

To wine or not to wine? A scientometric approach to 65+ years of wine preference and selection studies

Wine
preference
and selection
studies

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Abstract

Purpose – Among the growing interest towards market segmentation and targeted marketing, the current study adopted a scientometric approach to examine the literature on wine selection and preferences. The current review specifically attempts to shed light on the research that explores the determinants of wine preferences at multiple levels of analysis.

Design/methodology/approach – CiteSpace was used to compute a Document Co-Citation Analysis (DCA) on a sample of 114,048 eligible references obtained from 2,846 publications downloaded from Scopus on 24 May 2021.

Findings – An optimized network of 1,505 nodes and 4,616 links was generated. Within the network, impactful publications on the topic and thematic domains of research were identified. Specifically, two thematic macro-areas were identified through a qualitative analysis of papers included in the 7 major clusters. The first one - “Methods of Wine Making” - included clusters #0, #3, #5, #6 and #18. The second one - “Consumers’ Attitudes and Preferences Towards Wine” - included clusters #1 and #2. The first thematic macro-area included more technical aspects referring to the process of wine making, while the second thematic macro-area focused more on the factors influencing individuals’ preferences and attitudes towards wine. To reflect the aims of the current paper, publications giving light to the “Consumers’ Attitudes and Preferences Towards Wine” macro-area were analyzed in detail.

Originality/value – The resulting insights may help wine makers and wine sellers optimize their work in relation to market segments and to the factors influencing individuals’ purchasing behaviors.

Keywords Wine preference, Wine selection, Scientometrics, Systematic review, CiteSpace, Document co-citation analysis

Paper type General review

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Highlights:

- (1) 65+ years of wine preference and selection studies via 2,846 documents were analyzed.
- (2) Consumers' wine preferences are influenced by intrinsic and extrinsic wine attributes.
- (3) Intrinsic wine attributes refer to the physical composition of the wine itself.
- (4) Extrinsic wine attributes refer to wine's external features (e.g. price, packaging).
- (5) Interest in eco-friendly wines from both producers and consumers is growing.

1. Introduction*1.1 Literature review*

Wine, the most ancient alcoholic beverage (McGovern *et al.*, 2004), has become part of the cultural heritage of many countries and a form of entertainment in others (Acuti *et al.*, 2019). Since its popularization by the ancient Romans, wine is a beverage that has been produced and consumed throughout the centuries (Lukacs, 2012; Snopek *et al.*, 2018). Evidence suggests that, in 2020, around 260 million of hectolitres of wine were produced worldwide (2020 Wine Production – OIV First Estimate, 2020).

Given the wide range of wine styles that are currently available and the globalization of the wine market (Festa *et al.*, 2020b), possibilities for segmentation and targeted marketing have increased (Pickering and Hayes, 2017). In fact, researchers have tried to quantify wine consumers' preferences and selection to not only provide insight into the multitude of factors that drive wine purchasers' decisions but to also identify market segments (Goldsmith and d'Hauteville, 1998; Martínez *et al.*, 2006; Pickering and Cullen, 2008). For instance, the study by Wolf *et al.* (2022) showed that dividing consumers by generation (i.e. Generation Z, Millennials, Generation X and Baby-Boomers) is an effective method to accurately target wine consumers with customized products. In brief, the factors driving wine (and also food) purchasing behavior can be divided into intrinsic and extrinsic dimensions of quality (Olson and Jacoby, 1972; Wang *et al.*, 2019). The former, intrinsic dimensions, refer to the physical composition of the product itself (Jover *et al.*, 2004). For instance, both taste and aroma influence consumers' wine experiences and preferences (Delwiche, 2004; Lee and Lee, 2008; Pozo-Bayón *et al.*, 2016). The latter, extrinsic dimensions, refer to external attributes of the product. For instance, packaging, price and brand reputation all influence the perceived quality of a wine (Barber and Almanza, 2007; Charters and Pettigrew, 2007; Veale and Quester, 2008). Even more subtle extrinsic cues can modulate consumers' perception of the taste of food and beverages. For instance, Crisinel *et al.* (2012) reported food taste being affected by changes in background music. Similar effects on the taste of food and beverage are frequently reported in the available scientific literature (Ares and Deliza, 2010; Piqueras-Fiszman *et al.*, 2012; Carvalho *et al.*, 2016). Cross-modal influences across the five senses dynamically interact and shape the overall wine tasting experience (North, 2012; De Luca *et al.*, 2019; Campo *et al.*, 2021). Accordingly, the systematic review by Giacomarra *et al.* (2020) highlighted the importance of considering the relevance of extrinsic cues in purchasing decisions to optimize wine market targeting strategies. In line with this, Setoh and Esposito (2021) proposed a framework for multilevel lifespan development to reveal the determinants of wine preferences. In agreement with the available scientific literature, the authors posit that consumer preferences are not only shaped by perceptual or intrinsic level attributes (e.g. taste, appearance), but by the integration and interaction between multiple factors associated with wine consumption. These multiple factors include aspects belonging to the individual level of behavior (e.g. memories and context), to the interpersonal level (e.g. culture, values and prestige) and to the group level (e.g. social status).

1.2 Research question and purpose of the study

This multilevel framework for the determinants of wine preferences has recently favored interdisciplinary research approaches, where contributions from developmental psychology, consumer psychology, cultural psychology, cognitive neuroscience and behavioral economics have also started to play a role. A systematic insight into the contributions in the multilevel framework and the interactions between disciplines in shaping the literature of wine preferences and selection has not been provided yet. To address this research gap, the current study adopted a scientometric approach. The scientometric approach can be considered as an application of the broader bibliometric approach to systematic reviews (Mejia *et al.*, 2021; Ranjbari *et al.*, 2022). The use of the scientometric approach is gaining momentum in recent years and the method proved its efficacy in reviewing literature topics belonging to the fields of neurobiology, clinical psychology, developmental psychology (Carollo *et al.*, 2021a, b, c; Lim *et al.*, 2021). A scientometric approach enables reviewing the existing scientific literature on wine selection and preferences in a data-driven fashion. In particular, the current review intends to provide insight into the literature on wine preferences and liking by focusing especially on the scientific contributions that led to the multilevel framework in the determinants of wine preferences. This scientometric analysis has two aims: (1) identifying the impactful publications; and (2) identifying the thematic domains that, in the years, gave shape to the available literature on wine preferences and selection. A systematic understanding of the roots and developments of the recent multilevel and interdisciplinary approach on wine preferences could potentially have at least two benefits. First, it would help provide a unified framework of factors influencing wine purchases. Secondly, it would help bridge the gap between research on wine preferences and its application to the wine markets.

2. Research methodology

2.1 Materials

To have a holistic insight into the field of wine preference and selection, the complete literature on the topic available on the Scopus platform [as done by Carollo *et al.* (2021a, b, c)] was downloaded as the basis for the scientometric analysis. As in Cataldo *et al.* (2022), Scopus was chosen over other platforms because of its wider coverage of journals (Falagas *et al.*, 2008). In particular, the search string “TITLE-ABS-KEY (wine* AND preference* OR selection*) AND (LIMIT-TO (LANGUAGE, “English”))” was adopted to guide the literature research on Scopus. In particular, the string of keywords enabled the collection of all documents that had words starting with “wine” and at least one between “preference” and “selection” in their title, abstract, or keywords. Furthermore, the language of documents was limited to English in order to only collect internationally accepted scientific literature. Data was collected up to May 24, 2021. The data pool consisted of 2,846 publications on wine preference and selection published from 1955 to 2021. The time range was limited according to publication availability on Scopus. Subsequently, data was imported into the CiteSpace platform (version 5.8.R1). 116,746 references over the 117,766 (99.13%) cited by the downloaded papers were considered valid for the analysis. Furthermore, when importing data in CiteSpace, irregularity in the citation format may result in anonymous references that are not discarded when data are firstly imported. The data pool of converted references contained 2,698 unusable anonymous references (2.31% of the valid references; 2.29% of the total references). Unusable references are references that are inserted on Scopus following a wrong template and are not recognized by the software. An *ad-hoc* Python script was implemented to remove these anonymous references from the data pool. At this stage, a data loss of ~1.0% – 5.0% is common and is typically due to data irregularities that cannot be processed by CiteSpace. Therefore, when considering both the invalid and anonymous references, a total data loss corresponding to the 3.16% of the total references is acceptable and negligible for the subsequent analysis (Gaggero *et al.*, 2020).

2.2 Document Co-citation analysis

To gain an insight into the scientific domains that dynamically shaped the knowledge on wine preference and selection, a CiteSpace's Document Co-Citation Analysis (DCA) was implemented in the study. This type of analysis relies on the frequency in which two documents have been co-cited (cited together) by subsequent works. Thus, both the cited references and the citing works – in this case, the ones downloaded from Scopus (Small, 1980; Carollo *et al.*, 2021a) – are of interest for the DCA. With these documents, the DCA results in a network of documents that represent the underlying structure of the scientific field of interest. To generate such a network in the current study, the node selection criteria and its parameters were optimized after several DCAs, as done by Carollo *et al.* (2021c). In particular, three types of node selection criteria were considered in the optimization procedure. G-index is the “largest number that equals the average number of citations of the most highly cited g publications” (Egghe, 2006; Alonso *et al.*, 2009; Chen, 2016). The other two possible criteria were TOP N and TOP N%. TOP N includes the N documents cited the most in a given time slice in the network. The given time slice was always set at 1 year in this study. On the other hand, TOP N% builds the network by considering the N% most cited documents for each time slice. DCAs were computed with g-index set at 15, 25 and 50; TOP N with N set at 15, 50 and 75; and TOP N% with N set at 10. After examining the structural metrics of all these DCAs, the best node selection criteria to adopt was g-index with k set at 25 (see Figure 1).

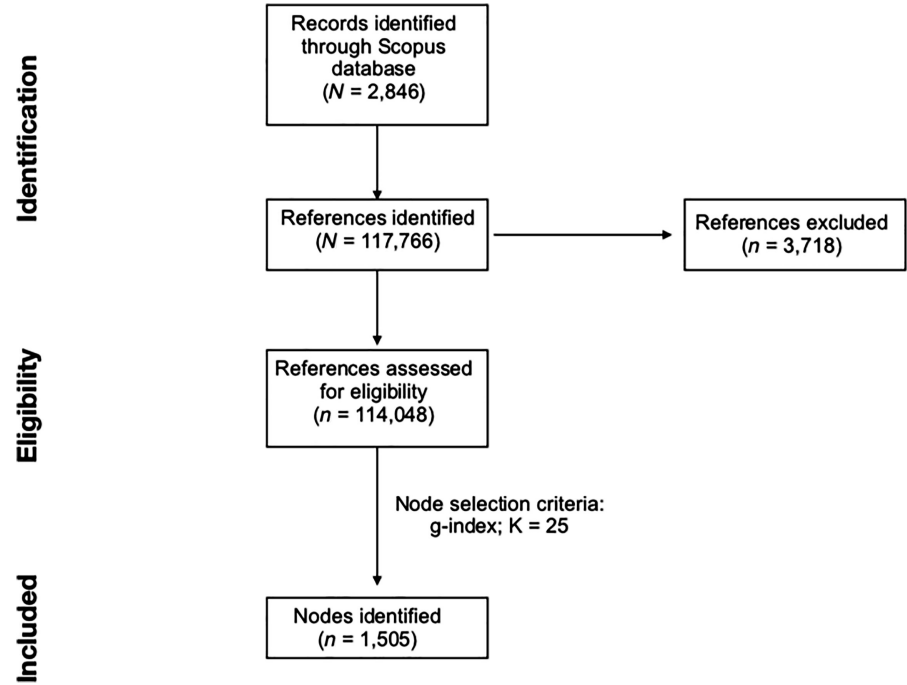


Figure 1.
Study flow diagram

Note(s): The initial sample of publications was obtained from Scopus on 24 May 2021 using the following string of keywords: “TITLE-ABS-KEY (wine* AND preference* OR selection*) AND (LIMIT-TO (LANGUAGE , “English”))”

2.3 Metrics

The results of a CiteSpace scientometric analysis are interpreted by considering two types of metrics: structural and temporal. Whereas the impact of single nodes in the overall network is assessed using both types of metrics, only the structural ones allow an evaluation of the global network. The structural metrics in CiteSpace are modularity Q , silhouette score and betweenness centrality. Modularity Q is an index in which values range from 0 to 1. It indicates the extent to which the computed network is divisible into single and distinguished modules (also called clusters) (Newman, 2006). The homogeneity of such single clusters is measured using the silhouette score. The silhouette score can take values from -1 to 1 , with higher numbers indicating higher homogeneity within the cluster (Rousseuw, 1987; Aryadoust and Ang, 2019). The other structural metric, betweenness centrality, enables assessing how a single node functions as a bridge in connecting otherwise separate nodes. Values of centrality go from 0 to 1. The higher the value, the more likely the node indicates groundbreaking ideas (Freeman, 1977; Chen, 2014). In terms of temporal metrics, two are of particular interest: citation burstness and sigma. Citation burstness, computed using Kleinberg's algorithm (Kleinberg, 2003), is an index of an abrupt change in the number of citations received by a node within a period of time (Chen, 2017). Possible values of citation burstness go from 0 to infinite. The other temporal metric, sigma, is derived by combining values of betweenness centrality and citation burstness by using the equation $(\text{centrality} + 1)^{\text{burstness}}$. High values of sigma suggests that the node could be highly novel and influential within the network (Chen *et al.*, 2009).

3. Findings

The computed DCA network consisted of 1,505 nodes and 4,616 links (see Figure 1). This means that, on average, each node of the network was connected to other 3.07 nodes. The structural metrics indicated that the obtained network was highly divisible into modules (modularity $Q = 0.8873$). On average, each module was highly homogeneous (weighted mean silhouette = 0.9641).

The network was found to be divisible into 7 major co-citations clusters. Cluster IDs rank the clusters in regards to their size. The largest clusters in the network, clusters #0 and #1, included 123 and 119 nodes respectively. Cluster #1 had a higher silhouette value of 0.984, while cluster #0 had a silhouette value of 0.941. The average year in which their references were published was 2011 for cluster #0 and 2015 for cluster #1. Thus, both clusters were recent. Among the clusters, the highest silhouette scores were obtained by cluster #18 (Silhouette score = 0.99; Size = 10; Mean year of publication = 2016), cluster #1 and cluster #6 (Silhouette score = 0.978; Size = 39; Mean year of publication = 1999). In general, the larger clusters consisted of publications published in the 2000 and 2010s, with cluster #18 and #1 being the most recent ones, followed by cluster #5 (Silhouette score = 0.968; Size = 73; Mean year of publication = 2011). All clusters were renamed manually to reflect their scientific contents (see Table 1 for more details). After a qualitative examination of the documents included in the major clusters, two thematic macro-areas were identified. The first one, formed by clusters #0, #3, #5, #6 and #18, which examined the biological and production processes underlying wine making and determining the different wine sensory features. The second one, composed by clusters #1 and #2, with a focus on the attitudes and preferences of wine consumers. The two macro-areas were then called "Methods of wine making" and "Consumers' attitudes and preferences towards wine", respectively (see Figure 2). Furthermore, according to CiteSpace's Narrative Summary function (Chen and Song, 2019; Liu *et al.*, 2020; Lim *et al.*, 2021; Gao *et al.*, 2021), clusters #0 – "Non Conventional Yeasts" – and #1 – "Buyers' Attitudes" – were identified as the meaningful ones in the network.

Within the network, 42 references showed a burst in their citation history, corresponding to their impact in the literature. In particular, the publication authored by Pomarici and Vecchio (2014) was the node with the strongest citation burst, with a value of 12.56

Table 1.
Summary of the 7
major clusters
identified with the
Document Co-Citation
Analysis (DCA)

(Start of burstness = 2018; End of burstness = 2021; Burst duration = 3 years). The next three nodes in order of burst strength were [Schäufele and Hamm \(2017\)](#), [Lockshin *et al.* \(2006\)](#) and [Lockshin and Corsi \(2012\)](#). These publications had citation bursts of 11.69 (Start of burstness = 2018; End of burstness = 2021; Burst duration = 3 years), 10.54 (Start of burstness = 2007; End of burstness = 2014; Burst duration = 7 years) and 10.54 (Start of burstness = 2017; End of burstness = 2021; Burst duration = 4 years), respectively. Among the top three references in terms of citation burstness, two of them, specifically [Pomarici and Vecchio \(2014\)](#) and [Schäufele and Hamm \(2017\)](#), belonged to cluster #1. Conversely, the node corresponding to [Lockshin *et al.* \(2006\)](#) was part of cluster #2. This last reference was also the one with the longest burst duration within the network (burst duration = 7 years). Other references with lower burst values also showed a duration of 7 years: [Bruwer *et al.* \(2011\)](#) (Strength of burstness = 6.84; Start of burstness = 2012; End of

Cluster ID	Size	Silhouette	Mean year	Assigned label	Macro-area
0	123	0.941	2011	Non Conventional Yeasts	Methods of Wine Making
1	119	0.984	2015	Buyers' Attitudes	Consumers' Attitudes and Preferences Towards Wine
2	112	0.974	2007	Consumers' Preferences	Consumers' Attitudes and Preferences Towards Wine
3	92	0.946	2003	Genetic Factors	Methods of Wine Making
5	73	0.968	2011	Traditional Yeasts	Methods of Wine Making
6	39	0.978	1999	Genetic Engineering	Methods of Wine Making
18	10	0.99	2016	Microorganisms	Methods of Wine Making

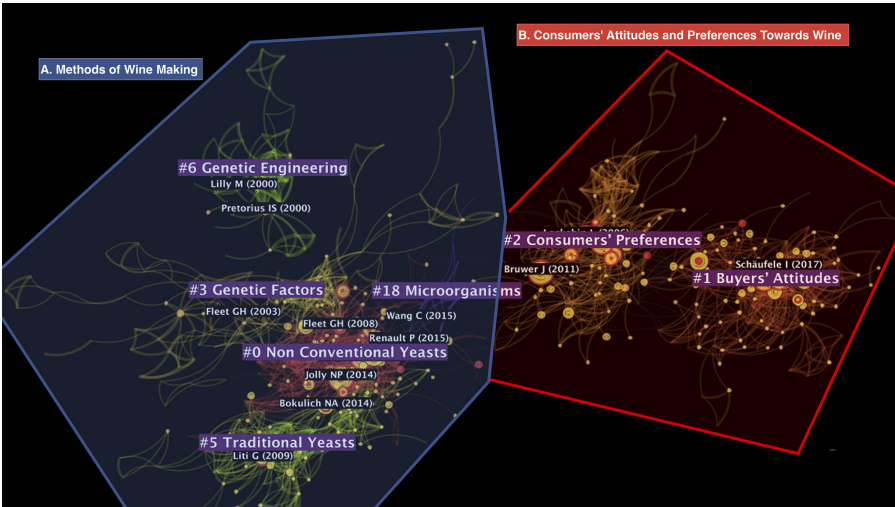


Figure 2.
Seven major clusters
identified in the
network generated
through the Document
Co-Citation
Analysis (DCA)

Note(s): Two thematic macro-areas were identified in the network. On the left, in blue, clusters #0, #3, #5, #6 and #18 form the macro-area named “Methods of wine making”. On the right, in red, clusters #1 and #2 together form the macro-area called “Consumers’ attitudes and preferences towards wine”

burstness = 2019), [Comitini et al. \(2011\)](#) (Strength of burstness = 6.62; Start of burstness = 2012; End of burstness = 2019), [Ciani et al. \(2010\)](#) (Strength of burstness = 5.99; Start of burstness = 2011; End of burstness = 2018) and [Bely et al. \(2008\)](#) (Strength of burstness = 5.26; Start of burstness = 2009; End of burstness = 2016). In [Table S1](#) of the supplementary materials, the values for the main metrics on the 42 publications with a citation burst are reported.

4. Discussion

A scientometric approach was adopted in the current study in order to explore the available scientific literature on wine selection and preferences. A DCA was computed in order to identify the main domains of research that gave shape to what is known regarding the topic of interest. Two thematic macro-areas were identified when analyzing the contents of papers included in the seven major clusters of the network. As the aim of the current paper is to analyze the trends in the research regarding wine selection and preferences, the first macro-area, “Methods of wine making”, is discussed briefly with a focus on cluster #0 as it was identified as a meaningful cluster by the CiteSpace’s Narrative Summary function. Conversely, as the second macro-area, “Consumers’ attitudes and preferences towards wine”, aligned more with the current paper’s interests, it is discussed in depth. Again, the focus of the discussion for “Consumers’ attitudes and preferences towards wine” is cluster #1, as it was meaningful according to the Narrative Summary function. However, some insights on cluster #2 are also provided.

4.1 Macro-area A: “Methods of wine making”

[Table S2](#) of the supplementary materials reports the forty-eight citing documents that gave shape to cluster #0. The main citing document of the cluster, [Ciani et al. \(2016\)](#), focused on reviewing the role of non-conventional species of yeasts enabling winemakers to lower the content of ethanol in wine. The authors suggest that the use of non-conventional yeasts during fermentation could help face challenges related both to the rising sugar content in grape must and the increasing alcohol levels in wine. Although non-Saccharomyces wine yeasts were originally introduced in the wine industry for their effect on the wine sensory profile ([Padilla et al., 2016](#); [Jeromel et al., 2019](#)), they also allow for the production of wines with lower alcohol content ([Canonico et al., 2016](#); [Maturano et al., 2019](#)). The properties and the effects of non-conventional wine yeasts were examined by many citing (e.g. [Comitini et al., 2011](#); [Domizio et al., 2011](#); [Belda et al., 2016](#); [Jara et al., 2016](#); [Masneuf-Pomarede et al., 2016](#); [Mylona et al., 2016](#); [Rollero et al., 2018](#); [Binati et al., 2019](#); [Loira et al., 2020](#)) and cited papers (e.g. [Jolly et al., 2006](#); [Viana et al., 2008](#); [Zott et al., 2008](#); [Comitini et al., 2011](#); [Contreras et al., 2015](#); [Englezos et al., 2015](#); [Liu et al., 2016](#); [Benito, 2018](#)).

4.2 Macro-area B: “Consumers’ attitudes and preferences towards wine”

[Table S3](#) of the supplementary materials reports the thirty-six citing documents that gave shape to cluster #1. In cluster #1, the majority of citing papers investigated the factors driving consumers’ purchasing of and attitudes towards traditional and sustainable wines. Although a wine’s taste is an important factor influencing wine consumers’ preferences ([Lesschaeve et al., 2012](#); [Schmit et al., 2013](#); [Rahman et al., 2014](#); [Culbert et al., 2017](#)), commercial descriptions of wines also directly influence the products’ perceived value ([Sáenz-Navajas et al., 2013](#); [Danner et al., 2017](#); [Sillani et al., 2017](#); [Verdonk et al., 2017](#)). In fact, extrinsic features of wine, such as wine origin, label aesthetic, bottling, awards and legacy strongly drive consumers’ judgment of wine quality ([Bernabéu et al., 2012](#); [Sáenz-Navajas et al., 2013, 2014](#); [Thiene et al., 2013](#); [Panzone, 2014](#); [Lanfranchi et al., 2020](#)). In some cases,

extrinsic features are even stronger than intrinsic attributes in influencing consumers' preferences. For instance, [Vecchio et al. \(2019b\)](#) studied the role of the wine price and the denomination of origin on influencing the consumer preferences. On the one hand, they documented that in a blind tasting session, price did not determine the consumer preferences. On the other hand, when information on the denomination of origin (i.e. Sangiovese) was given, consumers' willingness to pay increased for wines of all prices. Additionally, information about methods of wine production affects both the sensory profile of the selected wines and the consumers' liking expectations ([Wiedmann et al., 2014b](#); [Vecchio et al., 2019a](#)). During a blind test, consumers show higher ratings for wines presented with additional information on the product's production process. Interestingly, consumers even rate "conventional wine" presented as "organic" higher. In this last case, both wine appearance and taste are perceived by consumers to be better and their willingness to pay is higher as well ([Lee et al., 2013](#); [Wiedmann et al., 2014b](#)).

However, it is worth noting that individuals act in a significantly different way when they buy a bottle of wine for themselves than when they buy it as a gift. Different wine attributes drive the purchase in the two scenarios ([Yang and Paladino, 2015](#); [Boncinelli et al., 2019](#)). For instance, in a gift-giving scenario involving Italian participants, wine's geographical indication was shown to have a marginal role, while brand and claims that the wine is organic strongly impact the decision ([Boncinelli et al., 2019](#)). In another study conducted with Chinese wine consumers, product image and gift packaging moderated the effect of wine country of origin on the purchasing behavior ([Yang and Paladino, 2015](#); [Dominici et al., 2019](#)). Thus, individuals' motivations need to be also considered to get a complete understanding of people's purchasing choices on wine.

Given the gap in the literature on consumers' attitudes towards wine in emerging wine markets ([Lockshin and Corsi, 2012](#)), preferences of consumers from countries such as Canada, Japan, China, India, Korea, Hong Kong, Russia were also examined within the cluster ([Somogyi et al., 2011](#); [Williamson et al., 2012](#); [Yoo et al., 2013](#); [Agnoli et al., 2014](#); [Capitello et al., 2015](#); [Tang et al., 2015](#); [Galati et al., 2017](#); [Chu et al., 2019](#); [Deodhar et al., 2019](#); [Jantzi and McSweeney, 2019](#); [Kunc, 2019](#)). Culture plays a crucial role in people's wine preferences. For instance, wine price and origin are more important than wine flavor descriptions in influencing Nova Scotian wine consumers' purchasing behavior ([Jantzi and McSweeney, 2019](#)). Wine price also plays a role in Chinese wine consumers' purchasing behavior. Even in emerging wine markets such as the Chinese one, both intrinsic and extrinsic factors play a role in a consumer's wine selection. On the one hand, Chinese consumers tend to prefer dry red wine, refreshing and soft tasting wine, still type wine, wine with moderate aroma degree and mellow aroma and sweet wine ([Chu et al., 2019](#)). On the other hand, consumer education, wine-related activities, channels of communication, country of origin, quality, price rank, messages about environment and other buyers' reviews strongly influence Chinese consumers' choice of wine ([Camillo, 2012](#); [Williamson et al., 2016](#)).

Historical time and life trajectories also determine people's wine preferences too. In fact, different attitudes and preferences towards wine are also found across generations ([Charters et al., 2011](#); [Agnoli et al., 2011, 2018](#); [Fountain and Lamb, 2011](#); [Anchor and Lacinová, 2015](#)). [Lerro et al. \(2019\)](#) observed that the Baby Boomers generation is the generation reporting the lowest sparkling wine consumption frequency. Together with Generation X, Baby Boomers also have the highest wine consumption frequency in the \$15–19.99 price range. Conversely, Millennials had the highest consumption frequency in the \$10–14.99 price range. Within the cluster, several references also explored Millennials' attitudes and preferences towards wine in order to help marketing managers define the best strategies to reach young consumers most effectively ([Iazzi et al., 2019](#)). Generally, Millennials appear to drink wine less frequently and their wine consumption happens more often in social on-premise settings ([Nassivera et al., 2020](#)). They also typically tend to rely less on geographical cues (e.g. the origin of the

wine) to determine the quality of the wine and pay more attention to medals won, label imagery and alcohol content (Atkin and Thach, 2012). When purchasing wine, Millennials are willing to pay more and they tend to prefer carbon-neutral brands or, more generally, eco-certified wines (Gassler *et al.*, 2015; Sogari *et al.*, 2015; Galati *et al.*, 2019; Moscovici *et al.*, 2020; Nassivera *et al.*, 2020). Moreover, social media seems to play a crucial role in increasing consumers' sustainability awareness, consecutively influencing their wine purchasing behavior (Sogari *et al.*, 2017).

In the cluster, the theme of environmental sustainability does not emerge only in relation to Millennials. In fact, Ghvanidze *et al.* (2019), with data collected through a survey distributed in the US, the UK and Germany, reported that wine consumers, in general, are typically careful about the environmental problems, the social responsibility of companies and the ethically and sustainably produced products (Kelley *et al.*, 2019). Wine consumers typically adopt healthy lifestyles and control their diets (Higgins and Llanos, 2015). A considerable amount of consumers from all over the world seems to have positive perceptions about different sustainable production processes and reported a higher willingness to pay a premium price for wine with characteristics of sustainable production (D'Amico *et al.*, 2016; Sogari *et al.*, 2016; Schäufele and Hamm, 2017). For instance, the increasing level of consumers' environmental concern towards the impact of food production on water usage led the agriculture sector, the main sector responsible for the freshwater scarcity, to introduce new sustainable practices (Lamastra *et al.*, 2014; Pomarici *et al.*, 2018). In their paper, Pomarici *et al.* (2018) showed that young consumers of wine are willing to pay higher prices for water saving labeled wines. Willingness to pay for those wines was further positively influenced by other factors such as wine consumption frequency, label trust and use and consumers' environmental-friendly attitude (Ruggeri *et al.*, 2020). The demand for healthier wines due to the presence of natural compounds is also growing. Pappalardo *et al.* (2019) observed that consumers were willing to consume resveratrol-enhanced wine as they saw it as a source of beneficial and healthy properties. Again, extrinsic (organic label, brand) and intrinsic wine attributes (tannins content), as well as consumer's socio-demographic factors (e.g. gender, age) have a direct effect on the consumers' willingness to consume wine naturally enriched with resveratrol. This suggests that, in the eye of consumers, there are significant differences between a natural enhancement and technological enrichment. Moreover, in recent years, products obtained from organic farming methods (i.e. a system that minimizes pollution and avoids the use of synthetic fertilizers and pesticides) has rapidly increased in wealthier countries, especially in the wine production (Pagliarini *et al.*, 2013; Taghikhah *et al.*, 2020).

Many studies reveal that wine companies' actions towards sustainable development have been generally accompanied with positive attitudes towards organic and sustainable wines among consumers (Pagliarini *et al.*, 2013; Wiedmann *et al.*, 2014b; Truant *et al.*, 2020). However, real sales data indicate that the market share for organic wine is still much lower than the total wine market globally (Barber *et al.*, 2016). In fact, a gap between intentions and behaviors is typically reported in the literature. In this gap, cognitive and affective factors, together with normative cues, seem to play a crucial role and may prompt unplanned and spontaneous purchasing behavior, causing consumers to act against their beliefs (Taghikhah *et al.*, 2021). To address the attitude-behavior-gap, Schäufele and Hamm (2018) and Schäufele *et al.* (2018) showed that consumers' preferences for organic products and sustainability concerns strongly determine purchases of organic wine (as in Olsen *et al.* (2012)) and that, generally, consumers' attitudes were in agreement with purchase behavior. Nevertheless, prices for organic wine constitute a barrier for consumers with low-incomes, even when they show positive attitudes towards environment protection (Aschemann-Witzel and Zielke, 2017).

In fact, the growth of organic and sustainable markets is thought to be potentially limited by price premiums. It is worth noting that prices also serve as a quality signal for wine

consumers (Almenberg and Dreber, 2011; Oczkowski and Doucouliagos, 2015; Janssen *et al.*, 2020). In general, consumers are willing to pay premiums for either organic or sustainable wines (Sellers, 2016; Sellers-Rubio and Nicolau-Gonzalez, 2016; Ay *et al.*, 2017; Maesano *et al.*, 2019; Lim and Reed, 2020; Migliore *et al.*, 2020). The study conducted by Schäufele and Hamm (2020) documented that consumers' price sensitivity was low for organic wine, which was predominantly what customers would select over conventional wine. The effect of price as a quality cue or purchase barrier changed between price categories. Price sensitivity was extremely high for organic wine in the low-price segment, while price functioned as a quality signal in both the premium segment for organic and conventional wine. The willingness to pay for an eco labelled wine also depends on the denomination of wine origin. In fact, consumers' are willing to pay higher prices for the ecolabels on wines from less-prestigious regions. Conversely, the willingness to pay for ecolabels is lower for wines from higher-prestige regions (Lim and Reed, 2020). Generally, Migliore *et al.* (2020) observed that there is a positive association between consumers' willingness to pay for a "natural wine" and their drink frequency and occasion, organic production method, the content of sulfites (since part of the consumers believes that sulfites in wine are the cause of headaches (Costanigro *et al.*, 2014; Chang *et al.*, 2016)), incomes and attitudes towards healthy eating and the environment (D'Amico *et al.*, 2016; Sogari *et al.*, 2016; Amato *et al.*, 2017). The decision to support a premium price for the sustainable wine is strongly influenced by knowledge regarding sustainable production methods (Lanfranchi *et al.*, 2019).

Recently, a number of certification systems for environmental-friendly products have been created (e.g. water-saving labels and fishery sustainable labels) (Mazzocchi *et al.*, 2019). In general, customers seem to be willing to pay a premium price for wine certifications that guarantee sustainability and usage of agricultural methods that protect the biodiversity in the vineyard during the production of grapes for both medium-high price wines and for low-price wines (Mazzocchi *et al.*, 2019; Fanasch and Frick, 2020; Ruggeri *et al.*, 2020; Capitello *et al.*, 2021). Generally, Millennials, women, unmarried individuals, those purchasing eco-certified foods, low-income individuals and those looking to celebrate a special occasion are willing to pay more for eco-certified wines compared to respondents who are older, male, married, do not buy eco-certified goods, have higher incomes and are purchasing the wine for a regular occasion (Moscovici *et al.*, 2020). Nevertheless, the quality of wine and organic certification remain important attributes in expensive wine purchasing choices (Mazzocchi *et al.*, 2019; Ruggeri *et al.*, 2020; Stanco and Lerro, 2020). In fact, when consumers perceive a specific product as high quality, they might be less willing to pay for further environmentally-friendly certifications (Ruggeri *et al.*, 2020). Moreover, it seems that consumers who are aware of the social and environmental impact of their consumption choices pay more attention to the information displayed on the label (Galati *et al.*, 2019).

With the establishment of sustainable certification systems, there is the risk that the prominent use of symbol and icon type labels might obscure individual sustainability attributes and weaken signaling to consumers searching for specific credentials. The use of simplistic symbols and logos makes it difficult for consumers to identify which elements are contained within a scheme. Tait *et al.* (2019) documented that sustainability attributes influence both the choice of buying Sauvignon blanc and customers' willingness to pay. The weight of sustainability in wine purchase choices depends on the specific environmental and social outcomes. In fact, the authors argued that growers and wineries implementing sustainability programs might benefit from focusing attention on the sustainable attributes that are relevant for the consumers (e.g. pests and disease, water resources) and not on those less valued (e.g. energy and biodiversity management). In this regard, Stanco and Lerro (2020) documented that the most important corporate social responsibility initiatives for a group of Italian wine consumers were "health and food safety", "sustainable agricultural practices" and "air pollution". Conversely, the least important for consumers were "energy

consumption”, “sustainable packaging” and “fair trade”. [Bazzani et al. \(2020\)](#) highlighted that consumers’ health consciousness is an important driver in the use of wine labels. In fact, health information on wine labels seems to be the attribute to which consumers assign greater utility ([Annunziata et al., 2016](#)).

Table S4 of the supplementary materials reports the forty-six citing in cluster #2. The main citing document of cluster #2, [Casini et al. \(2009\)](#) applied the best-worst scaling method to assess the wine preferences of an Italian sample of participants, providing insight into the attributes that influence wine choice. The wine attributes driving people’s preferences were examined by several other citing and cited documents in the cluster (e.g. [Balestrini and Gamble, 2006](#); [Barber et al., 2006](#); [Mueller and Szolnoki, 2010](#); [Gunay and Baker, 2011](#); [Chrysochou et al., 2012](#); [Corsi et al., 2012](#); [Lesschaeve et al., 2012](#); [Chocarro and Cortiñas, 2013](#); [Cicia et al., 2013](#); [Corduas et al., 2013](#); [Thiene et al., 2013](#); [García-Muñoz et al., 2014](#); [Caracciolo et al., 2015](#); [Chamorro et al., 2015](#); [Gustafson et al., 2016](#)), often times by using the same best-worst scaling method (e.g. [Marley and Louviere, 2005](#); [Barber et al., 2008](#); [Cohen, 2009](#); [Mueller et al., 2009](#); [Agnoli et al., 2011](#); [Bernabéu et al., 2012](#); [Loose and Lockshin, 2013](#); [de Magistris et al., 2014](#)). As in cluster #1, wine preferences of different generations of consumers were compared and assessed in several documents (e.g. [Thach and Olsen, 2006](#); [Olsen et al., 2007](#); [de Magistris et al., 2011](#); [Fountain and Lamb, 2011](#); [Atkin and Thach, 2012](#); [Garcia et al., 2013](#); [Wiedmann et al., 2014a](#)).

4.3 General discussion

Overall, the current review highlights that two main domains of research underlie and give shape to the overall existing literature on wine selection and preferences. The first domain is more focused on the traditional aspects of wine research and wine making (e.g. type of yeast); the second domain is more recent and mostly concerns consumer attitudes towards wine than the wine itself. Aside from a wine’s biological composition and taste, multiple factors emerged to influence the consumers’ wine purchases. These factors act both at the wine level and at the individual level. For instance, wine purchases are influenced by wine bottling, but also by consumers’ country of origin, generation and even wine knowledge ([Kammer and Rios-Morales, 2016](#)). These findings, which emerged in a data-driven fashion, agree with the multilevel lifespan developmental framework proposed by [Setoh and Esposito \(2021\)](#) to frame the determinants of wine preferences. For [Setoh and Esposito \(2021\)](#), wine liking and preferences is modulated at multiple levels: perceptual, individual, interpersonal and group level. If traditional research on wine preferences has been mostly oriented on the perceptual level, the current scientometric review showed that recent scientific contributions are starting to investigate the factor acting at the individual, interpersonal and group levels. Nevertheless, the identification of the factors acting at the interpersonal and group levels is at its beginning and more research is required. Additionally, while research on factors belonging to all levels is gaining momentum, some aspects to achieve an integration of the levels are missing. For instance, it is not yet clear how factors influence each other both within the same level of influence and between different levels ([Werner, 2021](#)). For an integrated multilevel model of factors influencing wine liking and preferences, a dialogue between different disciplines (e.g. oenology, behavioral and cognitive neuroscience, social psychology, behavioral economics and cultural anthropology) is desirable. Insights from interdisciplinary streams of research could help to better understand which attributes in an individual’s profile may influence one’s wine preference and selection. This, in turn, could bridge the gap between research on wine liking and its application and allow for optimized targeted market strategies or for implementing wine tourism plans ([Soós et al., 2019](#); [Festa et al., 2020a](#)). As an example, when considering the importance of moving towards sustainable methods of wine production ([Amatucci et al., 2015](#)), evidence-based targeted marketing strategies could potentially help

winemakers increase the wine consumer community's propensity to switch to sustainable products in order to safeguard the resources of our planet.

5. Conclusions

In the current paper, a scientometric analysis was conducted on the references cited in 2,846 published works on wine selection and preference. The analysis led to the identification of two thematic macro-areas in the scientific literature: "Methods of Wine Making" and "Consumers' Attitudes and Preferences Towards Wine". The content of the documents included in the two macro-areas was examined in the paper. Specifically, it emerged that when purchasing a bottle of wine, people are not only influenced by the sensory profile and the intrinsic attributes of wine, which largely depend on the adopted production methods. Conversely, wine choice is also influenced by extrinsic attributes, such as the wine price, country of origin and certification labels. Additionally, different preferences were found in a cross-generational and cross-cultural fashion. The importance of both intrinsic and extrinsic factors is in line with a recently proposed framework for multilevel lifespan development to reveal the determinants of wine preferences (Setoh and Esposito, 2021). Future studies in this field should integrate multiple factors associated with wine consumption.

The results need to be interpreted by considering the limitations that are intrinsic to the adopted methodology of the scientometric approach (see Carollo *et al.*, 2021a, b, c). First of all, the results of the scientometric analysis largely depend on the initial data collection, both in terms of selected key terms and the selected data source (in this case, Scopus). While the terms used to direct the data collection were broad enough to include the most important documents published in the field of wine selection and preference, future works may extend the insights given by the current review by using data derived from different platforms, such as Web of Science. Secondly, the results of a DCA largely depend on the quantitative, more than qualitative, patterns of citation among documents. The focus on the quantity, more than on the quality, leads to treating all the citations similarly without considering the reasons for which a document was cited (e.g. a document may also be cited because it is controversial and not replicable). Lastly, since the scientometric approach relies on citation patterns, recently published documents, even when highly relevant and influential, might have been ignored or their impact might have been underestimated because they were not yet massively cited by the documents in the data pool. In fact, past documents may have a higher number of citations when compared to more recent ones not only because they are more influential, but also because they have had a longer "lifespan" since their publication date.

Even when considering the aforementioned limitations, future works can build on the insights given by the current scientometric review to help wine makers and sellers target the wine market. For instance, creating and ameliorating eco-friendly methods of wine production together with understanding the attitudes of people (especially young consumers) towards sustainable practices will be of central importance now and in the future years, when more attention will be given to preserving the Earth's resources.

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Supplementary material

The supplementary material for this article can be found online.

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