analysis, this study aims to: 1) identify the winescape attributes of an emergent wine destination as perceived by organized wine tourists and compare them to a well-established Old-World wine region, and 2) provide some insight on the links between winescape attributes and experienscape dimensions. To this end, the netnographic approach was taken, through thematic analysis of TripAdvisor reviews.

2. LITERATURE REVIEW

The winescape appeared as a concept in the scientific literature in the 1970s, when Peters [15] defined it as a specific form of an agricultural landscape consisting of three main elements: the grapes, their environment, and the vintners in the context of the cultural practices related to wine. This first perspective was mostly geographical in nature and placed winescape into the broader framework of cultural landscapes; later on, the concept evolved to adopt a more marketing-oriented focus.

In its present use, the winescape is actually more related to the broader term of servicescape, than to the notion of cultural landscape [16]. The concept of servicescape was initially used in the field of marketing of service organizations and denotes the built environment that affects both employees and customers and whose dimensions can be controlled by the firm [17]. This model describes the servicescape in three key dimensions: (1) ambient conditions; (2) spatial layout and functionality; and (3) signs, symbols and artifacts, and excludes the social and natural dimensions. These were later added by Rosenmaum and Massiah [18], who claimed that a servicescape was formed not only by factors that can be controlled by the company, but also by immeasurable, and often managerially unmanageable social, symbolic and natural stimuli.

In a similar vein, Arnould et al. [19] defined two main attributes pertinent to the servicescape: the substantive staging and the communicative staging. The former refers to the physical staging of environment, while the latter is connected with its interpretation and transmits meanings from the provider to the customer.

The winescape models for the macro (destination) and the micro (winery) level do not exhibit any signifi-

cant differences. Scenery setting, the wine product, people and hospitality, ambience of the region, wineries and wine estates are among the main attributes at the wine destination level [4]. The micro level framework presents winescape as consisting of almost the same supply-related elements: setting, atmospherics, wine quality, wine value, wine complementary product, signage, and wine service staff [16]. The only difference is seen in the model of the wine tour servicescape, where tour planning and logistics is one of the most salient attributes [8].

So far, there has been only one study on winescape from the perspective of package tours [8]. It offered a model consisting of six winescape attributes: tour guiding, core wine product, tour planning and logistics, complementary activities, food and dining, and nature and scenery. These were validated by a consequent study on wine tour success factors [13], which was performed for the same destination, but used totally different research methods (multidimensional scaling method, cluster analysis, and sentiment analysis).

Along with the obvious similarities, there are also some noticeable differences in the above models, which mainly refer to the stated significance of individual attributes. At the destination/wine region level, the nature was reported as the most prominent attribute (Bruwer, et al., 2016). In contrast, staff was identified to exert much more influence at the micro (winery) level [16] and in the case of organized travel, where it was operationalized as 'tour guiding service' [8], [13].

Despite these differences, there are enough similarities to suggest a generic winescape framework that encompasses the findings of various studies for the three levels – the micro, the macro and the intermediary one, consisting of six attributes: destination features, wine, people, wineries, food and dining, and signs and symbols [20]. Composed of clearly identifiable attributes, it is supply-related in its structure and content, but when assessed, the approach is usually demand-oriented, taking the customer perspective by employing either structured surveys [6] or free text analysis [21].

There is one more approach in conceptualizing winescape that differs from the attribute-based models presented above – the wine-experiencescape [10]. It is premised on the theory of experienscape, which is defined as the stimuli in a service environment (along with a hospitality culture) that shape tourist experiences and affect customer reaction towards the product [12]. There are five types of stimuli: sensory, functional, social, natural, and cultural. In the case of wine tourism, experienscape has been operationalized in the following way [10]:

- Sensory dimension: wine tasting, winemaking.
- Functional dimension: attributes of utilitarian value such as layout, architectural design and equipment of the winery, layout, signage, quality of the accommodation, and value for money.
- Natural dimension: landscape, scenery, vineyards.
- Social dimension: interaction with fellow travellers in the winery, communication with winery staff.
- Culture and hospitality dimension: heritage, attitude, and behavior of the employees and staff toward the customers.

The model is entirely based on literature review and there has not been any empirical study to test how the dimensions are linked to attributes identified in previous research. The present study will attempt to fill this gap by constructing a model, which takes into account both the supply-related attributes of traditional winescape frameworks, and the more demand-oriented dimensions of Pizam and Tasci's and Gunasekar et al's concepts. The two research questions are:

RQ1. Are there any differences in winescape attributes' perceptions for a well-established Old-World wine destination (Tuscany) and an emergent destination from South-Eastern Europe (Bulgaria)?
RQ2: How are supply-driven winescape attributes and the experienscape dimensions linked?

3. MATERIAL AND METHODS

3.1. Study area

The study is focused on a specific country – Bulgaria, which can be used as exemplary for an emergent wine destination with an interesting history as far as wine production is concerned. For more than 20 years (1961-1985) the country almost consistently ranked among the world top 5 wine exporters [22, pp. 176, 196]. Gorbachev's anti-alcohol campaign in the mid-1980's ended this positive trend, resulted in the loss of a major market and gradual decline of both production and export [23, p. 265]. The decade after 1989 was marked by a dramatic restructuring of the sector and signs of slow recovery were only seen after 2000. In recent years, the country is slowly regaining positions on the world market but by 2021 it ranks only 34th in world wine exports [24]. There is a positive trend of reorientation from quantity to quality, which is especially important for wine tourism. An increasing number of wineries open their doors to tourists, although unfortunately there are no official data on their total number. According to a study conducted in 2020, Bulgaria is in the second stage of the wine destination life cycle [25], visitor numbers

are still small, but with a positive increase rate, horizontal and vertical networks are insufficient, and there are initial steps in the launch of wine routes and joint wine events [14]. There are only a few specialized tour operators offering mainly inbound tour packages. Most of them are small, family owned businesses emphasizing on private and small group tours.

3.2. Data collected

The main goal of the study is to gain a deeper understanding of the winescape, which is best achieved through analyzing qualitative information. One of the relatively new methodologies in this regard is netnography - an interpretive method that adapts ethnography to the study of online societies [26] and is very suitable for 'generating rich, thick description through grounded interpretations' [27]. In tourism studies, the main sources for accessing the needed type of qualitative data are platforms providing user-generated content such as TripAdvisor, Instagram, AirBnB or Flickr. In this particular case, the most appropriate choice was found to be TripAdvisor, because of its high degree of reliability [28], [29] and broad popularity worldwide, which brings in a sufficient number of consumer reviews. One of the few Bulgarian tour operators specializing exclusively in wine tourism was selected as the object of the study – it was also the one with the greatest number of customer reviews on TripAdvisor. The reviews referred to several tours offered by the company, ranging from one-day to multi-day ones. A total of 80 reviews (79 in English and 1 in French), posted from November 2015 to November 2021 were subjected to thematic analysis. The analysis is based only on the body text of reviews, while the title was omitted, because it would often contain information present in the body text, thus leading to distortion of results. The company and its tours have an outstanding traveller rating on TripAdvisor – 77 reviewers have rated them as excellent and 3 – as very good, using the TripAdvisor 5-point rating system, ranging from 1 bubble=terrible to 5 bubbles=excellent. The majority of reviewers were foreign tourists coming from Germany, UK, the USA, Australia, etc., with only 9% of all reviewers being domestic ones (Figure 1).

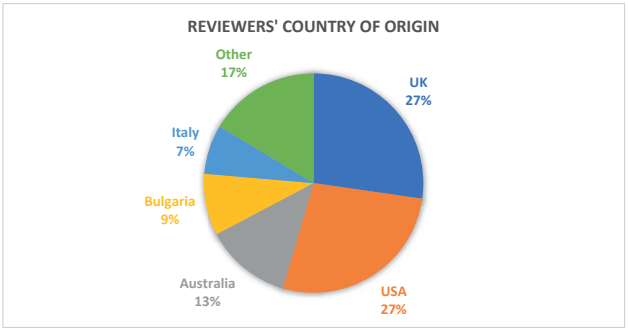

Figure 1. Distribution of reviewers by country of origin.

3.3. Methodology

The identification of winescape attributes was premised on the notion of salience – the quality of some attitudes and beliefs to be more prominent, to enter a person's mind more readily and as a consequence be more frequently verbalized [30, p. 163]. Thus, following the identification of categories and codes, the initial dataset (traveller reviews) were coded manually and the results were quantified in terms of category and code frequency of mentions. The definition of categories and codes was partially informed by previous research – the winescape model of Terziyska and Damyanova [8], but also keeping the in vivo element – new categories and codes were added if identified, which was done through thematic analysis, one of the most popular methods for 'identifying, analysing and reporting patterns (themes) within data' [31]. Reviews were then qualitatively analysed to get additional insight on individual codes and identify possible links between winescape attributes (named categories in the analysis) and the dimensions of the wine experienscape model. Finally, the results were compared to a similar study, conducted earlier in a different context – a well-recognized Old-World destination (Italy). Thus, the research went through seven stages, starting from choosing the dataset and ending with comparison with findings from previous research (Figure 2).

The advent of qualitative analysis software has enabled the use of mixed methods and the processing of large datasets of unstructured text through automatic coding. A lot of recent studies in wine tourism using a

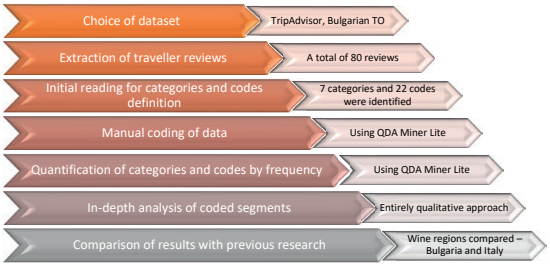

Figure 2. Research stages.

qualitative approach have taken benefit of this opportunity [10], [13], [32]. At the same time, some authors claim that this may lead to a loss of 'valuable, often nuanced, information' and recommend a more in-depth, traditional qualitative analysis of at least some part of the data [33, p. 649]. To answer this concern, the present study is based predominantly on pure qualitative analysis, though some quantification is also included, using QDA Miner Lite – qualitative data analysis software for coding, retrieving and analyzing texts or images.

4. RESULTS AND DISCUSSION

4.1. Winescape attributes for package tours: the case of Bulgaria

The initial category and code definition resulted in the identification of 7 categories (winescape attributes), and 22 codes pertaining to them. Of these, the most salient was the core wine product, which was mentioned in 84 % of cases (traveller's reviews), followed by the tour guide – 83 % (Table 1).

Table 1. Frequency distribution of categories and codes.

Category	% Cases	Code	% Cases
core wine product	84%	wineries	57,5%
		wine-based activities	25,0%
		wine	56,3%
tour guide	83%	knowledgeable	62,5%
		accommodating	20,0%
		friendly	21,3%
		passionate	13,8%
		general/unspecified	12,5%
		fun	5,0%
		English fluency	2,5%
planning and logistics	45%	general planning and coordination	33,8%
		booking	7,5%
		vehicle/driving	6,3%
		pick-up	6,3%
destination appeal	41%	choice of activities	2,5%
		nature and scenery	5,0%
		cultural attractions	36,3%
food and dining	35%	food	27,5%
		dining place	8,8%
complementary activities	5%	passive involvement	5,0%
		active involvement	0,0%
accommodation	5%	hotels	5,0%

Core wine product

The core wine product is composed of three subcategories (described as codes) – wine, wineries, and wine-based activities. Of these, wineries and wines are the most salient, mentioned in 58% and 56% of reviews respectively. This finding was quite expected, as wine tourism revolves around wine, and the places and experiences related to it. At the same time, this is the first study reporting the core product category as the most salient as far as winescape attributes are concerned.

There are three types of reviews on wineries:

(1) Posts that just include the word winery or wine cellar, but do not provide additional information. These were only used for measuring the saliency of the attribute.
(2) Posts that describe wineries using only a few adjectives. The most common words used are *quality, stunning, beautiful inside, small, authentic, organic*.
(3) Posts where the reviewers explain more elaborately what impressed them about their visit. These are the segments that will be analyzed in depth to gain more insight and identify possible links to wine-experienscape dimensions.

Apart from the obvious references to wineries' design, the other two prominent features that stood out during the qualitative analysis were the attitude of wine staff/winery owners and the educational aspect. A number of reviewers discuss the warmth and passion of the employees who welcomed them on site: *'At both locations we were shown round by very passionate vintners'* (Fiona D, UK, July 2021), *'the wineries we visited had the most informative staff'*. The above reviews point to a significant overlap of the role and desired features of the tour guide and the winery staff.

Diversity is also a feature that seems to be highly appreciated by reviewers: 'We visited several different and contrasting vineyards' (Kevmcc655, UK, January 2017), 'Two very different wineries, a great range of very good and very interesting wines. Fully recommended!' (twoa2017, Germany, 2017).

Wines are described as great and delicious. There is also an emphasis on the opportunity to taste traditional local varieties: 'We enjoyed our day tour from Plovdiv and had a great experience tasting wines from traditional Bulgarian grapes, as well as other varietals.' (EBHart, USA, July 2019).

Wine tasting and winery tours are the most common wine-based activities mentioned by reviewers.

> I have been to a fair share of wine tours and what made this trip even more unique is at the end of the trip we learnt how to blend our very own wine with the enologist

> which we bottled and brought home with us. (Mila, Croatia, August 2016)

However, what seems to be most valued is the opportunity to talk to the winemakers / winery owners:

> We visited 11 wineries and received a very warm welcome from every one of them. The passionate winemakers gave informative tours and we tasted almost 60 wines, some of which we could not resist taking home in our overloaded suitcases. (Westbourne W, June 2019)

> Ultimately though it was Vasil and the winery owners' kindness and warmth that made this a really wonderful experience, and we would recommend anyone to try such a tour! (Johanmyst, The Netherlands, September 2021)

The core wine product has obvious links to at least three of the experienscape dimensions – the functional one (references to the design and character of the wine cellars and vineyards – small, different, fantastic, beautiful), the social one (communication with winemakers, focus on warmth, passion and informativeness), and the sensory one (wines, tastings). The cultural dimension can also be seen through the mentions of traditional local wines.

Tour guide

Despite being ranked as second in terms of salience, in reviews the tour guide is often pointed as the main reason for an unforgettable and meaningful experience:

> Vasil, who drove us around and acted as our guide and interpreter when needed, was very knowledgeable about the ancient and recent history of Bulgaria. This background made our experience much more meaningful. (Darby H, UK, June 2017)

Of all the features that were mentioned, knowledgeable stands out as the most prominent one, seen in 62% of all posts. Apart from knowledge in history and culture of the destination (see above review), the other most discussed aspect is expertise in wines and winemaking and the ability to communicate it to an audience with varying degrees of proficiency:

> Our tour guide Nicollet has a true passion for wines and Bulgarian culture and history. Her enthusiasm was contagious as we soon felt like we were touring with old friends. (Pablo J, USA, June 2017).

Friendly and *accommodating* are the two features that follow next in terms of saliency with almost equal frequency of mentions: 21 and 20 percent respectively. In some of them the guide's kindness and responsiveness are directly linked to tourist satisfaction: *'our guide Nicolay was so kind and so good and helpful, that we enjoyed this tour in this beautiful country'* (yiota123, Cyprus, May 2018), *'First of all, the driver was one of the owners and it was a pleasure to spend the day with him. He was friendly, knowledgeable and fun.'* (Celisa B, USA, September 2018).

The tour guide's passion and enthusiasm for their job are mentioned in only 13 percent of reviews but are always linked to a highly positive impression / experience: *'The hosts were fantastic-- they know a ton about wine and you can't help but get swept away by their enthusiasm.'* (Pablo J, USA, June 2017), '*He clearly had a huge passion for Bulgarian wine which shone through throughout the tour'* (Pat M, August 2018).

Fun is another quality of the tour guide, which has been articulated in 5 % of reviews. It is strongly connected with the social dimension of the experienscape and the entertainment aspect of the experience model of Pine and Gilmore [34].

Fluency in English was appreciated by 2 of reviewers, one of whom emphasizes how important this is if you do not know the local language and the guide actually acts as a translator in contacts with locals.

Tour guiding has a pronounced relation with the functional, social and cultural dimensions of the wine-experienscape dimensions defined by Pizam and Tasci [12] and Gunesakar et al. [10]. In line with previous research [35], the tour guides transcend their role as a one-way communicator, and act as experience brokers who, in addition to conveying information (functional dimension), engage their audience in emotional experiences through friendliness, enthusiasm and sharing, and connect tourists (through interpretation) with the destination history and culture.

Planning and logistics

This category is unique to the wine tour servicescape and for obvious reasons is not present in the micro (winery) or macro (wine region) levels. With a share of 45% of mentions, it is the third most important in terms of salience. Apart from that, there are also clear verbal references to its significance for the overall tourist experience.

> The arrangements after the tour were also done very competently and appropriately, with good hotels and transport arrangements, and excellent suggestions for things to do. The whole experience couldn't really have been better. (Kevmcc655, UK, January 2017)

In addition to the flawless arrangements of the tour, attention to detail and the excellent choice of non-mainstream wineries are highly valued: *'The tour was an outstanding success largely due their efficient organisation and attention to detail coupled with a flair for finding smaller more interesting vineyards'* (Martin H, UK, June 2017).

Similar to the findings of Terziyska and Damyanova (2020), the pace of travel and the included activities are also an important factor: *'We packed a tremendous amount into the three days without it feeling exhausting.'* (Lucy L, March 2020).

The booking process has been mentioned in a relatively small number of reviews (7,5 % of all posts). Timely reply, responsiveness to individual preferences and suggestions/information on what can be seen at the destination are appreciated. Convenient pick-up arrangements and safe and comfortable driving are the least salient, with only 6,3% of mentions each.

Choice of activities is the least mentioned subcategory and comments mainly refer to diversity and combining wine tastings with visits to historical sights: *'Each wine stop along the way was slightly different making the tour all the more interesting.'* (Liseylou82, Australia, March 2016).

The Planning and Logistics category does not have a clear link to any of the dimensions of the experienscape defined by Pizam and Tasci (2019). The most logical reference is the functional dimension, as it refers to practical arrangements, which facilitate the creation of a satisfying experience.

Destination appeal

This category refers to the macro environment, or in other words – the appeal of the broader destinations and the specific attractions included in the tour. There are clear cues to the importance of this attribute for a more enjoyable trip and a way to get a more in-depth understanding of the destination:

> The countryside near the Greek border is really quite beautiful and the walking tour of the old town of Plovdiv with its cobbled streets and Roman Theatre made a delightful start to our first day. (Westbourne W, June 2019)
>
> The day was also broken up with a visit to the red church, which was a great way to experience a little bit of the region's history, while sobering up so we could enjoy the wines at the next stop. (Liseylou82, Australia, March 2016)
>
> The three day tour is an excellent way to get a feel of Bulgaria in a very short time. (Lucy L, March 2020)

Food and dining

Food and dining have been mentioned in more than one-third of reviews and are thus ranked fifth of all attributes. Special attention is paid to the opportunity to taste local produce: *'We had lunch at the second vineyard which was delicious and comprised mainly locally sourced produce including goat - which I can recommend!'* (Fiona D, UK, July 2021), and traditional Bulgarian cuisine: *'We had a delicious, traditional Bulgarian lunch thanks to him'*. As stated in Gunasekar et al. (2021), this attribute has an obvious sensory experienscape dimension, coupled with a cultural one. Although there are no cues linking it to the social dimension in this dataset, a previous study [8] points to the existence of such a relation too.

The dining place is usually described as nice and traditional / local and has a slight reference to the cultural dimension expressed through descriptions of style and setting 'The tasting was in a beautiful old town restaurant' (R8574VYpauls, January 2018).

Complementary activities

This category entails activities that are not related to the core product (wine) and exclude visits to cultural attractions, which are under the Destination appeal category. Of the two subcategories – active and passive involvement, only four mentions of passive involvement were found, referring to a visit to a folk festival, craft beer brewery, spa, and a meeting with a rose oil producer. Most of these could be linked to the cultural dimension of the experienscape.

Accommodation

Together with Complementary Activities, this is the least salient category (mentioned in only 5% of all reviews). It is specific to the multi-day wine tours and is clearly lniked to the functional dimension of the experienscape. Seen in 5% of reviews, it is verbalized exclusively through comments on the quality of hotels – *excellent, wonderful, good, far better than most I have experienced*.

4.2. Two types of destination – similarities and differences in the perceived winescape

The present study has followed the same methodology as a previous one [8], which enables a direct comparison of results. As the wine regions are very different in nature – the former one is a well-established Old-World wine destination and a leading wine producer

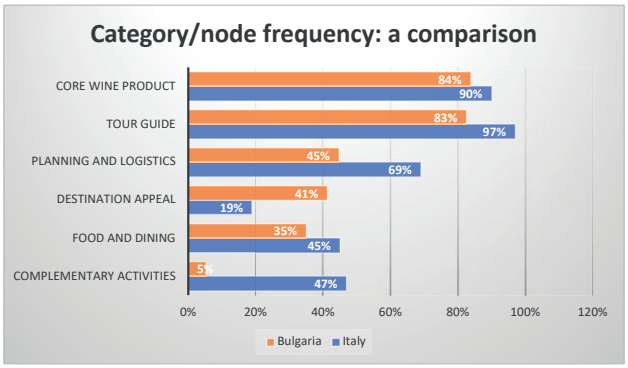

Figure 3. Winescape attributes' salience in Italy and Bulgaria: a comparison.

(Italy), and the latter is a post-socialist country (Bulgaria), which is striving to regain its position on the world wine market, and can be seen as an emergent wine destination, still in its early steps of development [14]. The two companies under study are of the same type – family wine tour operators, offering private and small group packages.

There is an almost complete correspondence between the winescape attributes identified in the two studies, the only difference being Accommodation, which is not present in the study of Terziyska and Damyanova [8], due to the fact that only one-day tours were analyzed.

5. DISCUSSION

The winescape attributes identified in this study almost fully coincide with the model of Terziyska and Damyanova [8], and the success factors presented by Barbierato et al. [13], the only difference being the "Accommodation" attribute, which is present only in this study. "Destination appeal" to a great extent corresponds to "Nature and scenery", but has been extended to include cultural attractions.

This conformity validates the winescape model, but at the same time, there are some significant differences in the salience of individual attributes (Figure 4) that can probably be explained by the different nature and stage of development of the two destinations.

The most obvious differences (more than 20 percentage points) are seen in the following three attributes - planning and logistics, attractiveness of the destination and complementary activities, with the latter exhibiting a difference of more than 40 percentage points.

In previous studies based on sentiment analysis, the *logistical aspect* has been associated more with negative experiences and evaluation [13]. However, in the two studies discussed here, negative ratings are virtually non-existent, and since this is an attribute that applies exclusively to the specific tour company, the difference is probably due to the individual specifics of the two tour operators. In any case, the conclusion that can be drawn is that a higher degree of salience is caused not only by the low perceived quality of this attribute, but also by positive impressions.

In the case of the *destination appeal*, expressed through the natural and cultural attractions, the probable explanation lies in the different phases of wine tourism development in the two destinations. Bulgaria is a relatively new player on the wine tourism scene, with a wine culture still under development. In this case, the increased presence of cultural tourism elements in wine tours compensates for the shortcomings in the winery offerings. This observation is also confirmed by a supply-based study [14], which shows a significant share of the wine&culture type of tours in Bulgaria. In this type of tours, a significant part of the programme is dedicated to cultural/heritage attractions, sometimes at the expense of the number of wine tastings.

The great discrepancy in the salience of *complementary activities* can be attributed to the more general nature of tourism supply in Bulgaria, which is still focused on non-participatory activities and is dominated by visits to natural and cultural attractions.

The lower salience of *food and dining* in Bulgaria is destination-specific – while Italy is a world leader in gastronomy, in Bulgaria this is still a problem area.

As for the two most important attributes – *tour guide* and *core wine product*, the score is higher in the Italian study, but the difference is not so significant. Though not so well-known, Bulgarian wines have a noticeable rise in quality in recent years, attested by a number of international awards [36] and attract with their novelty. At the same time, as evidenced by the rating in TripAdvisor, the specialized wine tour operators in the country offer products of extremely high quality.

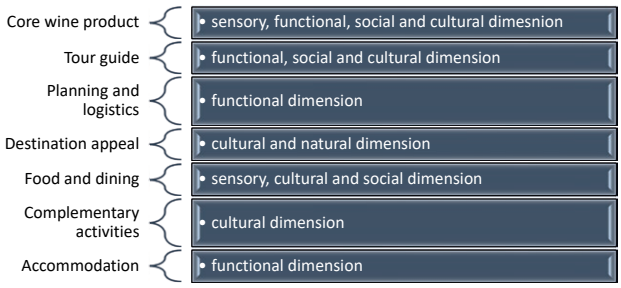

Figure 4. Associations between winescape attributes and experienscape dimensions.

As far as the relation between the winescape attributes and the experienscape dimensions is concerned, the most obvious finding is that one and the same attribute can have several experienscape dimensions (Figure 4). Having sensory, functional, social and cultural dimensions, the core wine products is most complex one, followed by tour guiding and food and dining.

In this study, the categories of "Accommodation" and "Planning and logistics" were found to be related only to the functional dimension of the experiencescape, and "Complementary activities" – to the cultural dimension, but other settings or cases (destinations and individual operators) could produce different results, especially as far as "Complementary activities" are concerned.

6. CONCLUSION

The results presented in this paper validate the winescape model of Terziyska and Damyanova [8] and the success factors of Barbierato et al. [13]. The leading role of the tour guiding service, which dominates as an element of the winescape and is probably the most important factor for success, is fully confirmed. Of no less importance is the core wine product, consisting of wine, wineries and wine-related activities. These are the two attributes with the most references to experienscape dimensions. The core wine product is the most complex attribute, combining almost all dimensions: sensory, functional, social and cultural. The social dimension of the tour guide is exhibited through their role in involving tourists into an enriching and relaxing experience, providing both knowledge and entertainment. A warm and friendly attitude and passion for their job are the most emphasized facilitators to achieving a satisfying interaction and memorable experiences. Tour guides also act as cultural ambassadors of the destination and ensure a deeper insight into its culture and history.

Although the set of attributes is nearly the same in the two studies, which validates the general framework of the model, there are significant differences in the salience of individual attributes. The main reasons for this are the specifics of the firm under study (the wine tour provider), the stage of development and the features of the wine destination (the structure and nature of the viticultural sector and the tourist products offered by wine cellars) and the general trends in tourism development in the broader destination. Providers in Bulgaria, which is an emergent wine destination, seem to rely more heavily on attractions other than wine and this is reflected in the perceived winescape. The resources of the destination also have their impact – in Italy, the food and dining aspect is much more pronounced. It was interesting to find out that wine popularity did not exert significant influence – in the case of Bulgaria it was compensated by novelty, quality and local character (the opportunity to taste local varieties).

As winescape attributes are easily translated into success factors [13], the above findings can be very useful for wine tourism practitioners (both wineries and tour operators) in analyzing their products and adjusting them to customer needs. The model can also be used as a basis for measuring tourist satisfaction for wine tours, because of the association between salient product attributes and customer satisfaction and tourist experience [33], [37]. Last but not least, the results can be used for future comparative studies to identify context-specific patterns for different types of wine destinations.

The main limitation of the study is the fact that was conducted for a specific destination – Bulgaria, which hampers generalizability of results. However, most probably findings will also be valid for other destinations of the same type – newcomers on the scene of wine tourism.

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What do women like? A quantitative study of the female behavior of sparkling wines consumers

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Abstract. The purpose of this paper is to investigate the purchase process of the sparkling wines female consumers, in order to understand the variables that influence the purchase process of this product. The consumer behavior in the purchase decision process is one important topic of the marketing studies, to the extent that it helps to explain how decisions are made and what elements determine them, it can support strategic marketing decisions. The importance of gender segmentation has been highlighted in several studies; in addition, women have made most purchases and their influence in purchase decision has been highlighted. This study uses data from a survey carried out on a representative sample of 1,003 female consumers from Brazil. It was used a five levels Likert scale; Independent tests and correspondence analyses were performed. The study could identify the five main factors influencing the choice. Also, the results contribute to elucidate points such as confidence to choose and consumption occasions and contexts.

Keywords: Brazil, consumer behavior, purchasing decision, gender.

1. INTRODUCTION

The consumer behavior in the purchase decision process is one of the main topics of the marketing studies. The consumer behavior can be defined as a set of physical and mental activities, carried out by goods consumers that result in decisions and actions, such as how to search, choose, purchase and use products and services in order to satisfy a latent need [1, 2]. According to Solomon, consumer behavior is the study of the processes involved when individuals or groups select, buy, use or discard products, services or ideals to satisfy their needs and desires [3].

When an organization proposes to study consumer behavior, it seeks the purchase's motives, how decisions are made and what elements (internal and external) determine such decisions [4, 5]. Thus, several factors, such as individual differences, environmental influences and psychological processes, can affect purchasing and consumption behavior [6]. This topic is one of the most

complexes of marketing and the work for understanding it stimulates an increasing number of researches in this field.

The importance of gender segmentation has been highlighted in several studies, including online shopping and services [7, 8]. Women are responsible for most of the purchase and an important part in purchasing decisions, which indicate that this segment can be better considered in terms of advertisements, products, marketing strategies and studies.

The purpose of this paper is to investigate the sparkling wines, in order to understand what are the variables that influence this product's purchase process. The Brazilian female sparkling wines consumers represented the study group.

The wine production in Brazil was introduced by Portuguese and Spanish in XVI century and was consolidated starting with XIX century due to Italian immigrants' direct participation. The Brazilian vineyards occupy an area of 86 thousand ha, in 6 main regions. [9]. The wine production is concentrated in the south, the State of Rio Grande do Sul gives almost 90% of national production of wines and grape juices, an annual harvest between 600 and 700 million tons. The country has 1100 wineries, mostly small properties, with an average of 2ha [10].

In the international context of wine consumption decline, the official data indicated a 50% increase in the marketing of Brazilian sparkling wines between 2010 and 2018 [10]. The situation was different for the still wine, which fell by 28% in the same period [11]. Another element of interest, in Brazil, is represented by the relation between imported and local wines: official data indicates that 75% of the sparkling wines consumed in the country have national origin, despite only 12% of still wines [12]. This data reinforce the importance of studying the sparkling wines' consumer behavior, providing a better understanding of this rising market, as well as data that can support more effective marketing actions.

This research aims to help marketers, as well as sparkling wine producers, to consolidate the possible guidance of female consumers. It also aims to add knowledge about the behavior and preferences of women in terms of most relevant factors of their decision making at the time of this purchase. A better understanding of female behavior allows the use of market segmentation techniques to highlight specific groups of consumers and the monitoring of purchases [8, 13, 14]. In this sense, the work intends to comprehend different profiles and preferences, contributing to a more effective segmentation of the studied group.

2. BACKGROUND

2.1 Woman's consumer behavior

The transformations experienced in the technological, economic and social environment in recent decades have changed the manner how consumers, in particular females, have been buying. Experts like Peters [15] have advised companies to focus their strategies towards women, as this market segment is an excellent business opportunity for any organization [15]. Women are still a depreciated segment in terms of advertisements and in various commercial groups, even though they represent more than half of the world's population and are responsible for an important part in purchasing decisions [16, 17].

Historically, women have made most purchases. They buy for the family, including products for husband and children, but the last decades have witnessed important changes in the woman's social and professional life [14, 18]. The first changes of the female's role took place in the family, when millions of women were launched into the labor market and left their homes, to spend more time outside [19]. The social change brought by the inclusion of woman into the labor market has a significant role in spending on food, as well as on alcoholic beverages [20].

In terms of buying and consuming behavior, women have been dealing with products considered "masculine". For example, researches prove the influence of the female market in the purchase of vehicles and alcoholic beverages [21]. In the case of wine, researches have highlighted the role of women and the importance of segmentation by gender. In the "Old World" countries, wine consumption has been associated to the men, but to the "New World" women have been increasing the consumption, becoming even more representative than men [22, 23]. Thus, researches indicate that women buy 80% of the wine sold in the USA [24].

The influence of gender on wine buying and consumption behavior has been examined in some prior research. Forbes highlight that even if several studies propose relation between wine attributes and gender, there is lack of consistency in terms of results and practical implications of gender segmentation [21]. For instance, this exploratory and cross-country study about the influence of gender on wine buying and consumption indicates that gender has no significant impact in terms of number and importance of attributes, and little impact on the frequency. On the other hand, the results pointed that women are more sensible by price discounts while men pay attention to region of origin [21]. Otherwise, study based on sociodemographic profiles of wine

consumers indicate that gender is a determinant factor to the frequency of wine consumption [22].

Among the factors considered no buying behavior are: factor of time, economic situation, long term consideration, influence of advertisements, post purchase experience and past regrets related to the purchase [13]. In terms of practical imprecations to marketing, women like a collaborative, conversational style dialogue. In this sense, advertisements are often more detailed, considering women tend to ask more questions and they have a longer decision process. Also women appreciate very fine distinctions as consequence of being more sensitive, registering higher level of sight, sound and touch [13, 17].

In terms of wine buying and consumption behaviour, women are more to associate wine to the context of consumption while men associate it with convivial and sensorial pleasure. In the moment of choice, women seems to carry more about brandy and previous experience and they are more willing to dialog, seeking information from store personal, sommelier or a server [24, 25]. Labels and shelf tags are also significantly more important for women than man, according to Atkin et al. [24]. These are some findings and indications from previous studies and literature that can provide some orientations to marketing professionals. Overall, it is also important to understand that there are differences inside this large group of "women" and that marketing strategies should consider it into the segmentation's decisions.

2.2 Women and the preference for sparkling wine

In the sparkling wines market, 60% of Brazilian sparkling wines' consumers are females [26]. In addition to Brazil, in Australia women are the biggest wines consumer, according to the Australian Bureau of Statistics; more women than men bought wine [27]. In the United States, study that retrieved data from 2010 to 2016 indicates that 50% of Americans women who consume alcoholic beverages prefer wine, comparing to 18% of men [28].

It is necessary to understand a little more about the female universe, in order to understand these statistics. For example, women can have better tastes and smells than men. Their capacity to distinguish different odors is up to 20% higher than that of men; so, women taste wines more subtlety. They have a better olfactory sensitivity than men and can better understand the complexities of wine [29]. They also feel the subtleties of white wine more often than men [30].

Therefore, the significant differences in wines types are explained by the physical and sensory differences of the different genres. This fact defines preferences, as white wines tend to have more subtle acidity and lower tannins, while red wines, in most cases, have a lot of tannins. Women's palates tend to be more sensitive. This may explain why many women prefer white wines, which have more subtle acidity and lower tannins content. On the other hand, within red wines, they find higher tannins content, astringency and bitterness.

Therefore, women prefer less potent wines, because they are easier to consume and to enjoy; consequently, they are more likely to consume white and sparkling wines than men [24, 29, 31, 32]. Men tend to look for red wine and women for delicate wines [30, 33]. A study of Australian wine consumers found that women are more likely to drink sparkling and white wines [32]. Similar results were found in a Canadian study [34]. Also, women consume significantly more white wine than men [29].

There are several academic studies on wine consumer behaviour in countries such as the United States, Portugal, England, France, New Zealand, Peru, Australia [29, 35–40], however, there are few studies that focus their aim on women who consume sparkling wines. Unfortunately, the role of women as wine buyers is often poorly understood and underestimated; gender-specific segmentation is therefore an important issue in wine marketing [41].

3. MATERIALS AND METHODS

3.1 Research design

This study is based on quantitative approach, collected quantitative data from individual respondents using on-line survey. The questionnaire was developed and refined during a two-phased pre-testing approach. In the first phase, the construct validity was checked by 3 expert participants. The identification of participants' names and characteristics are reserved in order to preserve confidentiality commitments. The experts were two women and one men, age between 30-40, with research in customer behavior, wine management and wine marketing. In the second phase the questionnaire was pilot tested, being possible to correct some problems arising from the consumer's interpretation, as well as technological problems.

A non-probabilistic sampling research was carried out for convenience, with female consumers of sparkling wine in Brazil (state of Rio Grande do Sul, RS), using survey online. Data collection included 1,003 women who consume sparkling wine and live in Brazil (RS). The final sample had 1000 answers, 3 questionnaires were discarded due to inconsistency. The data collection covered the period from March 26 to April 26, 2018.

The questionnaire had 31 questions, seeking to find the variables that influence the decision making at the time of purchase. The variables were divided in 3 blocks: socioeconomic characteristics, consumption characteristics and behavioral aspects. The information on socioeconomic and consumption characteristics was collected using mainly categorical questions.

Behavioral aspects were measured in this study using five-point Likert scales. The main observed aspects were: the recommendation, the consumption on special dates, the daily consumption, the preference for organic and the difficulty in sparkling wine selection. The choice of the five-point scale was based on the fact that it is metric accurate and, at the same time, easier and faster to use than other types of scales (shorter or longer, as is the case of the three and seven points scales). Different studies have been carried out to support such a decision [42].

The collected data were organized and analyzed using Excel. The analysis initially used descriptive statistics, including the frequency distribution, the mean and the standard deviation. Cross-analysis was performed for better understanding the consumption and purchasing behavior, using the $\chi 2$ independence test, with significance being tested at the 0.01 and 0.05 levels. This test shows whether there is a relationship between sociodemographic aspects or consumption frequency and other variables that indicate habits and consumption preferences. The evaluated aspects were found to be reliable when tested, with a Cronbach's a of 0.780.

3.2 Data analysis

The sociodemographic characteristics of all respondents are shown in Table 1.

Regarding the age group, it can be noticed a concentration, well distributed among the segments, between 26 and 50 years old, summing just over 73% of the studied group. This finding corroborates with the previous consulted data, which indicated that sparkling wines represent an attraction for all ages, concentrating a large part of their consumption among the population between 25 to 64 years old, but are common in all groups [10].

4. RESULTS AND DISCUSSION

4.1 Consumption characteristics

Table 2 summarizes Consumption characteristics from the sample analysis.

Table 1. Socioeconomic profile of sample group.

Variable	%
Age (years)	
18-25	14.1
26-33	26.6
34-40	26.1
41-50	20.9
51-64	11.6
65+	0.7
Education	
Post-graduation (Specialization, Master or PhD)	39.6
Complete Higher Education	25.4
Incomplete Higher Education	22.9
High school	11.2
Elementary School	0.9
Occupation	
Employee in the private sector	29.0
Public functionary	26.6
Freelancer or independent professional	22.8
Businesswomen	7.4
Trainee	5.0
Unemployed	9.2
Revenue (US$)	
Under 850	27.0
850-1700	32.1
1700-2850	14.1
Over 2850	8.6
No information	18.2
Marital status	
Single	29.7
Stable Union/Married	46.0
In a relationship	16.8
Separated or divorced	5.8
Widow	1.7
Children	
Yes	52.8
No	47.2

On terms of sparkling wine type, the Muscatel is the most consumed, with 39,2%. Such preference corroborates with the literature: women prefer delicate and less potent wines, since muscatel has a higher sugar content comparing to other sparkling wines [24, 30, 33] [24, 30, 33, 43]. However, it is interesting to note that brut and brut rosé are the segments with the highest consumption after muscatel, summing 22.8% and 18%, respectively, while demi sec is only in fourth place with 14.2%. This data indicates that the relationship between women and sugar content is not linear, which means that women

Table 2. Consumption characteristics.

Characteristic	%
Type	
Brut	22.8
Brut Rosé	18.0
Demi sec	14.2
Muscatel	39.2
Pro Secco	2.9
Nature	2.4
Season	
Summer	84.1
Spring	32.5
Autumn	24.9
Winter	21.9
Frequency (glasses/month)	
1-2	33.6
3-4	22.7
4-6	19.4
7-10	11.4
10+	12.9
Place of purchase	
Border and free shops	27.3
Cellar and specialized stores	20.1
Directly from producer/wine maker	11.9
Pubs and bars	10.8
Restaurants	6.0
Internet and online purchases	4.6
Place of consumption	
Residence	80.6
Family events	36.4
Social events	33.2
Pubs and bars	15.7
Restaurants	5.2
Trips	4.3

would prefer sweeter sparkling wines. If added the brut category (white and rosé), it is obtained a higher value than muscatel. In addition, both brut have values higher than demi sec, the second category in sugar content.

Regarding the season, the women consume sparkling wines particularly during summer, summing 84% of the total. Therefore, the higher the temperatures are, the greater the consumption of sparkling wine by women is. It is important to add that although Brazil is known for being a tropical country, the research was carried out in the southernmost state of the country, which has a humid subtropical climate, with well-defined seasons. Another aspect to note is that summer is also the period of the Christmas and New Year celebrations, which are moments identified with the consumption of sparkling wines in general.

In terms of frequency, the average was calculated for all year long and not for the months or for the period of consumption. The concentration in the lower segments (just over 56% consume up to 4 glasses per month) reflects the national trend, with an average annual wine consumption of 1.9 l/per capita [44]. The relation between frequency and other variables regarding consumption factors is presented below.

In terms of place of consumption, the participant's or her partner's residence was indicated by more than 80% of the studied group, which is quite representative. Family and social events are in the second place. They represent together almost 70% of the participants, reinforcing the idea of a relation between sparkling wine and festive moments. The lack of representativeness of commercial establishments, such as pubs and bars (15.7%) or restaurants (5.2%) drew attention and it can be explained by values, availability or package. Such hypotheses can be tested in future works.

4.2 Purchase factors

Women were asked about the factors that most influence the sparkling wine choice, having the possibility to choose up to 3 alternatives. Table 3 summarizes the results.

The main factors that influence consumption are taste, having tasted sparkling wine before, brand and someone's recommendation, which corroborate with

Table 3. Factors that most influence the choice.

Factors	%
Flavor	49
Having tasted the sparkling wine before	41
Brand	39
Someone's recommendation	35
Price	33
Sparkling wine's origin (region or country)	19
Promotional highlight in shops	17
Medals and awards	8
Have read posts / comments on the Internet / Social Networks	5
Information on the back label	3
Packages and Accessories (glasses, boxes)	3
Having read about the sparkling wine in a guide	3
Alcoholic Content	2
Attractive front label	1
The sparkling wine being organic	1
Information on the shelf	1

results found in literature. For example, the results of a research carried out in Portugal showed that the most valued factors at the time of purchase are the price, the origin region and the friends' and family's recommendation [40]. A cross-country study in four countries already showed that the main factors influencing female consumption were the price, the type, have/having tasted the wine, applied discounts, the variety and the brand [21]. However, the price is the first attribute in both studies, but does not apply in present research, where price is ranked on 5th place.

For women, having tasted the wine before has more weight at the time of decision [45]. In addition, women use the friends' and family's recommendation and their own knowledge as their main strategies to reduce the risk when buying [40]. Thus, the research showed the women's priority in appealing to their prior knowledge to support the purchase decision, this factor being even more important than the price.

Sparkling wine's origin (region or country) was the 6th factor in purchase decision. Previous studies pointed out that men were more concerned with origin than women, which can't be confirmed in this study [46–48]. Even if research findings have not always been so conclusive, this point is a lack to be explored in further studies.

4.3 Behavior aspects

The influence of age on the sparkling wine consumption frequency was the first behavioral aspect analyzed. The relationship was validated through a X2 independent tests. Table 4 presents the results.

Regarding age, the choice of different products and services is linked to this characteristic, as there is a change in habits and new expectations arising from maturity [49]. A premise found in the literature of this study area is that the frequency of consumption increases with the woman's age [29, 50, 51]. Analyzing the data, it can be noticed that the quantity of 1 to 2 glasses drops, while the consumption of 7 to 10 glasses per month increases, as the age advances.

In a qualitative research carried out in Portugal, based on an in-depth interview with 15 women aged between 23 and 35 years old, it was revealed that the majority of the interviewees increase the frequency of consumption with age. Women said they felt more comfortable drinking wine and wanting to try new wines. Other women revealed that consumption remained constant and increased in quality and not necessarily in quantity [40]. The hypothesis of increased quality was tested, considering quality as a synonym for willingness to pay higher prices, and validated through a X2 independent test. There is evidence of a relationship at 5% significance between age and quality (higher prices).

Table 4. Influence of the age group on the frequency of consumption (% of consumers).

	Frequency (glasses/month)					X^2
	1-2	3-4	5-6	7-10	Over 10	
18-25 y	40.7	15.0	27.1	10.0	7.1	47.96
26-33 y	40.8	19.5	23.2	7.1	9.4	
34-40 y	29.0	15.6	24.4	13.7	17.2	
41-50 y	26.2	21.9	21.0	14.3	16.7	
51-64 y	31.6	29.8	15.8	11.4	11.4	
Over 65 y	28.6	14.3	28.6	28.6	0.0	

Note: n=1000; Significant at 1 per cent level.

Another aspect analyzed was the consumption on special occasions or daily. The instrument proposed that consumers position themselves in two antagonistic statements - the first showing the sparkling wine consumption more daily and the second relating the sparkling wine consumption only to special occasions. As it can be seen in table 5, both statements had a high degree of disagreement, which means that the sparkling wine consumption does not occur only on special occasions, but also that it does not happen more daily.

The association between sparkling wine and celebration moment can be seen in this research, since more than 67% of women disagree that they consume more on a daily basis. On the other hand, the research also identified a new behavior - the sparkling wine consumption also on a daily basis - indicated when more than 72% disagree that they only consume on special dates. Thus, it can be observed that the relationship between sparkling wines and special dates occurs again, but that the sparkling wine is also part of other moments.

4.4 Sparkling wine choice

One of the results that surprised the most in the research was in relation to the decision to buy or to choose the sparkling wine. Women were asked about the level of knowledge of sparkling wines and who made the decision to buy or to choose the sparkling wine. Tables 6 and 7 present the results.

Previous studies indicated that choosing a wine is a difficult and uncomfortable activity and that self-confidence would be an aspect to consider supporting the decision-making process [50, 52]. The results of this research do not indicate any evidence that the task of

Table 5. Special occasions or daily consumption (% of consumers).

	Likert scale ("strongly disagree" to "strongly agree")					
	1	2	3	4	5	Mean
Consumption just on special dates	48.9	23.4	12.9	8.4	6.4	2.0
Daily consumption	40.6	26.9	15.0	7.7	9.8	2.2

Note: n=1000.

Table 6. Level of knowledge of sparkling wines (% of consumers).

Characteristic	%
Expert	1.0
Very Good	4.2
Good	16.1
Week	39.2
Medium	34.7
Null	4.8

choosing sparkling wine is difficult to be accomplished for women. Even though more than 78% consider themselves to have little knowledge about sparkling wines, more than 65% disagree with the statement that choosing a sparkling wine is a difficult task.

On the other hand, the studies also show that younger women are more likely than men to be influenced in their purchasing decisions by family, friends and other third parties [29]. This trend can also be seen in the present study. The influence of the age group on the purchase decision is significant and validated through a X2 independent test, significant at 1 per cent level (Table 8).

A greater influence of third parties on younger women can be seen, although in all age groups the majority of women claim to make the purchase decision. The partners and the family are the main influencers for the youngest. The influence of the family decreases and the participation of friends increases between 26 and 50 years old.

In an overview, when it comes to make the decision of which sparkling wine to buy, about 73% of women make this choice. This result contradicts previous studies which find that women deliberately give up responsibility for the purchase of wine in several situations of public purchase and consumption [29, 36]. In this regard, the present research shows a group of consumers who make the purchase decisions, not transferring this choice to partner or family members.

5. CONCLUSIONS, IMPLICATIONS, LIMITATIONS AND FUTURE RESEARCH

When an organization proposes to study the behavior of women in relation to a specific product, it is necessary to understand that they have gone through and continue to go through several social changes. The

Table 7. Confidence in the sparkling wine purchase decision (% of consumers).

	Likert scale ("strongly disagree" to "strongly agree")					
	1	2	3	4	5	Mean
I consider choosing a sparkling wine a difficult task	37.1	28.3	17.0	11.7	5.9	2.2

Note: n=1000.

Table 8. Who chooses sparkling wine by age group (% of consumers).

	18-25 y (14%)	26-33 y (26.7%)	34-40y (26.3%)	41-50 y (21%)	51-64 y (11.3%)	Over 65 y (7%)	X^2
Me	55.7	76.0	77.6	74.8	74.3	57.1	61.19
Friends	5.7	6.7	6.5	10.0	7.1	14.3	
Partner	17.1	10.1	11.4	11.4	9.7	0.0	
Family	18.6	5.6	4.2	3.3	8.8	28.6	
Waiter or Salesmen	2.1	0.7	0.0	0.5	0.0	0.0	
Others	0.7	0.7	0.4	0.0	0.0	0.0	

Note: n=1000; Significant at 1 per cent level.

insertion of women on the labor market influenced the most the beverages market and provided greater financial independence and increased social participation at events, clubs and restaurants. Thus, it transformed the lifestyle of modern women and stimulated the consumption of drinks, especially sparkling wine.

This study was based on a convenience sample and limited to a wine producing area. Further studies can expand the sample and test the findings in other contexts. Also, this study had an exploratory approach and future research can use established consumption scales. In addition, this study was based on a female sample; further studies can include a comparison between women and men in the same analytical basis.

It is important to highlight that data collection was carried out in 2018, before pandemic scenario. In our analysis the pandemic does not change the main conclusions, to the extent that it contributes to increases consumption and not the factors of choice, according to local marketing research.

This research showed that women have no difficulty with choosing the product and do not find it a complicated task. They do prefer to choose the product, not leaving this decision to a partner, boyfriend, friend or family member. Women choose and they are not influenced by them either; simply, they choose for them. Major influencers in consumption were not observed, excepting their own will. Also, it was a surprise that the price was not the most important influence on this product's consumption, as imagined.

The most interesting information for sparkling wine producers is that there is a market potential that differentiates daily consumption and consumption on special dates. Women assume that they not only consume on special dates, but also, that they do not consume more on a daily basis than on special occasions. This is very important, as sparkling wine has always had the stigma of being a seasonal product.

Further studies are needed. In addition to gender issues (an important theme and still little explored), other elements need to be unveiled, including understanding whether there is an economic divide, which helps to better understand the behavior of these consumers. Also, understanding the influence of local culture on these consumption habits becomes imperative. We hope that this study will serve as a stimulus for such research.

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U.S. Wine consumer interest in wine ingredient and nutritional information

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Abstract. In the United States, labelling for wine containing at least 7% alcohol by volume is regulated by the Tax and Trade Bureau, which does not require wine labels to include ingredient or nutrition labelling, except for added sulfites. With the European Union moving toward mandatory disclosure of nutrition and ingredient information for wine, one may expect the level of debate in the U.S. to increase. We conducted an online survey of consumers in the U.S. who are at least 21 years old (legal drinking age in the U.S.) and consume wine at least once every two or three months to determine their interest in wineries disclosing ingredient and nutrition information for wine. We asked about the importance of ingredient information when deciding which wine to purchase and when determining willingness to pay, and we asked about the importance of nutrition information when deciding which wine to purchase. We separately regressed three dependent variables against Wine Consumption (frequency), Price, Physical Activity, Diet, Wine Knowledge, Age, Income, and Education. Overall, respondents indicated that having ingredient and nutrition information was only somewhat important, with mean responses 3.04 on a 5-point scale (1 = Not Important, 5 = Very Important) for ingredient information when choosing a wine, 3.01 for ingredient information when determining willingness to pay, and 2.48 for nutrition information when choosing a wine. The factor with the greatest impact on interest in ingredient information was Price, with consumers who buy a higher-end wine at least monthly having a higher level of interest, followed by Diet, with consumers with a healthy diet having a higher interest in ingredient information, and Age, with older consumers having less interest in ingredient information. Price, Diet, and Age also had the greatest impact regarding interest in nutrition information, following the same direction but with Age being the most significant.

Keywords: ingredient and nutrition information, U.S. wine consumers.

1. INTRODUCTION

In the United States (U.S.), the labelling requirements for prepared or processed food products are regulated by the Food and Drug Administration (FDA). The FDA generally requires food manufacturers to list all ingredients of a food product on the label and requires most foods to bear nutrition

labelling. However, labelling for wine containing at least 7% alcohol by volume is not covered by FDA regulations and is instead regulated by the Tax and Trade Bureau (TTB). The TTB does not require wine to bear nutrition labelling, and the only ingredient requiring listing is added sulfites. Alcohol by volume must be listed, but alcohol is neither an added ingredient nor a nutrition category.

In Europe, the European Commission has rejected self-regulation proposals from the beverage alcohol industry, and the European Union (EU) is moving forward with a proposal for mandatory ingredients and nutrition labelling on alcoholic beverages. The European Commission's proposal is part of the "Europe's Beating Cancer Plan" adopted on February 3, 2021, with a 2021 – 2025 timeframe for the alcohol-related initiative. The debate on the issue in the U.S. has been building over the past few years, but as of now the TTB has not indicated interest in expanding wine labelling requirements for ingredients or nutrition information.

Public opinion on the topic in the U.S. is unclear. Forbes [1] quotes John Gillespie of the market research company Wine Opinions as saying, "I can say from a number of consumer research projects in the past, 'involved wine drinkers'—those who account for the greatest percentage of wine purchases—are usually interested in having more information and detail, especially as concerns health or wellbeing issues. I do think that would have an impact on how wineries respond to the possibility of mandatory ingredient labeling."

However, in a survey conducted by the Wine Market Council (WMC) in May 2020 [2], 41% of regular wine drinkers said they rarely want to know nutritional information or the ingredient list, and only 21% said they always want to know. When asked to choose the top five categories of information they wanted to see on a wine label, only 4% put nutritional information and ingredient list as most important, and 81% did not include it in the top five. Interest in ingredients and nutrition information was positively correlated with level of education and negatively correlated with age. Core wine drinkers expressed more interest than Marginal wine drinkers in this information, but they expressed more interest in most forms of information, and nutrition information and ingredient list were not highly ranked in the list of types of information they want. Moreover, Core wine drinkers valued having additional information for the sake of knowing more about the wine and did not place much value on having information as an aid in making wine purchasing decisions.

With the EU moving toward mandatory disclosure of nutrition and ingredient information for wine, one may expect the level of debate in the U.S. to increase, as illustrated by a pair of posts on the wine-searcher.com website in which wine writer W. Blake Gray argued that the U.S. should follow the EU on this issue [3] while wine maker Adam Lee responded with a list of challenges such regulation would create and reasons why the labels could potentially cause consumer confusion [4]. This study seeks to contribute additional information to the debate in the U.S. on adding the ingredient list and nutrition information to required disclosure for wine and to add insight into the value of such disclosure from a policy perspective.

2. LITERATURE REVIEW

Much of the academic literature related to nutrition information and ingredient list disclosure for wine has centered on Europe, which is not surprising since the EU is closest to making such disclosure mandatory. Bazzani, et al., [5] conducted an online survey of Italian red wine drinkers that included questions on consumer attitudes toward wine and health-related aspects and a choice experiment using attributes that are often associated with more natural and healthier foods. They found that health consciousness is an important driver in the use of wine labels, but they did not specifically include nutrition information or an ingredient list on the label.

Multiple studies show that the usefulness and value of nutrition and ingredient information vary across countries. Employing a discreet choice experiment with representative samples of wine consumers from Germany, Italy, and Australia, Pabst, et al., [6] found that consumers across all three countries had a significant positive utility for detailed nutrition information. Ingredient information, on the other hand, received a positive utility only in Italy, and a short ingredient list was preferred to a long ingredient list. Grunert, et al., [7] utilized an online survey in Denmark, Germany, Netherlands, Poland, Spain, and UK to examine consumer wants and use of ingredient and nutrition information from a range of non-label sources. Information wants and use varied between the countries, was highest in Spain, and was lowest in Denmark. Product involvement was a stronger predictor of information wants than health interest. The effect of product knowledge was lower still and decreased with more product knowledge. Previous ingredient knowledge led to lower ingredient information wants, while previous nutrition information knowledge led to higher nutrition information wants. The strongest predictor of information use was information wants.

Annunziata, et al., [8] conducted a survey in France, Spain, Italy, and the U.S. and found that interest in receiving additional information on wine labels (e.g., about ingredients or nutrition information) differed significantly between consumer groups based on the consumer's country. Among respondents in the U.S. panel, 40% said they seldom change a habit because of the nutritional label, and the mean response for the question "I find it difficult to understand nutritional labels" was 3.1 on a 5-point scale (5 = strongly agree). Only 25% said they always read the front label on a bottle of wine, and only 18% said they always read the back label. Still, the mean interest in having nutritional information was 3.6, and the part-wise utility value for nutritional information was higher than for price, health warnings, or units in bottle and units not to exceed.

Another consistent result in research studies is that the usefulness and value of nutrition and ingredient information are not identical across consumer segments. Escandon-Barbosa and Rialp-Criado [9] used eye tracking to study a sample of 114 individuals in a simulated supermarket with more than 100 wines at a university in Columbia, focusing on purchase intention, related to wine label information on denomination of origin, nutritional information, and health warnings. Expert wine consumers used all three pieces of information to make a purchase decision. Non-expert wine consumers, by contrast, made much less use of this information to make a purchase decision and tended to focus on the origin information and health warnings and not make use of nutritional information. The intent to purchase wine increased with the use of all three pieces of information for both men and women. However, the effect was stronger for men. Women and men processed the information differently, and the mean time to make a purchase decision was less than half as much for men as it was for women.

Annunziata, et al., [8] found that interest in receiving additional information on wine labels differed significantly between consumer groups based on the consumer's socio-demographic variables, wine consumption habits, attitudes towards nutritional information in general, and the degree of involvement with wine. In a survey of Italian wine consumers, Annunziata, et al., [10] found that consumers who already have better knowledge of wine nutritional properties and a greater awareness of the links between wine and health preferred a more detailed nutritional label than other consumers. Those who generally find it more difficult to understand nutritional labels either show higher interest in health warnings or prefer the specification of the number of glasses not to exceed and did not value more detailed information. Pabst, et al., [11] assessed consumers' reactions to new back-label information on ingredient and nutrition labelling in three focus groups with a total of twenty-one wine-involved participants in three different cities in Germany. Of those participants who looked at the back label (81%), almost two-thirds said they did not detect the nutrition or ingredient listing.

Pabst, et al., [12] conducted an online survey of German wine producers to examine producers' expectations about consumer reactions to new label information, the consequences of mandatory labelling on production processes, and relative competitive advantages for different producer sizes. They found that producers expect the labelling regulations to create consumer confusion and uncertainty; weaken wine's image as a natural product; and increase costs due to changes in oenological practices, the increased need for laboratory analyses, and more challenging labelling processes. Producers believe the regulations will create opportunities for wineries to focus on clean labelling strategies by completely avoiding additives that require labelling and that large wineries will be better able to react to the regulations.

Producers' concern for how consumers will react to the new labelling requirements is not unfounded. Pabst, et al., [9] found that focus group participants who recognized the nutrition labelling and ingredient list initially reacted to this information with insecurity, confusion, and incomprehension. Pabst, et al., [6] found that presenting negative media information resulted in subjects in all three countries surveyed significantly increasing their rating of importance of ingredients while also increasing their preference for clean labelled products without ingredients. Further, a significantly higher share of consumers in Germany and Italy prefer not to buy any wine. The effect of reading positive media information on consumers' wine choice is significantly lower than that of reading negative information.

Hayward, et al., [13] studied the influence an ingredient list had on the sensory perception of red wines from Nova Scotia. In this study, participants used attributes associated with liking the wine more often when the ingredient list was shorter and familiar. Hayward and McSweeney [14] studied the influence calorie information had on the sensory perception of rosé wines from Nova Scotia and found that the calorie information did not influence consumers' sensory perception.

One factor that is still undecided in the E.U. is the format of the disclosure, with producers generally hoping that technology-enabled disclosure will be allowed in lieu of labelling on the bottle. Vecchio, et al., [15] conducted an incentive compatible artefactual field experiment that indicated that Italian wine consumers most

prefer to have nutritional information presented in a panel and least prefer having only a link to a website that contains the information. Grunert, et al., [7] found that the level of both information wants (for ingredient and nutrition information) and information use was higher for websites (product, public, and health) than for advertising, apps, or in-store sources.

Robinson, et al., [16] conducted a rapid systematic review and meta-analysis of eighteen studies to assess consumer knowledge of energy content (calories) of alcoholic drinks, public support for energy labeling, and effect of such labeling on consumer behavior. They found consistent evidence that consumers tend to overestimate the number of calories in an alcoholic drink and that people are more likely to support than oppose energy labeling of alcoholic drinks, but there was a high degree of heterogeneity. (Two thirds of the studies used for this analysis examined nutrition information that included calories, and one third looked specifically at calorie information disclosure.) The authors concluded that the studies they included suggest that energy labeling did not affect consumer behavior but that the overall quality of the evidence supporting that conclusion was very low. Generally, the authors found that the use of self-reported information and lack of real-world settings resulted in most (72%) of the studies they reviewed provided low evidential value with high levels of uncertainty.

Overall, the body of work shows there is inconsistency across consumers in the importance of both nutrition and ingredient labeling. This includes how they might use it and how much content on the labels they would find important. Additionally, much of the research had been conducted in Europe. The current project seeks to continue to fill the gap in how important information is to consumers, targeting a U.S. sample.

3. MATERIAL AND METHODS

We conducted an online survey of consumers in the U.S. who are at least 21 years old (legal drinking age in the U.S.) and either consume or purchase wine at least once every two or three months. A professional panel recruitment agency recruited respondents across the U.S. using its internal recruiting platform. Respondents who did not finish the questionnaire, including respondents who failed a quality control check embedded in the survey, were eliminated. We received 331 completed surveys. Thirteen respondents were rejected based on a speed test (completing the survey in less than half the median time in a soft launch of the survey), and we obtained 318 useable responses, with an average completion time of 10 minutes, 38 seconds. See Table 1 for demographic information on our sample.

To verify that our respondent set is representative of regular wine drinkers in the U.S., we compared it to the Wine Market Council's (WMC) U.S. Wine Consumer Segmentation study, one of the most thorough such studies in the industry. Comparing our respondent set to wine drinkers in the 2019[1] U.S. Wine Consumer Segmentation study [17], our set skews older. Our respondents have an average age of 53.8 compared to 48.2 for the WMC study, and we have a lower percentage of respondents in each 10-year age group (21-29, 30-39, etc.) below 60. Females are overrepresented in our respondent set, 66% compared to 54% in the WMC study[2]. In terms of educational attainment, our respondent set is highly comparable to the WMC study, with the same proportion of respondents who did not earn any degree beyond high school (44%) and the same proportion with postgraduate work or degree (20%). We have slightly more respondents with a technical or two-year degree (13 v. 11%) and slightly less with a four-year degree (23% v. 25%). Respondents who identified as non-Hispanic Caucasian are overrepresented (79% v. 67%). Blacks and African Americans are almost equally represented in our study (10% v. 11%), but we have proportionately about half as many Hispanics (7% v. 14%), Asians (2% v. 4%), and respondents identifying with another designation (2% v. 5%).

Geographically, the northeast U.S. is slightly underrepresented compared to the WMC study (17% v. 20%), with the difference divided nearly equally as overrepresentation of the mid-west, south, and west regions. However, our sample set closely mirrors the distribution of the entire U.S. population, with less than one percentage point difference in any region (Table 2).

Table 3 reports the frequency of wine consumption for our sample. The 318 usable responses include six whom the Wine Market Council would not consider a wine drinker, since four drink wine less than every 2-3 months and two never drink wine. We initially included these in the respondent set because they purchase wine regularly, at least once every 2-3 months. Because the number of respondents in this category was too small to analyze as a sub-group, we excluded them from further analysis. None of the six purchased wine at a high level of frequency, five only once every 2-3 months and one 2-3 times per month.

The WMC defines Core wine drinkers as those who report drinking wine at least once per week and Margin-

[1] The most recent study available as of this writing

[2] None of the 318 respondents either identified as non-binary or preferred not to indicate a gender.

Table 1. Demographic Characteristics of the Sample.

		Frequency	Percent
Gender	Female	208	65.409
	Male	110	34.591
Race	Caucasian/Non-Hispanic	252	79.245
	Hispanic or Latino	21	6.604
	Black or African American	31	9.748
	Asian	7	2.201
	Mixed Race	4	1.258
	Other	3	0.943
Marital Status	Married, in an official civil union, or in a registered domestic partnership	148	46.541
	Living with a partner	31	9.748
	Single, never married	64	20.126
	Separated or divorced	51	16.038
	Widowed	24	7.547
Income	< $35,000	106	33.333
	$35,000 – $49,999	56	17.610
	$50,000 – $74,999	48	15.094
	$75,000 – $99,999	44	13.836
	$100,000 – $149,999	37	11.635
	$150,000 or above	21	6.604
	Prefer not to state	6	1.887
Education	High school graduate or less	68	21.384
	Some college	71	22.327
	Completed technical/2-year degree	42	13.208
	Completed 4-year degree	74	23.270
	Some graduate school	11	3.459
	Completed graduate Degree (e.g., MA, MS)	43	13.522
	Completed terminal degree (e.g., PhD, MD, JD)	9	2.830

N = 318.
Note: percentages may not add to 100% due to rounding.

al wine drinkers as those who drink wine less often (but at least once every 2-3 months) and say that they like wine. The WMC definition of Total Wine Drinkers also includes those who report drinking wine at least once every 2-3 months but say that they do not like wine. Of the 312 respondents in our sample whom the WMC would classify as Total Wine Drinkers, 184 (59%) are Core wine drinkers, 113 (36%) are Marginal, and 15 (5%) did not report liking wine[3]. We conducted a Pearson's chi-squared test to compare our respondent set with the

[3] One respondent reported being too new to wine to have a decided yet whether he or she would claim to like wine. We included that respondent in the third group for the Chi-square analysis.

Table 2. Sample and U.S. Population Distribution by Region.

	Sample		U.S.	
	Frequency	Percent	Frequency	Percent
Midwest	66	20.755	68,329,004	20.817
Northeast	53	16.667	55,982,803	17.055
South	120	37.736	125,580,448	38.259
West	79	24.843	78,347,268	23.869

N = 318.
Note: percentages may not add to 100% due to rounding.

Table 3. Wine Consumption Frequency.

	Frequency	Percent
Every day	36	11.321
Not every day but more often than once a week	79	24.843
Once a week	69	21.698
2-3 times a month	74	23.270
Once every 2-3 months	54	16.981
Less than once every 2-3 months	4*	1.258
Never	2*	0.629

N = 318 (* excluded from further analysis).

WMC 2019 segmentation study regarding the proportion of Core wine drinkers, Marginal wine drinkers, and others in the Total Wine Drinker category. Base on X2 (2) = 4.655 we rejected the null hypothesis that the two groups are different at p = 0.098. For the remainder of our analysis, we define Core and Marginal wine drinkers based only on the frequency of wine consumption and disregard whether they report liking wine.

To determine the importance of having information about a wine's ingredients, we asked respondents to indicate the level of importance of knowing the wine's ingredients when purchasing wine for each of five different occasions: giving wine as a gift; bringing wine to a large gathering; bringing wine to a small dinner with friends; buying wine for a special occasion at home; and buying wine simply to drink at home. Using a 5-point Likert scale, respondents indicated whether, for each occasion, knowing a wine's ingredients is (1) Not Important, (2) Slightly Important, (3) Somewhat Important, (4) Important, or (5) Very Important.

We first asked about the importance of having information about a wine's ingredients when deciding which wine to purchase. Then we asked about the importance of having information about a wine's ingredients when deciding how much the respondent would be willing to pay for the wine. We calculated the mean response for

each respondent across all five occasions for each question as the dependent variables Ing-Choice and Ing-Pay, respectively.

To measure the importance of having nutritional information about a wine, we asked respondents to indicate the level of importance on the same 5-point Likert scale of thirteen nutrition elements[4] when deciding which wine to purchase, and we calculated the mean response for each respondent as the dependent variable Nutrition.

For each dependent variable we ran a separate regression using the following independent variables that had some significance during preliminary bivariate analysis:

- Wine Consumption: We divided respondents into (1) Core or (2) Marginal wine drinker as defined earlier.
- Price: We categorized respondents based on the highest price level at which they purchase wine at least monthly: (1) Do not purchase wine at least once a month, (2) Purchase wine at least once a month costing under $15 per 750 ml bottle, (3) Purchase wine at least once a month costing $15 – $24.99 per 750 ml bottle, (4) Purchase wine at least once a month costing $25 or more per 750 ml bottle.
- Physical Activity: We asked respondents whether they regard themselves as (1) Much less active, (2) Less active, (3) About the same, (4) More active, or (5) Much more active compared to others their age. This was dummy coded into healthy (4 or 5 = 1) and all others (0) to compare those who were intentionally engaging in a healthy lifestyle to everyone else.
- Diet: We asked respondents whether they would describe their diet as (1) Very unhealthy, (2) Unhealthy, (3) Neutral, (4) Healthy, or (5) Very healthy. This was dummy coded into a healthy diet (4 or 5 = 1) and all others (0) to compare those who were intentionally engaging in a healthy lifestyle to everyone else.
- Wine Knowledge: We asked respondents to describe their level of wine knowledge and familiarity as (1) Almost none at all, (2) Low, (3) Average, (4) Connoisseur, or (5) Expert.
- Age: We asked respondents for their year of birth and calculated their age as of their birthday in 2021. All respondents had to be the legal drinking age in the U.S. (minimum 21) at the time of the survey.
- Income: We asked respondents to report their annual household income as (1) under $35,000, (2) $35,000 - $49,999, (3) $50,000 - $74,999, (4) $75,000 - $99,999, (5) $100,000 - $149,000, or (6) $150,000 or more.
- Education: We asked respondents to report their highest level of completed education as (1) High school graduate or less, (2) Some college, (3) Completed technical/2-year degree, (4) Completed 4-year degree, (5) Some graduate school, (6) Completed graduate degree, or (7) Completed terminal degree.

Six respondents chose "Prefer not to answer" for Income and four others were missing another data point and were not included in the regression analysis. We tested the assumptions of regression and there were no issues across the three regressions. We found that collinearity between the independent variables was not an issue, as variance inflation factors (VIF) ranged from 1.097 to 1.366.

4. RESULTS

The respondents did not have a strong interest in ingredient and nutritional label information in general. Less than half of the sample said that they read label information Often or Very Often, whether it was ingredients (Often: 31.4%; Very Often: 17.9%) or nutritional information (Often: 31.1%; Very Often: 18.6%). When it comes to using nutritional information to decide which alcoholic beverage to consume, or whether to consume one, barely a quarter (25.3%) said that it was Important or Very Important. The lack of a strong interest in general ingredient and nutritional information carries over to wine even though, overall, the respondents think that wine is associated with good health. When asked which alcoholic beverages, if any, are associated with a healthy lifestyle or diet, almost 75% selected wine. When asked if they would agree that moderate wine consumption is good for health, the mean response was 3.958 on a 5-point scale.

4.1 Ingredient information when choosing a wine

Overall, respondents think that knowing the ingredients when deciding which wine to purchase is somewhat important, with a mean response of 3.037. Table 4 presents the regression results for the question "For each of the wine purchase occasions listed, indicate how important it would be to you to know what the ingredients are in deciding which wine to buy" (Ing-Choice).

The model was a significant predictor of Ing-Choice ($F(8, 293) = 10.652$, $p < 0.001$), accounting for 20.4% of the variance in the model. Price, Age, Physical Activity,

[4] The thirteen nutrition elements were Calories, Total Fat, Cholesterol, Sodium, Potassium, Total Carbohydrates, Sugar, Protein, Calcium, Iron, Vitamin B-6, Magnesium, and Phosphorus.

Table 4. Regression results for dependent variable Ing-Choice.

	B	SE	t	Sig.
Wine Consumption	0.223	0.126	1.772	*
Price	0.264	0.069	3.840	***
Physical Activity	0.308	0.131	2.356	**
Diet	0.314	0.127	2.483	**
Wine Knowledge	0.167	0.185	0.898	
Age	-0.010	0.003	-2.933	***
Income	0.052	0.039	1.328	
Education	-0.070	0.037	-1.905	*
Constant	2.830	0.284	9.974	***
F (8, 293)			10.652	***

Note: *, **, and *** indicate significance levels (two tailed) of 0.10, 0.05, and 0.01. N = 302. Adjusted R^2 = 0.204.

Table 5. Regression results for dependent variable Ing-Pay.

	B	SE	t	Sig.
Wine Consumption	0.117	0.136	0.864	
Price	0.248	0.074	3.351	***
Physical Activity	0.226	0.140	1.607	
Diet	0.362	0.136	2.654	***
Wine Knowledge	0.435	0.199	2.179	**
Age	-0.009	0.004	-2.398	**
Income	0.015	0.042	0.347	
Education	-0.051	0.039	-1.289	
Constant	2.943	0.305	9.644	***
F (8, 293)			8.046	***

Note: *, **, and *** indicate significance levels (two tailed) of 0.10, 0.05, and 0.01. N = 302. Adjusted R^2 = 0.158.

Diet, Education, and Wine Consumption were all significant predictors of wanting to know ingredients when deciding which wine to purchase.

The higher the price category the respondent reported purchasing at least monthly, the more the importance of knowing the ingredients increased ($p < 0.001$). Those who were more active ($p = 0.019$) or had a healthy diet ($p = 0.014$) were more likely to want to know the ingredients in deciding which wine to purchase, and Core wine consumers wanted to know the ingredients more than Marginal wine consumers ($p = 0.077$). On the other hand, wanting to know the ingredients decreased with age ($p = 0.004$) and education ($p = 0.058$).

4.2 Ingredient information when determining willingness to pay

On average, respondents think that knowing the ingredients when deciding how much to pay for a wine is slightly less important than when deciding which wine to purchase. The mean response for this variable was 3.014. Table 5 presents the regression results for the question "For each of the following wine purchase occasions listed, indicate how important it would be to you to know what ingredients are in a bottle of wine in deciding how much you are willing to pay for the wine" (Ing-Pay).

The model was a significant predictor of importance of knowing ingredients for willingness to pay ($F(8, 293) = 8.046$, $p < 0.001$) and accounted for 15.8% of the variance in the model. Similar to the importance of knowing ingredients when deciding which wine to purchase, Price ($p = 0.001$), Diet ($p = 0.008$), and Age ($p = 0.017$), are significant predictors of wanting to know ingredients when deciding how much to pay for a wine, with the importance of knowing the ingredients increasing with the level for each variable except Age. When deciding how much to pay, Wine Knowledge is also a significant ($p = 0.030$) positive indicator of wanting to know the wine's ingredients.

Table 6. Regression results for dependent variable Nutrition.

	B	SE	t	Sig.
Wine Consumption	0.136	0.134	1.019	
Price	0.237	0.073	3.257	***
Physical Activity	0.236	0.138	1.712	*
Diet	0.359	0.134	2.682	***
Wine Knowledge	0.355	0.196	1.808	*
Age	-0.016	0.004	-4.401	***
Income	-0.011	0.041	-0.261	
Education	-0.050	0.039	-1.298	
(Constant)	2.839	0.300	9.452	***
F (8, 293)			10.175	***

Note: *, **, and *** indicate significance levels (two tailed) of 0.10, 0.05, and 0.01. N = 302. Adjusted R^2 = 0.196.

4.3 Nutrition information when choosing a wine

Collectively, respondents were less interested in knowing nutrition information than in knowing a wine's ingredients. The mean response for the Nutrition variable was 2.481. The regression results for the importance of nutrition information for wine are reported in Table 6, which looks at the questions related to "For each of the following nutritional items, indicate how important

you think that item is when considering which wine to purchase." The model was a significant predictor of the importance of nutrition information ($F(8, 293) = 10.175$, $p < 0.001$) accounting for 19.6% of the variance in nutrition information. Price ($p = 0.001$), Physical Activity ($p = 0.088$), Diet ($p = 0.008$), and Wine Knowledge ($p = 0.072$) were positive predictors while as Age increases the desire for nutrition information decreased ($p < 0.001$).

5. DISCUSSION AND CONCLUSIONS

5.1 Overall summary of results and implications

Price is the only variable that was highly significant ($p \leq 0.01$) across all three regression models. Consumers who purchased a higher-priced wine at least once a month were more interested in having wine ingredient and nutrition information. This result is consistent with the WMC Communications Study [2] that indicated that high-end wine buyers tend to want more information about wine in general and are more likely to agree that the information found on wine labels rarely helps them choose a wine. This group represents a small portion of wine consumers. In our survey, less than 30% of respondents said they purchase a bottle of wine at least monthly at a price of $15 or more per bottle, and almost half of those did not purchase a bottle priced at $25 or more at least once a month. The U.S. Wine Consumer Segmentation study [17] also found that almost half of regular wine consumers say the never buy a bottle of wine in the $25.00 - $29.99 range and almost three-quarters never pay more than $50.00 a bottle.

Age was highly significant in two of the regression models (Ing-Choice and Nutrition) and significant ($p \leq 0.05$) in the third (Ing-Pay). It is the most significant factor when considering nutrition information. Younger consumers had more interest in ingredient and nutrition information than older consumers. Younger consumers were also more likely to accept getting this information through technology than the labels on a wine bottle. When presented with the statement in our survey, "including the website (URL) or a QR code that links to that information would be a good alternative to listing the ingredient or nutrition information directly on the bottle," almost 70% of respondents age 40 or younger chose either Agree or Strongly Agree, a significantly higher rate than respondents between 41 and 64 (55%) and 65 and older (41%) [$X2(8) = 23.336$, $p = 0.003$].

Diet is highly significant for Ing-Pay and Nutrition and significant for Ing-Choice. Respondents who indicated having a healthy diet were more interested in ingredient and nutrition information than those who do not. Similarly, respondents who say that they were more physically active than their peers were more interested in ingredient and nutrition information, although that variable was only significant for Ing-Choice and marginally significant ($p \leq 0.10$) for Nutrition. This result is consistent with the finding of Bazzani, et al., [5] that health consciousness was positively related to the use of wine labels information and the finding of Grunert, et al., [7] that interest in health is a predictor, but not the strongest one, of information wants for nutrition and ingredients.

Similar to Annunziata, et al., [10] we found that better wine knowledge (as self-assessed by respondents) is positively related to wanting more information. However, the variable was only significant for Ing-Pay and marginally significant for Nutrition. It is worth noting that the WMC Communications Study [2] indicated that more knowledgeable wine consumers tend to want more information of all kinds about wine and were less likely to use that information in making a wine-buying decision.

Surprisingly, frequency of wine consumption was not an important factor. Core wine drinkers were more likely to want ingredient and nutrition information, but the variable only reached marginal significance and only in the Ing-Choice model. In contrast, Escandon-Barbosa and Rialp-Criado [9] found that expert wine consumers, defined by the amount and frequency of wine consumption, make more use of nutrition information than non-experts.

The education level of respondents was negatively related to the interest in ingredient and nutrition information but, like wine consumption, only reached marginal significance in the Ing-Choice model. Income was the only variable not to be at least marginally significant in at least one regression model.

5.2 Policy implications of results

While some wine industry professionals and wine writers advocate for ingredient and nutrition information disclosure (e.g., Pellechia [1] and Gray [3]), the primary push for government regulations has come from the public health sector. In 2007, the TTB issued "Labeling and Advertising of Wines, Distilled Spirits and Malt Beverages; Proposed Rule" [18] that, if enacted, would have required alcoholic beverages covered by the rule to disclose "on any label affixed to the container" the alcohol by volume and a statement of calories, carbohydrates, fat, and protein. The proposed rule notice noted that almost 4 ½ years earlier the TTB had received a petition calling for such disclosure, and more, from the Center for Science in the Public Interest, the National Consumer

League, 67 other organizations, and eight individuals (including four deans of schools of public health).

Government regulations should weigh the costs of the regulations against the expected benefits. Our study suggests the actual benefits of such regulation may be less than the intended benefits. Overall, the respondents think that wine is associated with good health. Still, respondents had only a marginal interest in having ingredient and nutrition information for wine. Our findings would suggest that the benefit of requiring ingredient and nutrition information on wine bottle labels seems small, especially given research that shows that people tend to use nutrition labels at lower rates than they claim and that having such information often does not change consumers' choices. For example, Grunert, et al. [19] demonstrated that self-reported use of nutritional labels may be overstated by 50% and that the lack of use is mostly not attributable to not understanding the information on the label. In addition, their results do not prove that the label information changed consumers' choices, compared to a situation where such information is not available or is not read by the consumer. Furthermore, Köster [20] showed that many food and beverage purchase and consumption decisions are based on routine, habit, or other subconscious factors.

The operational cost for wineries, on the other hand, would be significant given the additional testing and chemical analysis that would be required and the cost of having to create new labels and seek TTB (and in some cases state) label approval with each new vintage as nutritional properties change from year to year. One might expect that ingredient and nutrition labeling could lead to negative news stories based on ignorance and fear rather than science and fact, and these stories could result in costs of lost opportunities, especially considering the findings of Pabst, et al. [6], and current TTB regulations related to advertising health claims could make it difficult for wineries to respond to such stories.

As EU regulations come into effect, researchers will have opportunities to study the impact of the regulations in the real-world settings that Robinson, et al., [16] concluded would be necessary to produce studies with high evidential value. In the meantime, our study adds to the body of research that calls into question the efficacy of requiring wine ingredient and disclosure information to meet public health goals and suggests that the TTB could benefit from the opportunity to learn from the EU's experience before issuing its own regulations.

5.3 Limitations and Research Opportunities

This study was based on a survey that asked respondents about their interest in having ingredient and nutritional information available. We did not attempt to measure the extent to which they truly would use ingredient and nutritional information in making wine purchase or consumption decisions or how having ingredient and nutritional information would change such decisions.

We approached our study from a public health perspective rather than a marketing perspective. We did not investigate whether consumers would be willing to pay more for wine that discloses ingredient or nutrition information. Likewise, we did not study consumers' preference for ingredient or nutrition information if having that information would require them to make a tradeoff between having access to this information or some other information, such as food pairings or a description of the wine, that they may use in making wine purchase and consumption decisions. These are all avenues for future research on this subject.

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Consistency of expert product reviews: an application to wine guides

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Abstract. *Purpose*. The purpose of this study is to examine the internal consistency of wine guides by comparing the judgements of expert wine tasters and reviewers. A classification of wines is provided to establish whether expert reviews of similar wines are coherent. *Design/methodology/approach*. Sentiment analysis based on natural language processing techniques was used to compare quantitative and qualitative reviews between experts. In addition, a finite mixture model was used to classify wines into categories to analyse internal consistency between ratings. *Findings*. The results for a sample of more than 200,000 *Wine Enthusiast* ratings reveal significant differences between expert reviews. This finding indicates that there are no standard criteria for reviewing wines included in the guide. *Originality*. Wine guides are amongst the most widely used marketing resources in the wine industry. They provide a signal to consumers about the quality of wines, guiding their purchase decisions. They also influence the reputation of brands and the performance of companies producing these wines. The main contribution of this study is to propose a new way to compare the reviews of wine guide experts.

Keywords: reputation, wine, expert ratings, sentiment analysis, finite mixture model, wine guides.

1. INTRODUCTION

Information influences users' decision-making processes. However, information asymmetry generally exists in the buyer-seller relationship because each party has a different amount of information about products [1]. Research on experiential and hedonic consumption has shown that consumers' behaviour is affected by "social influence including peer input (word-of-mouth) and judgments of respected experts (professional evaluations)" [2, p. 180].

Wine is an experience product whose quality cannot be assessed by consumers before purchase and consumption [3, 4]. This feature of wine increases the complexity of the purchase decision process. Thus, information asymmetries arise between consumers and winemakers in relation to product quality. Accordingly, high- and low-quality products can coexist in the market [5]. Wineries employ different marketing strategies to reduce these asymmetries and inform the market about the quality of their products [6]. Some use advertising in the mainstream media and encourage positive word-of-mouth communication amongst consumers [7, 8]. They also use awards in national and international competitions as part of their branding and communication strategies [6]. Finally, receiving high ratings in well-known wine guides, which are managed by experts and prescribers, can also help reduce information asymmetries between winemakers and consumers.

This study focuses on the social influence of experts in wine guides. Wine guides offer thousands of reviews of wines from around the world, basing their reviews on the opinions of panels of experts who taste these wines. The assumption is that consumers use judgements of wine quality by expert reviewers in wine guides as a source of information to make purchase decisions [9]. These expert reviewers might consequently influence the performance of the wine-producing companies. Previous research has in fact shown that there is a relationship between online reviews and consumer choice and firm sales [10, 11]. However, despite the potential impact on consumers and wineries, the nature and effects of expert opinions in wine guides remains an under-researched topic.

Wine experts usually provide a quantitative (score) and a qualitative (comment) review. The aim of this study is to test the consistency between these two assessments (quantitative and qualitative) of tasted wines. For wine guides to offer a credible source of information, both assessments of the same wine should match. That is, higher scores should be aligned with more positive comments. This analysis can confirm the role of expert evaluations as a credible source of information for consumers.

To test the consistency of wine experts' reviews, the qualitative content (i.e. tasting notes) is examined using sentiment analysis based on natural language processing techniques. Then, these reviews and other relevant variables (origin and grape variety) are used to establish whether expert reviews of similar wines are coherent. Coherence is examined by classifying wines according to reviews and wine-related variables. A finite mixture model is employed for this classification. The study context is the *Wine Enthusiast* guide, one of the most prestigious wine guides in the world. The results show significant differences between expert reviews, which raises doubts about the usefulness and credibility of wine guides as a source of information.

2. LITERATURE REVIEW

2.1. Wine guides as a marketing tool

Guides are extremely popular in the wine industry because they offer a point of comparison across brands [12] and provide consumers with a signal of wine quality. Wine guides are based on the opinions of experts and professional tasters, who follow standardised, systematic procedures that aim to provide a rigorous assessment of wines. These experts and tasters are assumed to be independent of wineries, thus helping consumers make informed purchase decisions, as the learning process necessary for consumers to become wine experts themselves takes time [13].

Research has highlighted the effect of wine expert recommendations from a marketing perspective. Parsons and Thompson [14] showed that consumers attribute high credibility to independent wine expert recommendations. Friberg and Grönqvist [15] found a significant effect of positive reviews by experts on the sales of the wines they had tasted. The scores that wines receive in these guides can also influence other marketing variables. A line of research has focused on the effect of expert reviews on wine prices [16]. For instance, studies have shown a positive effect of this type of evaluation on product prices, associated with a greater product reputation [7, 17]. Ashenfelter and Jones [18] showed that the influence of expert ratings on the price of wine is even greater than that of other factors such as terroir conditions or climate, which are commonly used to predict wine prices [19]. Wine research has also used the sensory reviews of experts in wine guides to measure wine quality and brand reputation [20]. Dressler [21] analysed the reputation of German wineries, individually and collectively, using three wine guides (Feinschmecker, Gault Millau and Eichelmann) and found consistent judgements across all three. Focused on Sicilian wines, Roma et al. [9] used experts' scores in wine guides as a proxy of firm (wine) reputation. This approach is common in the wine literature [22]. However, despite this evidence, the impact of a positive expert review on the price of a wine may depend not only on the reputation of the wine itself but also on the reputation of the expert [23, 24] because not all experts or guides have the same reputation and prestige [25].

2.2. The expert-consistency effect

According to dual-process theory [26], individuals' opinions and even behaviours are based on informational and normative influences such as those from expert reviews [27–29]. Information has a greater impact on the receiver if the sender is perceived as credible. Expert information is believed to be more credible and accurate (i.e. consistent) than non-expert information [30, 31].

In the context of wine, it is difficult to identify the factors that each expert considers when making judgements and rating wines because there is no common frame of reference across guides [16, 32]. An expert's rating is not necessarily an objective indicator of the quality of a wine because experts make judgements based on their own personal preferences. Thus, when an expert gives a high rating to a certain wine, it is not intended to convey the idea that the wine is of a higher quality than another wine with a lower rating. This lack of comparability arises because ratings of wines are conditioned by several factors such as origin, vintage, winery, price and even the expectations of the expert. Therefore, a higher score for one wine than for another simply indicates an expert's greater preference for that wine.

Consequently, despite their alleged objectivity (as stated in wine guides), expert reviews cannot be considered absolute objective assessments of wine quality. For instance, they may be biased by experts' personal preferences [33]. Evidence regarding the consistency of expert judgements is somewhat mixed. Some authors have found consistency between different experts' reviews of the same wine (e.g. [34]). However, other authors have expressed concern about inconsistencies between different experts' opinions of wine quality and even inconsistencies in reviews by the same expert over time (e.g. [35–37]). Cao and Stokes [38] reported that personal bias in wine expert reviews translates into different ratings, discriminatory capacity and variability in the ratings of different wines. Likewise, Ashton [35, 39] observed that wine guides focus on a few wines and cannot be considered fair representations of the entire market, noting that even the number of tasters used to issue a rating can influence the rating. These guides continue to be highly important in many markets and are used as a reference by consumers around the world. Therefore, further investigation of the effects of expert consistency/inconsistency is warranted.

2.3. Sentiment analysis: a tool for analysing the consistency of expert reviews

In recent years, natural language processing research techniques have allowed researchers to perform textual and sentiment analysis of reviews by both experts and consumers (e.g. [40–46]). Sentiment analysis is a subfield within natural language processing techniques that focuses on automatically classifying a text through its valence [47]. It enables the extraction of information on opinions about a subject (from users or experts) for a certain product [48, 49]. Previous research has shown that this type of analysis based on the characteristics of the product can provide more precise information than a general analysis of the overall (numerical) assessment [50]. Recent literature reviews have highlighted the importance and uniqueness of sentiment analysis in marketing research [51] and in hospitality and tourism [52].

In the context of wine guides, users typically find two ratings or judgements of a given wine. The first is a numerical score, usually on a scale of 0 to 100 points or 0 to 20 points, depending on the guide. Some guides only publish wines that receive a minimum score of 80 or 85 points. The second rating is a qualitative review based on tasting notes for the wine. These tasting notes consist of a brief literal description of the sensory and organoleptic qualities of the wine [53]. Although numerical scores are easily interpretable, the natural limitations of language hinder and complicate the task of using words to convey what a wine is really like and to describe the sensations that the expert wants to convey [54]. Sometimes, the sensory characteristics of wines are so special or unusual that there may not be the right words to describe it. Furthermore, some authors suggest that the language of professional tasting, which is used to describe the sensory properties of a wine, is based on jargon and vocabulary that is so complex and difficult to decipher that only the experts themselves or the most experienced consumers can understand it. In fact, Peynaud and Blouin [55] found that for professional tasting notes to be effective, consumers must have a high level of understanding about tasting, which is not always the case. Sometimes, these tasting notes may be pretentious, offering little informational validity for consumers [56].

Therefore, sentiment analysis based on each of the characteristics considered in the tasting notes could offer a broader and more accurate illustration of how experts review a wine. From an analytical perspective, the opinions of experts require analysis at the sentence level [57]. This sentence-level focus is necessary because experts who review wines consider different characteristics or attributes and generally have a different opinion on each of these aspects. Although many sentiment analysis tools can easily divide comments into negative, positive or neutral, a textual review of a given wine may contain phrases with different polarities because experts may have different feelings about each characteristic of

the wine. For instance, the standard tasting phases (i.e. sight, smell and taste) may have different polarities, with some aspects being rated positively, others negatively and others neutrally. In addition, there may be different degrees of positive or negative opinions. Accordingly, reviews cannot be qualified simply as positive, negative or neutral. Instead, they include a series of additive perceptions that create a nuanced rating and provide specific information on each of the aspects evaluated by the expert. For instance, some characteristics of the wine (e.g. in the olfactory phase of tasting) may be rated positively, whereas others (e.g. related to the palate) may be negatively rated.

In sum, sentiment analysis techniques could lead to precise inference of the overall numerical score for the wine. Therefore, these techniques are particularly useful for examining the opinions of experts about the wines in a guide. Nguyen et al. [58] recently employed a similar approach, focusing on so-called online expert users.

3. METHOD

This study focuses on reviews by 19 professional wine tasters from the *Wine Enthusiast* guide between 1999 and 2019. *Wine Enthusiast Magazine* is one of the most prestigious international magazines in the sector, together with *The Wine Advocate* (Robert Parker). Each review included qualitative tasting notes, in which the expert gave a judgement on the tasted wine, a quantitative score of the wine (from 80 to 100 points), and some additional characteristics such as price, origin and grape variety (see Figure 1). The wines were from 43 countries and their price ranged from 4 dollars to 3,400 dollars. After the elimination of outliers and missing cases, the final sample contained 201,004 reviews.

The method had two stages. The first stage involved that quantitative ratings as well as qualitative reviews were compared among the different experts in the guide. Reviews published in the guide were made by 19 experts, as well as some other anonymous reviewers. Although the comparison of quantitative ratings was straightforward, the comparison of qualitative reviews required prior analysis of tasting notes using sentiment analysis. This analysis was carried out using the AFINN lexicon. AFINN consists of 2,477 words in English that express a certain degree of positive or negative sentiment. This corpus of words, produced by Finn Arup Nielsen between 2009 and 2011, contains a rating for words ranging from −5 (*most negative sentiment*) to +5 (*most positive sentiment*). This lexicon displays the information in two columns: the word next to its corresponding value (e.g.

Figure 1. Sample *Wine Enthusiast* guide review. Source: *Wine Enthusiast* website (2021).

"awesome" - 4 or "awful" -3). In this study, the sentiment value of the expert review was calculated as the sum of the polarity of each of the words used in the review. In essence, each review was divided into sentences, and each sentence into words. To evaluate one sentence of the review, each word was assigned a value according to the AFINN lexicon. Adding up the values of all words in the sentence gave an evaluation of that specific comment. Once this process had been performed for all sentences in the review, the evaluations of each sentence or comment were summed to give an overall score for the review. Because an expert review covers different aspects, different opinions can be found in the same review. That is, the same review might contain both positive comments (e.g. regarding palate) and negative comments (e.g. regarding nose). However, the additive procedure employed in this study gave an overall evaluation of the intensity (value) and polarity (positive/negative) of the review based on the evaluation of each comment in the review. Compared to the alternative of using the average of the individual evaluations of each word, this additive procedure accounted for the length of the review because there is evidence that longer reviews provide greater added value to the tasting note of the wine [53]. In addition, it provided a broader ranking of the review than a simple classification as positive, negative or neutral.

In the second stage, the wines were classified according to their characteristics using techniques based

on cluster analysis. The starting assumption was that wines in a given group were homogeneous but different from the wines in other groups. Each wine was defined by a set of variables related to its review (qualitative and quantitative), origin and grape. The objective of this stage was to group similar wines by comparing specific vectors for the set of variables used in this study. An $N \times d$ matrix was created for this analysis, where the columns were the variables, and the rows were the observations. Each observation (i.e. row) was a vector of dimension d, denoted as x_i. The data set was denoted as $x = (x_i)_{i\in\{1,\cdots,N\}}$. Each observation had d_{cont} continuous variables in $\mathbb{R}^{d_{cont}}$ and d_{cat} categorical variables, with $\{1,\cdots,m_j\}$ levels for each nominal variable j. Hence, $d_{cont} + d_{cat} = d$.

To classify the observations into groups that could be interpreted in a meaningful way, an unsupervised learning method was used. It was hypothesised that there existed hidden or latent variables (unobserved random variables) for all data points in the data set that associated a specific cluster to each observation. Thus, the latent variable model was a mixture model.

In a mixture model, K distributions are mixed, and it is assumed that each observation belongs to one of them. The latent variable z_i for observation i corresponds to one of the distributions in the mixture. In other words, the latent variable z_i is the cluster to which observation x_i belongs. If the number of clusters is K, then $z_i \in \{1,\cdots,K\}$, and the set of latent variables is denoted as $z = (z_i)_{i\in\{1,\cdots,N\}}$. In a mixture model, the data generation process is assumed to be $p(z,x) = p(z_i)p(x_i|z_i = k)$. Here, $p(z_i)$ is a multinomial distribution, where $\eta_k = Pr(z_i = k)$ is the probability that observation i belongs to cluster k. The set of probabilities $\eta = (\eta_k)_{k\in\{1,\cdots,K\}}$ are referred to as the mixing weights. Furthermore, $\phi_k(x_i|\theta_k) = p(x_i|z_i = k)$ is the probability distribution of the data in cluster k, and θ_k are the parameters of this distribution. The probability density function is given as follows:

$$f(x_i|\theta) = \sum_{k=1}^{K} \eta_k \phi_k(x_i|\theta_k)$$

where $\theta = (\theta_k)_{k\in\{1,\cdots,K\}}$ is the set of all parameters for the distributions in the mixture, including the mixing weights.

For continuous variables, the cluster distributions were multivariate Gaussian distributions $\phi_k(x_i|\theta_k) = N(x_i|\mu_k,\Sigma k)$, where the parameters of the distribution k, $\theta_k = \{\mu_k,\Sigma k\}$ were the mean vector μ_k and covariance matrix Σk. Categorical variables were assumed to be independent multivariate multinomial variables distributed conditional on the latent variable. Therefore, $\phi_k(x_i|\theta_k) = M(x_i|\alpha_k)$ for $\alpha_k = (\alpha_{jk})_{j\in\{1,\cdots,d_{cat}\}}$, where α_{jk} is the vector of parameters (event probabilities) for the multinomial distribution associated with variable j in cluster k, and its dimension is m_j.

For the estimation of the parameters, the R package Rmixmod version 2.1.5 was used. This package maximises the log-likelihood with an expectation maximisation (EM) algorithm as follows:

$$\mathcal{L}(\Theta) = \sum_{i=1}^{N} \ln f(x_i|\theta)$$

for $\Theta = \{\eta,\theta\}$, the set of all parameters of the mixture.

Once the wines had been classified into similar groups, the differences between the expert reviews of the wines belonging to each cluster were analysed. The data processing and estimation was carried out in MATLAB.

4. RESULTS

In the first stage, the quantitative and qualitative expert reviews in the guide were compared. The average score of the tasted wines was 88.81 points (SD = 3.03), with a minimum of 80 points and a maximum of 100. The experts used an average of 40.56 words in their descriptions of wines (SD = 11.28), with a minimum of three words and a maximum of 135. The average sentiment score was 3.2 points (SD = 7.02), with a minimum of -33 points and a maximum of 41. The average price was 36.62 dollars (SD = 43.17), with a minimum of 4 dollars and a maximum of 3,400 dollars.

Table 1 presents the average quantitative and sentiment ratings for each expert. It also shows the average number of words used by each expert in the tasting notes. There are statistically significant differences between the experts' quantitative ratings. There are also differences in the nuances provided in the tasting notes, as reflected by the differences in the number of words used and the sentiment ratings for the experts.

In the second stage, the wines were classified according to their characteristics using techniques based on cluster analysis. The proposed model was estimated for K = 2,…,7 clusters in relation to the wines appearing in this guide. To identify the clusters, four variables were used: the quantitative rating, sentiment score of the tasting note, country of origin of the wine and grape variety. The model selection criterion was the Bayesian information criterion (BIC; [59] Schwarz 1978). This criterion suggested that K = 4 was the number of groups that best fit the data (see Table 2). External validation is also desirable to confirm the usefulness of the cluster solution. External validation consisted of examining

Table 1. Ratings of wines according to experts.

Expert	No. of wines tasted	Average quantitative score	Average of sentiment rating	Average number of words
Alexander Peartree	1,637	87.14	-1.28	41.26
Anna Lee C. Iijima	8,061	89.37	0.83	41.38
Anne Krebiehl MW	7,661	91.02	5.27	47.17
Carrie Dykes	268	86.45	1.10	42.75
Christina Pickard	2,349	88.97	1.72	57.00
Fiona Adams	408	86.72	-3.91	49.77
Jeff Jenssen	783	88.08	-1.39	35.75
Jim Gordon	9,083	88.71	4.71	38.12
Joe Czerwinski	5,842	88.66	0.24	40.96
Kerin O'Keefe	20,055	89.12	-1.88	38.03
Lauren Buzzeo	2,886	88.00	3.18	50.53
Matt Kettmann	13,910	90.21	-0.43	44.40
Michael Schachner	20,004	86.99	0.28	42.42
Mike DeSimone	956	89.07	-0.44	43.21
Paul Gregutt	13,824	89.34	4.61	43.48
Roger Voss	40,124	88.90	8.58	37.47
Sean P. Sullivan	9,197	88.67	1.74	38.39
Susan Kostrzewa	1,170	86.89	6.03	39.71
Virginie Boone	17,578	89.67	2.75	38.71
Nameless	25,208	87.81	4.10	38.96
Total	201,004	88.81	3.20	40.55
F		1158.84 ($p < 0.000$)	3534.31 ($p < 0.000$)	1351.94 ($p < 0.000$)

Source: Authors.

whether there were also intercluster differences in variables other than those used to classify the wines. This external validation served as an exploratory investigation of the influence of the cluster structure and main characteristics [60]. To this end, the price variable was also examined (see Table 2).

The empirical findings reveal some interesting differences between the clusters. The first group, "top-of-the-range wines (*best quality*)", consists of wines with a well-above-average rating based on both sentiment and quantitative ratings. These wines are also on average more expensive. It consists of red and white wines, mainly from France. The second group, "low-price wines (*affordable/low cost*)", consists of wines with a below-average quantitative score but with a slightly positive sentiment rating. The average price of wines in this group is well below the average for the entire sample. This group includes white and red wines from North and South America, France and Spain. The third group, "*overpriced* wines", consists of wines with a neutral sentiment rating but a roughly average quantitative score. These wines' average price is well above the average for the entire sample. They are mostly red wines from the United States and Italy. Finally, the fourth group, "best-value wines (*smart choice*)", consists of wines with a roughly average quantitative score and a below-average qualitative rating. They also have a lower-than-average price. This group mainly consists of white wines from the United States.

The differences between the four groups were significant for the four variables considered in the analysis. In addition, for the external validation of the four clusters, ANOVA was used to test whether the prices differed between clusters. The price variable (4064.87; < 0.0001) was significantly different between clusters, thereby externally validating the classification presented in this research.

Once the wines had been classified into homogeneous groups, the average sentiment evaluations of the

Table 2. Descriptive analysis of clusters with mean and standard deviation (in parentheses).

	Variables used in the cluster analysis				External validation
	Quantitative rating	Qualitative (sentiment) rating	Main country origin	Main grape variety	Price
Best quality N = 56,043	90.09 (2.77)	10.26 (5.74)	France	Red & White	41.50 (65.01)
Affordable N = 48,321	85.29 (1.74)	1.33 (4.47)	America, France and Spain	Red & White	21.10 (16.40)
Overpriced N = 67,789	90.00 (2.23)	0.08 (5.75)	United States and Italy	Red	47.24 (37.42)
Smart choice N = 28,851	89.41 (2.15)	-0.02 (5.65)	United States	White	28.80 (25.02)
TOTAL N = 201,004	88.81 (3.03)	3.21 (7.02)	N.A.	N.A.	36.62 (43.16)

Source: Authors.

Table 3. Test of differences of experts' sentiment ratings.

	F	*p* value
Group 1. Best quality	382.65	$p < 0.001$
Group 2. Affordable	110.97	$p < 0.001$
Group 3. Overpriced	295.44	$p < 0.001$
Group 4. Smart choice	151.12	$p < 0.001$

Source: Authors.

tasters were calculated for each group. The results indicate that the differences between the experts' reviews differ significantly, which shows that there are no standard criteria for reviewing the wines in the guide (see Table 3). This result reinforces the earlier idea (see Table 1) that tasting notes might differ amongst wine experts, even when the tasted wines are similar and receive a comparable quantitative rating.

5. CONCLUSIONS

Wine guides written by professional and expert tasters are widely used in the wine industry to market wine, providing important information signals for consumers around the world. However, despite the importance of these guides, some authors have expressed doubts about the consistency of the scores and reviews they provide. The objective of this study was to analyse the internal consistency of the scores and reviews of the experts and professional tasters writing for a specific guide. The method included sentiment analysis of the tasting notes and a novel clustering technique that identified groups of wines with similar characteristics.

The results show considerable divergence between the qualitative and quantitative assessments by professional tasters in the *Wine Enthusiast* wine guide. Although most consumers trust the guide to reduce their information asymmetries with respect to winemakers, disparity in the criteria used by the guide's experts raises doubts over its effectiveness as a source of reliable, verified, standardised information for consumers. In fact, even when wines are grouped according to their characteristics, there are still discrepancies amongst experts. Therefore, it cannot be said that the guide follows a single, uniform set of criteria for its wine reviews.

These results have managerial implications for the wine sector. First, the results have implications for wineries whose wines are tasted by experts writing for this guide. These wineries should be aware that experts' personal preferences may affect their judgements. Hence, knowing the personal tastes and background of each expert could help wineries improve the ratings of their wines. Second, these results are important for the management of the guide itself. The reputation and prestige of a particular guide is the basis of consumers' trust in that guide, which is considered a reliable and independent source of information. If the reviews in the guide are inconsistent and the experts do not reach a consensus when rating wines, doubts may arise about the reliability of these reviews, depending on which expert tasted the wine. These doubts could ultimately affect the publication's reputation.

Finally, regarding the limitations of this study, only one guide (*Wine Enthusiast*) was analysed. It is not possible to extrapolate these results to other specialist publications within the sector. Furthermore, the sentiment analysis was carried out using a specific lexicon. Although this lexicon has been widely used in academic studies, it is not the only available alternative, nor is it specific to the wine sector. These limitations open new research opportunities that should be addressed in the future. Future research could also explore the effect of reviewer expertise in the context of wine guides. Reviewer expertise has already been shown to influence reviewer ratings in the context of hotel and restaurant review platforms [58]. Finally, future research could extend this analysis to other markets where guides based on expert reviews are also common. Examples include the film and television industry, where sentiment analysis techniques have already been used to study expert and consumer opinions [2] but not to study specialised guides (e.g. Rotten Tomatoes).

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How are vineyards management strategies and climate-related conditions affecting economic performance? A case study of Chilean wine grape growers

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Abstract. In wine grape production, growers decide between alternative management strategies of the vineyard that have direct consequences on competitiveness. The aim of this study is to evaluate the impact on economic performance of four management strategies: training system, reserve quality production, irrigation method, and mechanization of labors. The data used in the study comes from face-to-face interviews to 336 wine grape growers of Central Chile, which was complemented with climatic variables retrieved from Geographic Information Systems. A log-log regression model of total value product (TVP) for the main variety grown in the vineyard was estimated, using production factors, vineyards' attributes, management strategies and climate-related conditions as explanatory variables. An interesting contribution of this study is the identification of TVP functions for land, fertilizers, fungicides, other agrochemicals, labor, and age of vines. Our results show that the training system has the most impact on TVP, where tendone-trained vineyards demonstrated 63% higher TVP than those vertically trained when holding all other variables constant. Reserve quality production also has a positive effect on TVP, increasing it by 25% compared to vineyards producing varietal quality grapes. In contrast, the use of pressurized irrigation systems and mechanization in harvesting do not present a significant effect on TVP. The findings of this paper represent an advance in the understanding of the economic performance factors associated with wine grape growing and could serve to guide on-farm decisions and sectoral policies in pursuing the competitive development of wine grape growers.

Keywords: economic performance, production function, vineyard management, wine grape growing.

1. INTRODUCTION

One of the main components of competitiveness in wine grape production lies in the capacity to innovate [1] and to improve performance using

available resources [2, 3]. The process of innovation at the vineyard level has played a prominent role in emerging countries from South America, South Africa, Asia and Oceania [4, 5, 6]. These countries have expanded their vineyard production, albeit not neglecting wine quality, to the extent that they are not only challenging the old world's leaders but also are increasing their domestic market share [7, 8, 9, 10]. Hence, there is evidence of improvements in competitiveness because of technological modernization processes, which has been especially relevant in developing countries.

An interesting example of this is Chile, a South American country that has experienced rapid development of its export-oriented wine industry in recent decades [11]. Indeed, wine grapes are one of the most important crops in the country [12]. Between 1990 and 2015, vineyard plantations doubled, wine production increased fivefold, and wine export volume grew from 22 to 1,445 million liters [13]. As a result, Chile has become an important player in international markets, being an example of how a traditional industry can become highly competitive in a short period of time by implementing important changes in technologies and production systems.

Despite the overall progress of the Chilean wine grape industry, there are some concerns in the domestic market from producers' associations regarding an oligopsony market structure (i.e., few grape buyers) that would generate competitiveness problems [14]. For that reason, on-farm competitiveness has turned to be an extremely relevant issue for the viticultural sector and a better understanding is required of the factors affecting vineyards' economic performance, such as the impact of innovations and management strategies. In this regard, management strategies are considered among the most important determinants of vineyard profitability [3, 15, 16, 17]. Within this category we distinguish between production technologies, such as pressurized irrigation or mechanization in harvesting, that are generally more affordable for larger producers because of economies of scale and financial access [3], and cultivation techniques, such as training systems and reserve quality growing, that are generally less demanding in financial capital.

This study seeks to understand the role of vineyards management strategies on the economic outcome exhibited by wine grape growers, controlling for other production factors (e.g., land, labor, and inputs) and climate-related conditions (i.e., potential evapotranspiration, precipitation, and chilling hours). Using Chile as a case study, the aim of this paper is to provide insights about vineyard-level drivers of competitive performance in emerging countries. Prior research analysing vineyards outcomes related to economic performance, efficiency, or productivity, have focused mainly on the effect of economies of scale [5, 10, 18]; to the best of our knowledge, there are no studies analyzing management strategies implemented by wine grape growers in explaining economic performance. The study of Urso et al. [19] is one of the few that evaluates production unit and contextual factors of vineyards; however, it is focused on production efficiency rather than analyzing the contribution of growers' production decisions on performance. Instead, our paper examines to what extent management strategies implemented by wine grape growers affect the TVP at the vineyard level, considering the heterogeneity of production units' attributes and climate-related conditions under which they operate.

The vineyards management strategies analyzed in this study were: a) training system (tendone vs. vertical structures), b) wine grape destination (reserve vs. varietal wines), c) irrigation method (pressurized vs. gravity irrigation), and d) mechanization in harvesting (mechanized vs. hand-picked). These vineyards' strategies are of different scope and nature, some of them represent structural (fixed) decisions while others are more related to flexible (alternative) decisions. For instance, wine grape destination is a flexible decision that might be defined each season, though it involves an array of practices aiming to regulate vine yield and grape quality, such as canopy management (e.g., pruning/mooring, desprouting, canopy defoliation, tipping of shoots) [20, 21], agrochemical use and irrigation regimes, among others. In contrast, the training system is a structural decision that must be made when wine grape growers establish the vineyard and is not (easily) modifiable.

The paper is structured as follows. The next section details the data used to perform the analysis and finishes with the empirical model. The third section presents and discusses results, and the last section summarizes the most relevant conclusions of the study.

2. MATERIALS AND METHODS

2.1. Sampling procedure and data collection

The study area covers the O'Higgins and Maule regions in Central-South Chile (33°50' and 36°33'S, WGS84 datum), located in central Chile in the heart of the fruit and vineyard production (Figure 1). Combined, both regions comprise 73% of the national planted area of vineyards, distributed among three important valleys, from north to south: Rapel, Curicó, and Maule (a brief description of the weather conditions prevailing in these

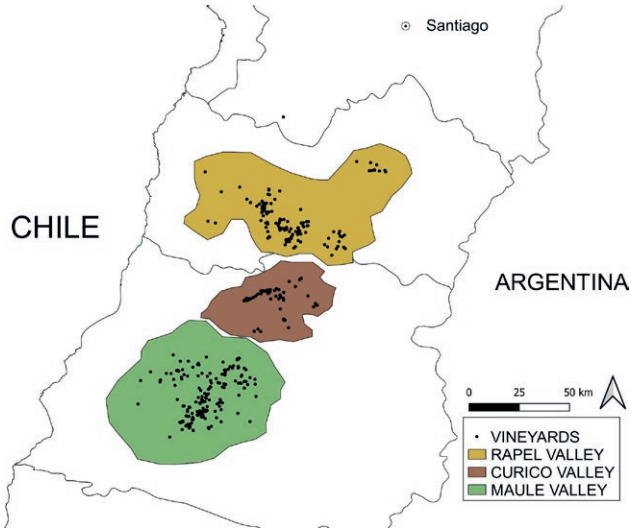

Figure 1. Map of the study area and locations of the vineyards included in the sample (black dots).

valleys is presented in Appendix 1). The area under study has a temperate Mediterranean climate, characterized by a six month dry season (Sept- Mar) and a rainy winter, with precipitation between 600 and 700 mm annually. The primary data used in this study was generated at the vineyard level, administering a georeferenced survey on-site to 436 wine grape growers between October 2014 and March 2015. This survey was restricted to vineyards from irrigated lands, growing at least one hectare. The sampling procedure consisted of a stratified random sample across 16 municipalities, where the number of surveys administered was determined depending on the relative number of vineyards in each municipality. The municipalities were, in order of number of surveyed producers: San Javier, Sagrada Familia, Curicó, Nancagua, Villa Alegre, Santa Cruz, Talca, Palmilla, San Clemente, Peralillo, Río Claro, Requínoa, Chimbarongo, Maule, San Vicente, and Peumo. After the field data collection process, in September 2020, using the georeferenced point of each survey, the dataset was supplemented with spatialized data of climate-related conditions 2015/2016 from the Chilean Natural Resources Information Center (CIREN) [22]. CIREN is a public institution that provides information on the natural and productive resources of the country through the use of geospatial data and applications. In this paper, the data from CIREN referred uniquely to environmental information for the years 2015-2016. As result of merging the primary and secondary data, the final sample with complete information was reduced to 336 observations because the Geographic Information System (GIS) used in this study did not cover the total distribution of surveyed vineyards.

2.2. Survey data

The questionnaire administered to wine grape growers collected detailed economic and agronomic information for the main variety grown in the vineyard in terms of planted area, such as surface, yield, grape price, and (per hectare) intensity of use of inputs and labor. Growers were asked about the number of applications, doses, and unitary prices in the case of agrochemicals (i.e., fertilizers, herbicides, insecticides, fungicides, and acaricides) and number of working-days or agricultural machines/equipment in the case of labor (i.e., harvest, pruning/mooring, tipping of shoots, de-sprouting, canopy defoliation, physical weed control, and other labor), which were valued at fixed market prices.

Regarding growers' performance, the yield obtained by each grower (kg ha-1) was multiplied by the average grape price of the variety in the sample ($ kg-1). As in our sample growers identified 19 different varieties, we used the average price for each variety to estimate their incomes. The reason for using fixed grape prices and fixed market prices for inputs and labor was to avoid differences in bargaining power or personal skills among wine grape growers, which are beyond the scope of our analysis as the objective of our paper is to estimate the impact of technical decisions on technical outcomes using an economic model.

Subsequently, to convert the monetary measures per hectare for inputs, labors, and output to the plot level, they were scaled-up (values were multiplied by the planted area of the main variety grown in the vineyard). Hence, the economic output variable analyzed in this paper is the total value product (TVP) generated by the main variety of the vineyard, considering that there are important differences in prices between grape varieties within the sample. For the purposes of this study, expenditures and total value products were converted to US dollars using the average exchange rate of 2015 (654 Chilean pesos per US dollar), the year in which the field survey process finished.

2.3. GIS spatial data

An important feature of this study is the inclusion of climate-related variables as controls in the econometric model. In particular, we included three variables: potential evapotranspiration, precipitation, and chilling hours; a description is presented in Table 1. The selection of these variables, representing referential production conditions for vineyards, is expected to exert an influence on vineyard yields. The climate-related variables were retrieved from high spatial resolution data of the

O'Higgins and Maule regions of Chile, using layers and isolines of Agroclimatic Districts (1:250,000 scale) gathered from the Chilean Natural Resources Information Center (CIREN) [22]. An intersection algorithm able to cross climatic layers and the georeferenced sampling site of each vineyard allowed us to add secondary information to our dataset of surveyed wine grape growers. This procedure was performed using the QGIS software (Open-Source Geospatial Foundation Project: http://qgis.osgeo.org).

3. CALCULATION

According to Chinnici et al. [23], evaluating the operational choices of a vineyard involves knowledge of the potentials and restrictions of both a technical and economic-managerial nature. Indeed, growers face different alternatives in which to invest but they have certain restrictions imposed by their own attributes and other territorial characteristics, ranging from natural resources to the availability of production factors and techniques [1]. Therefore, this paper considers that growers' TVP is a function of production factors (i.e., land, input, labor) attributes of the productive unit, climate-related variables, and management strategies.

To model the TVP generated by wine grape growers, we adopted a Cobb-Douglas functional form estimated using a multiple linear regression, in logarithms for all continuous variables. The empirical model in natural logarithms for the *i*-th wine grape grower can be expressed as follows:

$$ln\, Y_i = \alpha + \sum_{j=1}^{5} \beta_{ji}\, ln\, X_{ji} + \sum_{k=1}^{3} \gamma_{ki}\, A_{ki} + \sum_{m=1}^{4} \varphi_{mi}\, M_{mi} + \sum_{l=1}^{3} \pi_{li}\, E_{li} + v_i \quad \text{(Eq. 1)}$$

The dependent variable in our study is the total value product of wine grape growers (Y), which comes from the multiplication of yields (kg ha-1) per planted area (ha) and grape price ($ kg-1). The model is expressed as a function of five inputs: Land (X1), Fertilizers (X2), Fungicides (X3), Other agrochemicals (X4), and Labor expenditures (X5). In the case of other agrochemicals, this category represents the sum of expenditures in insecticides, acaricides, and herbicides; fertilizers and fungicides were incorporated in isolation into the model because of their agronomic importance in vineyard production. In the empirical model, there are also three sets of control variables for: a) attributes of the productive unit, b) climate-related variables, and c) management strategies. First, a set of three variables representing productive unit attributes was considered: grape color (A1), age of the vines (A2), and valley where the vineyard is located (A3). Following, a set of four dummy variables for management strategies: pressurized irrigation (M1) and mechanized harvest (M2), training system (M3), and type of wine for which the grapes are intended (M4). And finally, a set of three climate-related variables, namely: Potential evapotranspiration (E1), Precipitation (E2), and Chilling hours (E3). The last term of equation 1, v_i, is the normally distributed error that accounts for statistical noise in the model.

To test the robustness of our empirical model and observe the contribution of the different sets of variables included in the model, several progressive specifications for the above explained sets of explanatory variables were estimated and compared through maximum likelihood ratio tests. A complete explanation of the covariates included in the equations is shown in Table 1. The described model was estimated in STATA 15.1 [24].

4. RESULTS AND DISCUSSION

4.1. Vineyards' total value product and explanatory variables

Table 1 presents a description and summary statistics of the variables included in the models. It is worth noting that values are reported for the main grape variety at the plot level.

As shown in Table 1, growers' TVP and input and labor expenditures exhibit considerable differences between the mean and median, which reveals the skewed distribution to the left of these variables. Planted area is also a skewed variable, where the mean surface is 16.7 ha, and the median is 9.9 ha. The use of logarithms, besides its convenience in estimating partial elasticities of productive factors, helps to avoid the skewed distribution of the data.

Turning to descriptive statistics, at median values at the plot level wine grape growers spent about US$ 1,700, US$ 990 and US$ 1,520 on fertilizers, fungicides, and other agrochemicals, respectively. The expenditure in labors – including harvest, pruning/mooring, tipping of shoots, de-sprouting, canopy defoliation, physical weed control, and rest of labors – reached a median of US$ 8,130 in the sample. The sum of expenditures on fertilizers, fungicides, other agrochemicals (to control insects, spiders, and weeds), and labor represents an approximation of the operational costs incurred by grape growers

Table 1. Variable description and summary statistics of variables used in models of vineyard production for three wine grape growing areas of Chile (data at the plot level for the main grape variety of the vineyard in terms of planted area; N= 336).

	Variable	Description	Mean	S.D.	Median	Min	Max
DV	TVP	Total value product (1,000 USD)	65.60	104.47	29.36	0.60	1213.76
Production factors	Land	Planted area (hectares)	16.74	20.28	9.90	1.00	140.00
	Fertilizers	Fertilizer expenditure (1,000 USD)	4.34	7.36	1.70	0.00	52.95
	Fungicides	Fungicide expenditure (1,000 USD)	2.89	5.63	0.99	0.00	51.38
	Agrochem.	Expenditure in agrochemicals to control insects, spiders and weeds (1,000 USD)	5.99	17.29	1.52	0.00	201.38
	Labor	Labor expenditure (1,000 USD)	16.49	21.05	8.13	0.28	137.61
Vineyards' attributes	Grape Color	Grape color (red=1; white=0)	0.82	0.38	1	0	1
	Vineyard age	Age of planting (years)	29.84	26.28	19	4	116
	Rapel valley	Rapel valley (yes=1; no= 0).	0.35	0.48	0	0	1
	Curicó valley	Curicó valley (yes=1; no= 0, excluded category in models)	0.20	0.40	0	0	1
	Maule valley	Maule valley (yes=1; no= 0).	0.45	0.50	0	0	1
Management strategies	Irrig. method	Irrigation method (pressurized= 1; gravity= 0)	0.39	0.49	0	0	1
	Mech. harv.	Machinery use for harvest (yes= 1; no= 0)	0.17	0.38	0	0	1
	Training syst.	Training system (tendone=1; vertical=0)	0.18	0.39	0	0	1
	Grape Dest	Grape destination (reserve=1; varietal=0)	0.11	0.32	0	0	1
Climatic conditions	Evapotransp.	Cumulative evapotranspiration from Dec-15 to Feb-16 (mm)	456	21	461	408	512
	Precipitation	Cumulative precipitation from Dec-15 to Feb-16 (mm)	22.81	7.23	24	8	45
	Chilling hours	Cumulative chilling hours in 2016 (hours)	1,287	303	1,380	750	1,830

in a year, which reach a median value of US$ 15,005. On the other hand, the median TVP was US$ 29,360. Note that the median planted area was 9.9 ha, which informs about an approximate per hectare outcome of US$ 2,965 (this calculation is close to the actual median of the sample used to estimate the model, which corresponds to USD$ 3,058 per hectare).

Regarding vineyards' attributes, most wine grape growers cultivate red grapes (82%) rather than white grapes (the remaining 18%). The median age of the vineyards was 19 years, within a range of 4 and 116 years old. Regarding wine valleys, the distribution of the vineyards among Rapel, Curicó, and Maule was 35%, 20%, and 45%, respectively.

In terms of management strategies, 39% of the sample had pressurized systems to irrigate the vineyard and 17% used machinery to perform the harvest. The tendone training system was a minority compared to the vertical system (18% vs 82%, respectively), and only 11% of the growers produced reserve quality grapes while the remaining 89% produced varietal quality.

As for climate-related conditions, the average potential evapotranspiration and precipitation of the three warmest months in Chile, during the stage of veraison in grapes (period of accumulation of sugars), were 456 mm and 23 mm, respectively. Concerning annual cumulative chilling hours, the sample mean was 1,287 hours with a wide range (750 to 1,830 hours).

4.2. Contribution of production factors, vineyards' attributes, management strategies and climate-related conditions

As mentioned in Section 3, three sets of explanatory variables were progressively added to the basic production function (Model A) to select the most appropriate specification to explain wine grape growers' TVP. Four specifications, one for each set of regressors, were estimated and compared through maximum likelihood ratio tests. Table 2 reports the TVP model for the main variety of the vineyard under the four alternative models.

First, model A – the basic production function including land, inputs, and labor – presents significant parameters for all the covariates except for fertilizers. The base model was complemented with covariates representing vineyards' attributes (i.e., grape color, vine age, and wine valleys) resulting in model B. To compare models A and B, a likelihood ratio test was performed to verify the hypothesis that the former nested in the latter (i.e., additional covariates do not add to the explanation of growers' TVP). The test rejected the null hypothesis (p-value of 0.000 with 4 degrees of freedom), giving support to the inclusion of vineyards' attributes. Subse-

Table 2. Cobb-Douglas estimates for total value product of Chilean wine grape growers under four alternative models (N=336).

Variable	Model A: Production factors		Model B: A + Vineyards' attributes		Model C: B + Management strategies		Model D: C + Climatic conditions	
	Coeff.[a]		Coeff.[a]		Coeff.[a]		Coeff.[a]	
Ln Land	0.603	***	0.806	***	0.913	***	0.917	***
Ln Fertilizers	0.033		0.018		0.018		0.020	
Ln Fungicides	0.049	***	0.028	**	0.025	**	0.022	**
Ln Agrochem	0.110	***	0.066	**	0.060	**	0.054	**
Ln Labor	0.274	***	0.156	***	0.056		0.050	
Grape Color			-0.381	***	-0.384	***	-0.371	***
Vineyard age			-0.163	***	-0.112	***	-0.109	***
Rapel valley			0.262	***	0.246	***	0.137	
Maule valley			-0.189	**	-0.168	**	-0.161	**
Irrig method					0.088		0.117	*
Mech harvest					-0.018		-0.019	
Training system					0.492	***	0.513	***
Grape Dest					0.227	**	0.222	**
Ln Evapotransp							0.066	
Ln Precipitation							-0.275	**
Ln Chilling hours							0.123	
Constant	1.394	***	2.011	***	1.674	***	1.246	
Obs (N)	336		336		336		336	
Adjusted R^2	0.831		0.864		0.880		0.876	
BIC	635.687		587.499		567.751		580.637	

[a] Significance: ***=1%; **=5%; *=10%.

quently, we included the set of management strategies (i.e., irrigation method, training system, mechanized harvest, and grape destination) into model B to produce model C. The null hypothesis that model B is nested in model C is rejected (p-value of 0.000 with 4 degrees of freedom), supporting the consideration of management strategies in modelling growers' TVP. Finally, climate-related variables (i.e., evapotranspiration, precipitation, and chilling hours) were included in model C to produce model D. The likelihood ratio test in this case did not favor model D (p-value of 0.207 with 3 degrees of freedom), which explains that adding climate-related variables did not contribute to explaining growers' TVP.

In addition, we tested the inclusion of climate-related conditions in models A and B to corroborate whether these variables have an effect in alternative models (results not shown but available upon request). Only in model A was the inclusion of climate-related conditions supported by the likelihood ratio test (p-value of 0.000 with 3 degrees of freedom), while in model B it was not (p-value of 0.704 with 3 degrees of freedom). Thus, the inclusion of climate-related variables into the TVP models was not supported by statistical tests, except for the base model. Although somewhat unexpected, we believe that there is a competing effect between climate-related conditions and the variables controlling for vineyard location (i.e., the categorical variables for wine valleys). Indeed, analyses of variance demonstrate statistically significant differences for the climate-related variables across valleys (see Appendix 3). Each valley has distinct characteristics that are captured by the climate-related variables (for a further description of valley characteristics see Appendix 1). An additional possible explanation for the non-significant effect of climate-related variables in model D is the date of the primary and GIS data, which differed in one productive season. Specifically, the survey was administered to grape growers in 2014-2015, and the environmental information from GIS referred to 2015-2016. Although the timing of these two sources of information is not exact, due to GIS data availability, climate-related variables in this study contribute to characterizing the microclimate of the wine valleys included in the sample.

From the above, we can conclude that model C is preferred over the four confronted specifications, being

selected as the most appropriate to explain growers' TVP. It should also be noted that goodness of fit statistics reported at the bottom of Table 2 confirm that model C is the best alternative (maximum Adjusted R-squared and lower Bayesian Information Criterion). Hence, model C is further discussed in the following section.

4.3. Results and discussion of the Selected Model C

Table 2 shows that nine out of 13 covariates were significant ($p<0.05$) and explained 88% of the variance of growers' TVP. The estimated parameters must be interpreted as partial elasticities of production (or percentage impact after exponentiating coefficients in the case of dummy covariates) because of the logarithmic metric used in the model. The parameters of conventional inputs, here referred to land, inputs, and labor, are all positive and less than one, and thus consistent with economic theory [25]. The sum of these coefficients was 1.073, which was tested for constant return to scale. The null hypothesis was rejected (p-value of 0.014 with 1 degree of freedom), hence we concluded that the production function exhibits increasing returns-to-scale. This result is consistent with the findings of Galindro et al. [18], who analyzed vineyard size in the Demarcated Douro Region of Portugal, and with the findings of Sheng et al. [26] who found increasing returns to scale using a sample of different agricultural establishments in Australia.

The parameter of the variable Land had a significant contribution in the explanation of growers' TVP, with an average elasticity of 0.91, meaning that a 10% increase in planted area translates into a 9.1% higher TVP, when holding all other variables constant. Concerning other inputs, pesticides (i.e., fungicides and other agrochemicals) were all significant, while fertilizers were not. These results may be explained by the inherent characteristics of the crop (i.e., the *Vitis* genus), as wine grapes are highly attractive to pests and diseases due to their elevated content of water and sugar, and vines have a natural tendency to grow vigorously. Fertilization management, as in the case of irrigation, must be carefully administered to the vineyard in order to have a correct balance between vegetative growth and fruit production [27]. The latter seems to be supported by the data used in our study since fertilizers, compared to pesticides, represent a smaller fraction in the total expenditure (sample average sum of fungicides, insecticides, acaricides, herbicides, and fertilizers; see Table 1). The use of fungicides increases the TVP with an average elasticity of 0.025 (i.e., a 10% increase in fungicide expenditure translates into a 0.25% higher TVP). As for other agrochemicals – that includes insecticides, acaricides, and herbicides – the growers' TVP increases by 0.6% when the expenditure in this item rises 10%. These results are expected since grapes are very sensitive to fungus, such as powdery mildew, botrytis, and grapevine trunk diseases [28, 29, 30] and pests, such as *Lobesia botrana*, *Brevipalpus chilensis*, *Pseudococcidae* spp. [31, 32, 33].

Concerning labor expenditure, corresponding to the sum of expenses of performing the different management activities evaluated in this study, the estimated parameter was not significant. This result was unexpected since models A and B showed a significant contribution of labor expenditure in explaining growers' TVP. The only difference between these models and model C is that the latter includes management strategy variables; therefore, it is likely that its inclusion has diluted the effect of labor. Indeed, alternative training systems and grape destinations have implications in terms of the use of labor (i.e., harvest, pruning/mooring, tipping of shoots, de-sprouting, canopy defoliation, physical weed control, and other labors). For instance, the tendone training system imposes several limitations for mechanizability [34], which translates into a greater dependence on manual labor. Then, management strategies may act as confounding variables with labor expenditure. To illustrate the differences in labor expenditure by training system and grape destination, Tables A.2 in Appendix 2 present a complete characterization of the vineyards, respectively.

As mentioned above, the training system and grape destination played a relevant role in our TVP model, while pressurized systems and mechanized harvesting were not statistically significant. According to our results, the training system is a determinant variable in the explanation of growers' TVP, increasing it by 63% when vineyards are trained as tendone compared to vertical training systems (the marginal effect of binary variables corresponds to their exponentiated parameter estimate). Grape destination was also significant in the model, showing that vineyards producing reserve grapes (i.e., of superior quality) demonstrated a 25% increase in TVP compared to varietal oriented vineyards. Appendix 2 show that tendone training systems exhibit considerably higher yields and harvest expenditure and lower prevalence of mechanized harvesting and agrochemical expenditure. The reserve quality grape destination, for its part, presents lower yields that are compensated by higher prices to demonstrate a higher TVP (compared to varietal). As expected, it also presents a higher aggregate labor expenditure (see item other labors).

As for vineyards' attributes, all the variables included within this category were significant in explaining

growers' TVP. It was found that vineyards growing red grape varieties generate 32% less TVP than vineyards growing white grapes, holding all other variables constant. This is because white grape varieties receive higher prices and present higher yields than red grape varieties in our sample: the average price per kilogram is USD$ 0.292 vs USD$ 0.246, respectively, and the average yield per hectare is 16.7 tons and 14.5 tons, respectively. The age of the vineyard also plays a relevant role in the model, indicating that TVP is reduced by 1.1% when the age is increased by 10%. In the empirical literature there is mixed evidence on this topic, particularly on yield effects rather than on grape quality effects. Some studies have found that vine age may reduce yields [35], while others have found a positive [36] or no significant effect on yields [37].

In terms of production valleys, using Curicó as a reference, wine grape growers from Rapel exhibit 28% higher TVP while those from Maule are 16% lower. That is to say, the growers' TVP increases as moving north in the study area. This result corresponds with average data displayed in Table A.3 (see Appendix 3), showing that growers from the northernmost valley (i.e., Rapel) present higher average grape prices and yields. The same table shows that growers from Rapel face a lower incidence of precipitation and higher evapotranspiration between December and February, which may affect positively quality and yields, respectively.

4.4. Total value product functions derived from model C

Figure 2 displays several TVP functions for the production factors considered in this study (i.e., land, fertilizers, fungicides, other agrochemicals, and labor) and the age of the vines. They represent the relationship between each of these variables and vineyards' outcomes, by showing the average prediction of TVP in the sample (fitted value) at increasing values of the variable, holding all other covariates in the model constant at observed values. In each TVP function, the pair of coordinates that correspond with the median value of the variable (X-axis) and their expected TVP (Y-axis) is presented. For example, in the case of land, the median value is 10 hectares, which is associated with an expected TVP of US$ 29,854, holding all other covariates in the model constant at observed values (see Figure 2.a). It can also be seen that there is a positive and almost linear (barely concave) response of TVP as the quantity of hectares of vineyard increase. Notwithstanding, in the case of fertilizers, fungicides, other agrochemicals, and labor, the concavity of the TVP function is very clear, which indicates that the marginal effect of these variables is positive but decreasing. As for the age of vines, the relationship is negative and convex, showing a decreasing marginal effect on TVP as the number of years increase (see Figure 2.f).

5. CONCLUSIONS AND PRODUCTION IMPLICATIONS

The economic analysis carried out in this study showed the impact of alternative management strategies and cultural practices, controlling for vineyards' structural variables and production conditions, using a sample of 336 vineyards. Among significant variables, the results reveal that the vineyard training system, grape color, grape destination, and vineyard age play an important role in explaining growers' total value product (TVP). In particular, a better economic performance is expressed by vineyards using tendone training systems, growing white varieties, producing reserve quality grapes, and having younger aged vines. These results have direct implications for both wine grape growers and sectorial policy makers aiming to improve the competitiveness of viticultural production by providing management strategies that result in better outcomes. In addition, we improve on the existing literature as our results are based on a diverse, comprehensive, and relatively large dataset, while previous studies tend to focus on specific or narrow factors of economic performance (e.g., testing the effect of a particular management practice) and generally use purposive samples that do not guarantee diversity or representativeness. In this regard, we disentangle the role of a diversity of factors affecting viticultural production and estimate their impact on growers' TVP, which at the end is the ultimate goal of a vineyard.

We also included in the econometric model a set of climate-related variables from a GIS, which do not appear to be significant in explaining growers' TVP. This result was unexpected since agricultural systems are naturally determined by climatic conditions, especially in recent years as they are increasingly challenged by climate change. We believe that the joint inclusion of climate-related variables in the econometric models with other crucial variables for wine grape growing (particularly, the valley of production) competed in explaining the variance. In this regard, the study area of this paper is centered in three important and traditional wine valleys of central Chile, the core of the country's vineyard production, which at some point capture climate-related conditions. The results indicate that vineyards located in northern wine valleys – characterized by a lower on-season precipitation, lower annual chilling hours, and higher evapotranspiration – demonstrate a higher growers' TVP. Another potential reason for the non-signif-

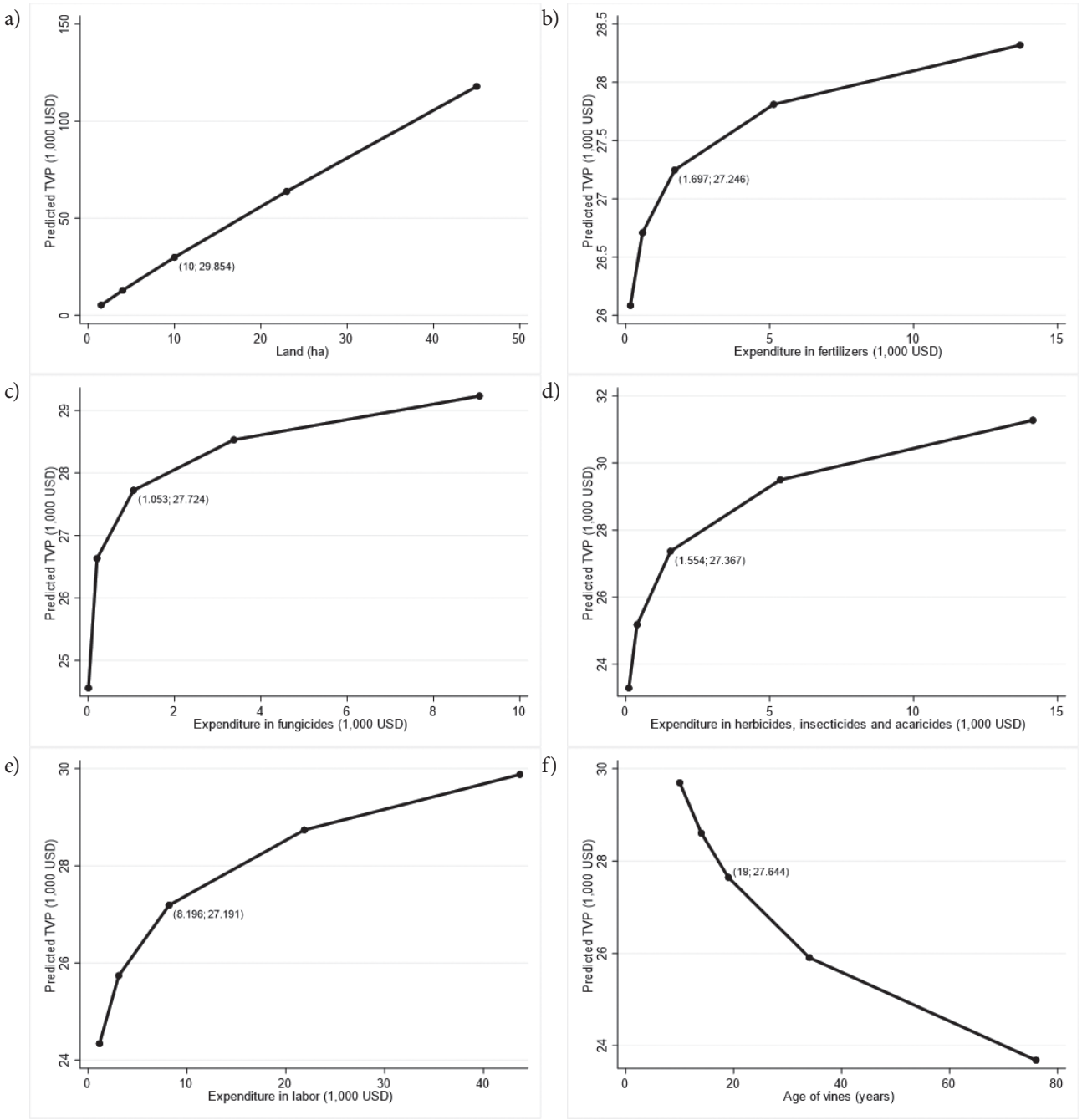

Figure 2. Total value product functions from a sample of 336 Chilean wine grape growers for: a) land, b) expenditure in fertilizers, c) expenditure in fungicides, d) expenditure in other agrochemicals, e) expenditure in labor, and f) age of vines. In each graph there are plotted five data points that, from left to right, correspond to the 10th, 25th, 50th, 75th and 90th percentiles. Therefore, coordinates (X, Y) represent median values in X and the associated values in Y.

icant effect of climate-related variables, apart from the competing effect by the variance with the valley of location in the statistical models, is that vineyards are not as sensitive as other crops to the climate-related variables analyzed in this paper. We suggest more research on this topic; deeper analyses are needed to explore this eventual trait of vines as our data and analyses are limited in this regard. Future research might explore the adaptive capacity of vines compared to other crops in light of the climate change phenomena affecting our planet.

Despite the contributions of this paper, there were some inherent limitations that can be considered by future investigations. First, in this study we use the main grape variety plot of the vineyard as the unit of analysis, but it is likely that growers produce several grape varieties within a vineyard. Future studies might consider this complexity when analysing economic performance by modelling simultaneously the different outcomes of vineyards. Second, we believe that subsequent studies may improve the findings presented here by including soil heterogeneity variables that may have an important effect on vineyards' economic performance. Although our model barely captured this effect through the variable valley of location, we suggest the consideration of specific measures of the *terroir* aiming to isolate this source of variability. Third, today's digital technologies, such as GPS, PDA, remote sensing or GIS, are becoming relevant in agricultural systems as they generate valuable information to make better decisions and thus turn production processes more efficient. In our study, we did not consider the adoption of these technologies as a management strategy that allows for making precision agriculture at the sub-plot level. We acknowledge it as a shortcoming that could be addressed in future research on this topic.

The main contribution of this paper is to advance in the understanding of economic performance factors in wine grape growing, by simultaneously considering management strategies, production conditions, and vineyards' attributes. Capturing the effects of on-farm decisions made by the vineyards, using a relatively large sample distributed in three different wine valleys, represents valuable information to develop a strategy for the primary sector in Chile, which faces significant competitiveness challenges compared to other agents of the marketing chain. Hence, our findings are hopefully valid for other emergent countries in the global wine industry, and especially for those that enjoy a Mediterranean climate. The practical implication of identifying what factors allow vineyards to be more profitable serves to guide on-farm decisions of the private sector, both growers and investors. Notwithstanding, the above is especially relevant for policy makers, to the extent that improved economic performance at the vineyard level can have an aggregate impact on the commercial success of the whole industry.

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APPENDICES

Appendix 1.

Valley	Surveyed producers	Characteristics
Rapel	164	Composed by the sub-valleys Cachapoal and Colchagua, both are located in the O'Higgins region of Chile and are characterized by their sub-humid, Mediterranean temperate climate, ideal for the production of red varieties. The hours of light, high thermal oscillation, and the existence of various microclimates allow for growing different wine varieties. This region has a pronounced seasonality, where winter concentrates the most of annual rainfall. It has an average temperature of 22 °C and precipitation around 600 mm. The soils are alluvial in origin. These valleys are located north of the Curicó and Maule valleys.
Curicó	91	Located in the Maule region of Chile, Curicó valley is considered the center of the Chilean wine growing because of its high concentration of vineyards. It has a temperate Mediterranean climate with a dry period five months a year, precipitation around 700 mm, and an average temperature of 20 °C. White varieties are best grown in the coolest areas of the valley. It has numerous water sources and the soil is alluvial and volcanic in origin.
Maule	181	Located in the Maule region of Chile south of Curicó valley and considered the "Cradle of Chilean wine" because of its origin during the time of Spanish colonization. It has a temperate Mediterranean climate with rainy winters. The soils are acidic and clayed, which partially reduces productivity to benefit the quality of the grapes. It has many rivers that also exert influence on the quality of their wines.
Total	436	

Appendix 2

Table A.2. Vineyards' characterization by training system and grape destination.

	Training system				Grape destination			
	Vertical		Tendone		Varietal		Reserve	
Variable	N	Mean	N	Mean	N	Mean	N	Mean
Grape price (USD kg-1)	275	0.260	61	0.229	298	0.235	38	0.409
Yield (ton ha-1)	275	12.609	61	26.000	298	15.554	38	11.011
Planted area (ha)	275	17.297	61	14.249	298	16.644	38	17.527
Fertilizer expenditure (1,000 USD)	275	4.228	61	4.818	298	4.468	38	3.291
Fungicide expenditure (1,000 USD)	275	3.111	61	1.904	298	2.807	38	3.560
Expenditure in agrochemicals to control insects, spiders and weeds (1,000 USD)	275	6.453	61	3.883	298	5.674	38	8.435
Labor expenditure (1,000 USD)	275	15.680	61	20.116	298	16.226	38	18.521
Expenditure in pruning/mooring (1,000 USD)	270	4.616	61	7.181	295	5.174	36	4.392
Expenditure in harvesting (1,000 USD)	265	5.789	60	10.373	287	6.567	38	7.154
Expenditure in desprouting (1,000 USD)	232	1.722	47	1.355	247	1.645	32	1.777
Expenditure in thinning of shoots (1,000 USD)	217	0.895	26	0.489	214	0.858	29	0.808
Expenditure in physical weed control (1,000 USD)	200	0.985	52	0.953	229	0.971	23	1.048
Expenditure in other labors (1,000 USD)	167	4.436	27	1.508	167	3.665	27	6.276
Grape color (red=1; white=0)	275	0.829	61	0.803	298	0.829	38	0.789
Age of planting (years)	275	32.335	61	18.574	298	29.658	38	31.237
Irrigation method (pressurized= 1; gravity= 0)	275	0.378	61	0.459	298	0.396	38	0.368
Machinery use for harvest (yes= 1; no= 0)	275	0.200	61	0.033	298	0.178	38	0.105
Training system (tendone=1; vertical=0)	275	-	61	-	298	0.201	38	0.026
Grape destination (reserve=1; varietal=0)	275	0.135	61	0.016	298	-	38	-

Appendix 3

Table A.3. Analyses of variance by valley and mean comparison of grape price, yield and climate-related variables across valleys (Sidak method).

Variable	Rapel		Curicó		Maule	
Grape Price (USD kg^{-1})	0.30	a	0.25	b	0.22	b
Vineyard yield (ton ha^{-1})	17.42	a	15.22	a	12.63	b
Precipitation (mm)	15.24	a	27.16	b	26.65	b
Evapotranspiration (mm)	464.28	a	453.27	b	450.06	b
Chilling hours (hours)	1009.13	a	1542.43	b	1395.87	c

* Different letters within the same row means statistically significant differences ($p< 0.05$).

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Is a new EU wine policy coming? The unexpected role of regulatory measures

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Abstract. On January 1, 2023, a "reformed" Common Agricultural Policy (CAP) will come into force, which is innovative by nature in structural terms, and focused on environmental and social sustainability issues, aimed at a comprehensive digitization-based modernization of the agri-food sector. The new CAP keeps the current structure based on *expenditure* and regulatory *measures,* but includes a new planning tool, the national CAP Strategic Plan, a new CAP management model, and the new delivery model (NDM). Concerning EU wine policy, the new regulations foresee a number of specific amendments to existing rules, including changes that will apply to financial support for the wine sector with a reduced budget and to the regulatory measures. Among the latter, the most globally impacting are labelling rules, which require more information to consumers and allow the use of an e-label, the use of hybrid grape varieties for the production of appellation wines, and the inclusion among CAP regulated products of partially or totally de-alcoholised wines.

Keywords: common agricultural policy, de-alcoholised wine, hybrid grape varieties, labelling.

INTRODUCTION

On January 1, 2023, a new system of regulations will come into force that defines the next EU common agricultural policy (CAP), ending a long process that started in June 2018, when the European Commission, led by Jean-Claude Juncker, presented a proposal that profoundly reshaped the CAP with the aim of defining a new governance model for post-2020 European agriculture. However, the approval process was slowed down by the issues of Brexit dependant budget cuts, the reshaping of rules for the management of the EU Multiannual Financial Framework (MFF), the settlement of a new EU Commission led by Ursula von del Leyen, which launched the *European Green Deal* Strategy and the consequent *From Farm to Fork* agricultural Strategy, and finally, by the COVID-19 pandemic. Therefore, the reform proposal adapted to the new context completed the process of approval in

December 2022, with the official publication of the new CAP regulations.

The "reformed" CAP has an innovative nature in structural terms, being much more focused on environmental and social sustainability issues, as clearly expressed by the 3 general objectives[1], each of them detailed in three specific objectives, and aimed at a comprehensive digitization-based modernization of the agri-food sector (1).

As the wine sector in the EU is highly supported and regulated by CAP (2, 3, 4), and the EU is a key actor in the global wine market, a new CAP may have a quite significant relevant effect on such market in terms of competitive scenarios, product innovation and institutional settings. Therefore, it is of some interest to look at the key aspects of CAP reform in general and in relation to wine, whose policy to date has been characterized by many peculiarities, which will be mitigated in the next programming period, thanks to the New Delivery Model. Despite this, European wine policy remains structured on two main blocks of interventions: expenditure measures on the one hand, and regulatory measures on the other. For this reason, it is worth to reflect on what news and what effects can be expected following its entry into force, starting from January 2023.

1. THE MAIN CHANGES

In terms of general architecture, the new CAP maintains the current structure, which combines two components of equivalent importance, *expenditure* and regulatory *measures*[2]. On the one hand, the expenditure measures consist of *direct payments* to farmers to ensure income stability and to remunerate them for public goods not normally paid for by the market, *sectoral interventions* to stabilise and/or improve the functioning of the concerned markets, and *rural development policy*, which provides for the structural strengthening of the agricultural sector and rural areas. On the other hand, the regulatory measures, defined by a very large number of different provisions, include provisions concerning many different areas of interest for agriculture and agri-food products.

However, beyond this element of continuity, the main novelty of the CAP 2023-2027 is a new tool, the Strategic Plan, that each Member States must draw upon for the joint programming of all expenditure measures to achieve the CAP objectives, also setting quantitative targets and milestones consistent with the achievement of "more ambitious" environmental and social targets (5). This novelty, which actually empowers EU Member States in the shaping of the CAP intervention, is part of the intended innovation of the CAP management, defined as a new delivery model (NDM) aimed "to shift the policy focus from compliance to performance, and rebalance responsibilities between the EU and the MS level with more subsidiarity [….] improving policy coherence across the future CAP and with other EU objectives"[3].

The rules concerning the CAP Strategic Plan and therefore the management of all expenditure measures are laid down by the new Regulation 2115/2021 (CAP Strategic Plan Regulation). The regulatory measures in force with the reformed CAP are those included in Regulation 1308/2013, modified by the new Regulation 2117/2021 (Amendment Regulation). Below, a brief but complete description is presented of the numerous and diverse changes that have been approved for the wine sector as a result of this long and complex reform process in the final stages, with the approval of the above mentioned regulations.

2. TOWARDS A NEW WINE POLICY

The CAP reform introduces changes in the wine sectoral intervention and regulatory measures, but does not turn upside-down the "EU wine policy" structure, consistently with the Commission view on the effectiveness of the current asset of such policy: "while the successive 2008 and 2013 reforms of the wine policy have overall reached their objectives, resulting in economically vibrant wine sector, new economic, environmental and climatic challenges have appeared. Therefore, the regulation foresees a number of specific amendments to existing rules to cope with these challenges"[4]. As a matter of fact, the analysis of the performance of the EU wine sector in the recent past has shown that there is no evidence of satisfactory progress towards high levels of environmental sustainability and a satisfactory exploitation of the potential of vitivinicultural activities in the development of marginal areas (1).

[1] Reg. 2117/2021, art. 5: (a) to foster a smart, competitive, resilient and diversified agricultural sector ensuring long-term food security; (b) to support and strengthen environmental protection, including biodiversity, and climate action and to contribute to achieving the environmental and climate-related objectives of the Union, including its commitments under the Paris Agreement; (c) to strengthen the socioeconomic fabric of rural areas.

[2] These measures define a complex framework which represents a characterising part of CAP; but nevertheless, the EU agricultural policy is frequently identified only with its expenditure measures.

[3] Explanatory memorandum to reform proposals (6, p. 2).

[4] Explanatory memorandum to reform proposals (6, p. 14). Such arguments are consistent with the last evaluation of CAP measures applicable to the wine sector (7).

2.1 The new financial support

The set of spending measures destined to the wine sectors will rely on a reduced budget with respect to the "old" CAP (approximately 1 billion €/year, - 3.9%), but with an enlargement of the range of the intervention types, or measures, that Member States may make available for wine actors[5].

In the new policy framework, wine growers and wine producers and marketers will be potential beneficiaries of seven types of "structural" measures that aim to strengthen the competitiveness of the wine sector in MSs, allowing the financial support of improvements at different levels of the supply chain. One measure sustains wine growers for "restructuring and conversion of vineyards" with the objective of improving sustainability by changing the vineyard management techniques, replanting the vineyard in better sites or using varieties more suited to the eco-physiological condition of the farm. Four different measures sustain material (physical assets) and immaterial (software, design costs, licenses, patents) investment and promote innovation activities and best practices to achieve better wine quality from the perspective of sensory properties and environmental and social sustainability. A new measure is included in this group, specifically designed to finance investment targeted to achieve specific improvements in terms of the carbon or water footprint. Two measures are designed to improve the position in the market of EU wines, including within Third Countries, which involves financing wine producer's true promotion activities, public relations, advertising, wine exhibitions, while inside the EU are admitted only actions limited to information campaigns about PDO and PGI, to comply with the opposition of the Directorate General for Health and Consumer Protection of the European Commission (DG SANCO) policies that could result in an increase in alcohol consumption in the EU.

Three measures offer a set of tools to assist enterprises in facing different economic risks: harvest insurance, mutual funds and green harvesting. These were conceived as preventive instruments able to encourage a responsible approach to crisis situations after the dismantling of the traditional market protection measures (price support, distillations, and private storage, with most aid in force until 2008) and are confirmed in the new CAP.

Two new measures finance actions undertaken by interbranch organisations recognised by Member States[6] in the wine sector aimed at i) enhancing the reputation of Union vineyards by promoting wine tourism in production regions, and ii) improving market knowledge.

Finally, a new measure finances the access of companies in the wine sector to advisory services, particularly concerning the conditions of employment, employer obligations and occupational health and safety, explicitly introducing the social dimension within sectoral wine interventions.

It is up to each Member State to decide which measures to make available for its own actors in the wine production chain[7] and how to distribute the wine national budget, with only an obligation to allocate at least 5% of the budget for actions with a positive impact on the environment, climate change or sectoral sustainability. Interestingly, a first analysis of the projects[8] of the CAP Strategic Plan delivered by Member States to the European Commission shows that the resources assigned are almost totally directed to the "old" structural measures, almost replicating the previous allocation patterns (1, 8). The exclusion of the new measures is probably partially related to the fact that these were introduced only in the last version of the regulation, when the draft of the CAP Strategic Plans was already in an advanced phase, and the stakeholders did not have enough time to evaluate their real interest. To this must be added the fact that the measures directed to interbranch organisation are not applicable in all EU wine producers' countries, as those existing are not always recognised under the EU rules. The new measures could eventually be selected in the case of a future update of the CAP strategic plans. Finally, it should be underlined that some (old and new) sectoral measures are addressed to objectives also pursued through the rural development policy. In these cases, the interest in their implementation under the sectoral interventions could be greatly reduced, as confirmed, for example, by the limited resources allocated by MSs in favour of the risk management measures, which are usually supported within the rural development policy framework.

If the wine sector, as a whole, is going to be less funded by sectoral intervention, more financial resources should reach winegrowers[9] through the renewed mechanisms for calculating the CAP direct payments. Winegrowers are only receiving direct payments from

[5] The complete description of the new CAP sectoral interventions for wine is included in article 58 of Regulation 2021/2115 (CAP Strategic Plan Regulation).

[6] According to Regulation (EU) 1308/2013.

[7] It is worth to remember that the wine sectoral interventions are addressed to different beneficiaries along the wine production chain, including nonagricultural actors.

[8] The projects of CAP Strategic Plans are currently (October 2022) in a revision phase according to the comments that the Commission sent to Member States and will be fully operative before the end of the year.

[9] In the CAP, the definition of "winegrowers" refers only to producers which are also involved in the agricultural phase of grape productions.

2013, and in some of the wine EU-producing countries, they received only a small amount of money[10]. Now, the new CAP should bring good news for agricultural actors in the wine sector, as the reform has among its targets the rebalancing of the distribution of such payments in all Member States. In the future, all winegrowers should receive a payment proportional to the farm area similar to that received in other sectors, under the condition that they comply with some basic requirements related to the adoption of sustainable practices. Moreover, they could benefit, according to the national decision, from additional payments in the case of the adoption of the new voluntary environmentally friendly practices laid down in each CAP Strategic Plan (the so-called eco-schemes[11]). Regardless, the actual increase in the resources coming from the direct payment budget will likely be different in each Member State, as both the increase in the basic payment assigned or the number of eco-schemes actually accessible for wine growers will depend on the single Member State decisions.

As already mentioned, in the "new" CAP, as in the "old", actors in the wine sector may also apply for financial support from the rural development policy in competition with actors belonging to other agricultural sectors, as no preassigned budget for grape or wine producers exists. Regardless, in the new policy framework, rural development measures open to vitivinicultural actors should be planned consistently with those of sectoral intervention inside the CAP Strategic Plan, with the aim of facilitating the accomplishment of the CAP objectives and of those specifically defined for the wine sector[12].

2.2 New rules

Most of the amendments to the EU wine policy announced by the Explanatory Memorandum to deal with the new economic, environmental and climatic challenges concern the rules for the marketing of agricultural products and the functioning of the agricultural sector, which are laid down by the Amendment Regulation[13] and includes relevant novelties.

The Amendment Regulation allows the inclusion of varieties coming from a cross between *Vitis vinifera* and other species of the genus *Vitis* in the production of wines with a protected designation of origin (PDO). This rule change is rather radical, as genetic purity has been, over time, a distinctive aspect of the regulation of European terroir-linked wines (2). In introducing this change, the EU recognises that these new varieties may represent a gamechanger for the future of sustainable winemaking [10]. Indeed, genetic research and nursery activities are delivering new interspecific hybrids obtained by multiple 'backcrosses' between some of the widely planted *Vitis vinifera* grape varieties (e.g., Merlot and Chardonnay) with non-*vinifera* grape varieties, obtaining new varieties with a high percentage of the *Vitis vinifera* genome, thus aiming to preserve most of the sensorial properties of the "noble parent" [11].

Such novel genotypes have an innate resistance against cryptogamic diseases, allowing a reduction in the use of synthetic pesticides by more than 80% [12] - far greater than the 50% objective set by the European Green Deal, allowing for approximately 60% savings/ha in the cost of treatments and 15% savings/ha in vineyard operating costs (13]. The first studies show a positive attitude of consumers towards these new varieties, also known as PIWI[14] (14), which therefore promotes all three dimensions of sustainability. Their diffusion could be fostered by the subsidies for restructuring and the conversion of vineyards under the sectoral intervention of the CAP described above.

Concerning new production options, the Amendment Regulation lays down the inclusion of the products obtained by wine de-alcoholisation with an alcoholic degree lower than the minimum indicated by the definition of wine[15] among the products covered by the wine sector. Such products can currently be produced and marketed only as beverages, but from January 2023, such products will be labelled wine if they comply with the EU approved wine oenological practices[16]. The de-alcoholisation can be total and partial, but only partial de-alcoholisation will be authorised for wines with a protected geographical indication or protected designation of origin. For such wine, the possibility of de-alcoholising must be included in the product specification, which should contain a description of the partially de-alcoholised wine and, where applicable, the specific oenological practices to be used to make the partially de-alcoholised

[10] The current value of the payment per hectare of vineyards is, in some Member States, different from other surfaces due to different rules in the Member States used in the implementation of the decoupling processes started with Agenda 2000 (9).
[11] Reg. (EU) 2117/2021, art. 31
[12] Reg. (EU) 2117/2021, art. 57.
[13] Regulation (EU) 2021/2117, art. 1, concerning changes to Regulation 1308/2013.
[14] From German: Pilzwiderstandsfahige (disease resistant).
[15] Regulation (EU) 1308/2013, Appendix I: At least 8.5% in the northern part of EU (Wine-growing zones A and B); at least 9% in the south (Wine-growing zone C).
[16] In the EU, products covered under the wine sector can be produced only by means of the oenological practices and using the substances listed in the EU Regulations: Reg (EU) 1308/2013, Reg. 934/2019, Reg 203/2012..

wine or wines, as well as the relevant restrictions on making them.

The Amendment Regulation recognises that further research and experimentation is necessary to improve the quality of the de-alcoholised wines, but the inclusion of such products in the wine sector allows producers to obtain subsidies for investments and R&D activities using sectoral intervention or rural development measures, again showing the high level of interconnection among different instruments (expenditures and regulatory measures) within the CAP for the wine sector. Regardless, it will likely be necessary to define new specific rules for the production of such products as the subtraction of alcohol, especially if the final result is zero or very low alcohol, requires specific technological interventions to rebuild the sensory equilibrium, which are currently not included in the list of EU oenological practices.

Interestingly enough, inclusion in the list of EU vitivinicultural products of de-alcoholised and partially de-alcoholised wines was not considered in the first draft of the Amendment Regulation, as a result of the co-decision process after the renovation of the EU Commission and Parliament in 2019. Such novelty also represents a break from the traditional European wine regulation, as the alcohol content was considered an essential part of the identity of wine in the European tradition. Not by chance, within the OIV for years EU Countries, although with different nuances, have been against the inclusion of such product in the wine categories of the OIV International Code of Oenological Practices, pressing for their inclusion in the category of "Products derived from grapes, grape must or wine". Likely, most European wine stakeholders are now confident that the market opportunities of such products are more important of the tradition[17]. The products of wine de-alcoholisation are not new in the market, but only recently have experienced a relevant growth. In particular, they have grown from US $7.8 billion in 2018 to $10 billion in 2022 in ten different key markets. Moreover, IWSR forecasts that no- and low-alcohol product volumes will grow by +8% yearly between 2021 and 2025.

Further amendments of the EU wine regulatory framework concern rules about labelling, new planting of vineyards and interbranch organisations related to PDO wines.

To provide a higher level of information to consumers, complying with the EU general regulation of labelling of food products, the wine label will include a nutrition declaration and a list of ingredients. Producers will have the option of limiting the contents of the nutrition declaration on the package or on a label to only the energy value, making the full nutrition declaration and the list of ingredients available on electronic support[18]. The Commission is delegated to lay down rules for the indication and designation of ingredients, with new rules coming into force after December 2023. The task of the Commission is not trivial, as the listing of what is an ingredient, beyond grape and must, is not straightforward. In principle, all the oenological substances listed in regulation 934/2019 as additives should be labelled[19], but professional organisations are lobbying to limit the obligation of labelling to those that are not already present in the grape.

Moving on to the scheme of authorisations for vine plantings, in force since 1 January 2016, it is extended from 2030 to 2045, with two mid-term reviews in 2028 and 2040 to evaluate the operation of the scheme and, if appropriate, apply changes. It is therefore significantly extended, with minor revisions, the current regime that allows Member States to make available each year authorisations for new plantings corresponding to 1% of the total area actually planted with vines in their territory[20]. This choice also confirms the impossibility of reallocating the area corresponding to the grubbed-up vineyards in farms that give up viticulture to other farms. The outcome of the CAP reform results in a substantial confirmation of the recently reformed scheme, which is effective in preventing structural surpluses of supply, but that in progress could determine a depletion of the production potential and hinder the structural strengthening of active and competitive farms in well developed areas, as well the improvement of the socioeconomic fabric of marginal areas developing vitivinicultural activity, which represents one of the few productive options for farmers.

The CAP reform introduces new rules that can empower interbranch organisation related to PDO and PGI wines[21] in managing the position of the wines of

[17] The preliminary statements of the Amendment Regulation (whereas 40) explain the choice concerning de-alcoholised wines only referring to market opportunities. But it can be assumed that such choice was supported also by the awareness that these products comply with the recommendations recently expressed by WHO in the framework of the *Global Action Plan on Harmful Consumption of Alcohol* https://apps.who.int/gb/ebwha/pdf_files/EB150/B150_7Add1-en.pdf).

[18] Anticipating the coming in force of the Amendment Regulation, some actors of the European wine industry developed the already operating *U Label platform* (https://www.u-label.com/) which can support wineries in implementing the e-labelling for wine products.

[19] The substances listed in the Regulation 934/2019 are classified in additives and processing aids; the processing aids, which are the most numerous oenological substances and that could be present in the wine only as residues, must not be labelled.

[20] As measured on 31 July of the previous year.

[21] Recognised by Member States according to Regulation (EU) 1308/2013.

interest in the market and deal with the distribution of added value along the supply chain. According to the new rules, interbranch organisation of producers of PDO and PGI wines will be allowed to request of Member States to lay down, for a limited period of time, binding rules for the regulation of the supply of their wines of interest. Moreover, such interbranch organisations may provide non-mandatory price guidance indicators concerning the sale of grapes for the production of wines of interest, provided that such guidance does not eliminate competition with respect to a substantial proportion of the products in question. In any case, the intention of the EU to empower interbranch organisations is also revealed by the new measures introduced in the sectoral intervention reserved to these bodies. However, the extension of the powers of interbranch organisations may raise questions about conformity with the principles of competition law but up to now no concern has been expressed by stakeholders.

3. POTENTIAL IMPACTS

In summary, the CAP reform is leading to interesting changes in the wine policy, which has potential impacts in the wine market at the European and global levels.

The amount of financial resources to be transferred to wine actors is not expected to change much, but the complex rule changes should determine other substantial evolutions, such as the improvement of the sustainability level that could make EU wine supply more consistent with the market demand and comparable to non-EU competitors. Therefore, the balance of power on the market should not be affected by the new CAP. Moreover, the scheme of authorisations for vine plantings represents a remarkable contribution of the EU to the global market equilibrium, which, however, could hamper the reaction of EU wine producers in the case of a wine demand rise.

More significative impacts of the CAP reforms will be on the labelling practices and innovation options.

Concerning labelling, the new EU rules are going to define a new global standard for trading. Third Country producers will be required to comply with such rules, and consumers of EU wines in Third Countries will become accustomed to the new labelling rules. These could also be a driver for a new OIV wine labelling standard[22]. However, beyond the aspects related to the technicalities of labelling, the new regulation could have interesting indirect effects in terms of changes in oenological practices. Such changes could result in a demand for new equipment or new services. In fact, most additives (i.e., the substances subject to labelling), which do not correspond to substances already present in the grape, can be substituted with physical treatments[23]. Therefore, wineries could be induced to change their processes to limit, as much as possible, the list of labelled items. As such, physical treatments require specific equipment that could be hard to pay back in small or medium wineries, and a new demand for external services could emerge, which will proceed in parallel to the demand for the supply of services for managing the e-label that will be linked with the physical label.

Moreover, the disclosure of a limited category of oenological substances could bring the attention of media and of consumers to the whole of complex oenological substances and practices that are allowed in the EU and are of common use elsewhere. The awareness of most consumers about how the wine is produced is currently quite scarce, so the additional compulsory information could result in an increasing demand for full disclosure on how wines are made, going beyond what is requested by the new rules, resulting in pressure for the exclusion of practices and processing aids that could be badly perceived by consumers. The final results could be positive, including a general orientation towards a "light" or "precision" oenology, which rely on high-quality grapes and minimal intervention in the winery. On the other hand, the higher transparency of the complex oenological practices and substances commonly used in wine making should be accompanied by an appropriate communication effort to prevent dangerous and unjustified trust issues.

Concerning the new rules about the partially or totally de-alcoholised wine and the use of hybrids in the production of PDO wines, these will have practical impacts that are currently difficult to foresee.

The EU is opening to de-alcoholised products presented as "wine", along with the contemporary positive forecast of market analysis agencies, that are now arousing the interest of many EU companies. The resources of the sectoral intervention could ease access to indispensable investments, at least for the larger of them. The actual market growth will depend, first on how much the interested companies will be successful in delivering quality consistent wines, and second, on successfully managing production costs that are rather high (15, 16).

[22] The EU decision to allow the electronic labelling of mandatory information is likely something without precedents; this is very relevant because the question of electronic labelling is being debated in Codex Alimentarius at the present time.

[23] As suggested by prof. Moio in his contribution "Vers une logique de l'etiquetage du vin" presented at the Conference at the Bordeaux University, June 21, 2018.

Moreover, the possible societal concern for the adverse social (overcompensation alcohol assumption - 17) and environmental (energy use -18) implications of these products may also play a role. In the case of wide consumer acceptance, it is possible to foresee that new service providers will emerge, organised to manage in specialised plants, compliant with the strict fiscal regulation of alcohol production and conservation, the dealcoholisation process and complementary operations.

Concerning the new hybrid resistant varieties, the actual speed and dimension of their diffusion will depend on the solution to many issues. Permission to use such varieties also for PDO wines is increasing the interest of producers and policy-makers, but new fungus-resistant grapevine varieties still represent an immature technology whose adoption requires investments with a long payback (19). In fact, the stability of resistance/tolerance to the targeted pathogens is unknown, and a strong research effort is even now devoted to obtaining new fungus-resistant grapevine varieties with multiple genes for resistance (11). Moreover, the implications of the use of such new varieties regarding other pathogens are not clear. Last but not least, the choice of available new varieties is still restricted with respect to the huge differences in wine styles, soil and climate conditions of viticulture, and a large uncertainty persists concerning the optimal viticulture and oenological practices to adopt.

The EU wine sector is moving in the coming years towards a normative framework with many differences with respect to the past. With regard to the new CAP organisation, only when the CAP Strategic Plans, in particular, and the new delivery model, in general, will be in force will it be possible to understand if this new organisation will be more effective in sustaining the wine sector, also reducing the red tape burden frequently criticised by practitioners and scholars (2, 3). With regard to the wine policy, EU wine producers will likely be better supported in achieving more ambitious environmental targets and will be inspired to evaluate new options in terms of product and processes and to deal with public opinion pressures that could result from the new labelling rules. The labelling rules, at least in the short run, could result in an additional non-tariff barrier to trade (20, 21). Regardless, a relevant consequence of the CAP reform is a significant change of some identity elements of the "European wine charter":_the minimum alcohol degree is no longer a constitutive element of the definition of wine, the wine is no longer the result of a magic (black) box fed only with grape, and the (high) quality of the EU wine is no longer exclusively linked to the *Vitis vinifera*. Dramatic changes, indeed, that could have unforeseen consequences on the global wine market.

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Table of contents

Nicola Marinelli
Old and new challenges in the wine business: what lies ahead for Wine Economics and Policy 3

Giulia Gastaldello, Elisa Giampietri, Elena Zaghini, Luca Rossetto
Virtual wine experiences: is covid extending the boundaries of wine tourism? 5

Ilinka Terziyska
Re-visiting the concept of winescape through netnography: "A tale of two cities" 19

Miriam de Oliveira Dornelles, Cláudio Vinícius Silva Farias, Shana Sabbado Flores
What do women like? A quantitative study of the female behavior of sparkling wines consumers 31

Terry M. Lease, Deirdre Sommerlad-Rogers
U.S. Wine consumer interest in wine ingredient and nutritional information 41

Gabriel I. Penagos-Londoño, Felipe Ruiz-Moreno, Ricardo Sellers-Rubio, Salvador Del Barrio-García, Ana B. Casado-Díaz
Consistency of expert product reviews: an application to wine guides 51

Carlos Bopp, Roberto Jara-Rojas, Alejandra Engler, Miguel Araya-Alman
How are vineyards management strategies and climate-related conditions affecting economic performance? A case study of Chilean wine grape growers 61

Eugenio Pomarici, Roberta Sardone
Is a new EU wine policy coming? The unexpected role of regulatory measures 75