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## **Tasting the Port Wine Cellar experience: what features please the most?**

### **Abstract**

This study addresses wine tasting experienced by tourists in the context of the worldwide renowned Port wine. A total of 824 online reviews posted in TripAdvisor were collected about four major Port wine cellars. Data was analyzed with text mining and topic modelling, and sentiment scores as well as ratings were also considered. Overall, results showed that guests were attracted mostly by the experience as a whole but including the tour and the wine culture and not just the wine tasting experience. Furthermore, six topics were found with associated main keywords and comprehending distinct groups of guests with different preferences. Three groups underlined tour and visiting experience whereas two other groups were composed by enthusiastic wine fans, with one more focused on the wine/winery/cellar experience while the other enjoyed a diversified wine carte. Yet another group aggregated tourists who valued the food experience.

**Keywords:** Wine Tourism; Port Wine; Online Reviews; Text Mining.

## 1. Introduction

Wine has existed alongside humans since the dawn of civilization. Its value is recognized in many cultures as a symbol of prosperity (Harvey et al., 2014). In recent decades, wine tourism has been developed as an important tourism product, attracting visitors to wine producing regions to leverage local economies (O'Neill & Palmer, 2004). Tourists are drawn by the sensory experience associated with wine (Ferrarini et al., 2010). Wineries have taken advantage of such interest by offering complementary services within wine tourism context such as local food experiences, vineyards tours, and wine making activities (Byrd et al., 2016). Additionally, wine tourism triggers the development of standard tourism services such as accommodation units, restaurants, and nature activities, among others (Hall & Mitchell, 2000). Therefore, some studies have emerged to assess wine tourist satisfaction (e.g., Quadri-Felitti & Fiore, 2013). Yet, wine tourism success is directly linked to the local environment, limiting the generalization of a study's findings in one region to other wine regions (Getz & Brown, 2006).

Port wine ("*Vinho do Porto*" in Portuguese) is a worldwide recognized wine brand, symbol of fine drinking (Rebello & Caldas, 2013). Port is a fortified wine made of distilled grape spirits of the vineyards planted on the Douro river valley, in the North of Portugal. Its name is directly derived from the city of Porto, located at the northern shores of the mouth of Douro river which, together with Gaia, the city at the southern shores, forms the second most populous metropolitan area of Portugal. Historically, the Gaia harbor worked as the main export point of the wine (Moreira & de Pinho, 2011). Nowadays, the city benefits from the wine as the most recognized local trademark, potentiating tourism. Specifically, the cellars in the city where the wine is fortified have developed to welcome tourists by offering unparalleled tasting experiences (Ferreira et al., 2019). Complementary services such as food and vineyard tours are also offered, while the local tourism economy thrives based on the cellar experience. Nevertheless, few scholars have devoted efforts to understand the cellar experience phenomenon from the visitors' perspective. Martins et al. (2017) conducted a survey to assess wine tourists' intentions based on the emotions triggered when visiting Port cellars. Through an analysis of 918 obtained responses, they found that tourists' personal and wine involvement during their visits influence their expressed emotions. Also using a survey-based approach grounded on 290 responses, Fernandes and Cruz (2016) discovered that experience quality has a positive effect on customer satisfaction and loyalty. Nevertheless, no study so far has

taken the advantage of already published online reviews by visitors to cellars. Online reviews have the advantage of being freely written by tourists without the pressure to quickly answer to a questionnaire, offering an excellent source for a qualitative analysis of the written textual contents (Guerreiro & Rita, 2019; Moro et al., 2019b; Boon & Foppiani, 2019). The most closely related study is the one by Brochado et al. (2019c), in which the authors analyzed 470 online reviews published about wine experiences of guests staying in hotels located within Douro wineries. Nevertheless, while using online reviews provides a large secondary data source, comments are self-selected and, hence, subjected to bias, since not everyone who visits the cellars writes a comment on TripAdvisor. As highlighted by Han and Anderson (2020), usually visitors who are highly satisfied or dissatisfied tend to be the ones that more often write reviews.

Our study analyzes a set of online reviews extracted from TripAdvisor (e.g. Oliveira et al., 2019) written by visitors to four renowned cellars where Port wine is fortified. Through a text mining and topic modeling-based approach, we contribute to existing literature by unfolding the main topics emerging from the written perceptions by tourists about their visit. By aggregating the qualitative information into logical topics, we enable both scholars and practitioners to understand how visitors are segmented and how the important elements vary between those segments.

## **2. Literature review**

Wine tourism has gained ground as a relevant component of tourism products in many countries. This link between wine and tourism has been strengthened with the development of wine routes (Bruwer, 2003). Furthermore, the potential of wine tourists' intentions to take wine-based travel was also studied by Sparks (2007) whereby past attitude, perceived control, normative influences as well as wine/food involvement contributed to intention to travel to a wine region.

The identification of critical success factors for wine tourism regions from a demand-based perspective was addressed by Getz & Brown (2006) who found that destinations offering a wide range of outdoor and cultural events received the preference from highly motivated and long-distance wine tourists. Earlier on, Getz et al., (1999) had already examined critical success factors from the supply perspective for the development and

marketing of wine tourism, with quality standing out in terms of wine, service and experiences followed by the appeal of the wine country and winery.

Interestingly, travel preferences and patterns are influenced by fondness of specific appellation-of-origin (e.g., French wines) and tourists plan wine-related travel following those geographical origin preferences (Brown & Getz, 2005). Bruwer & Alant (2009) highlighted several hedonic aspects related with wine tourism behavior, namely motivations driving tourists to visit cellars in a wine region. The most important feature was the scenic beauty of the wine region, but other characteristics were also relevant such as the diversity and overall ambience of wine estates, friendly and hospitable people. Moreover, Byrd et al (2016) examined factors influencing wine tourists' intentions to visit/revisit a wine region or even a winery. For repeat visitation intention, customer service was the primary predictor.

Wine tourism development has been also assessed taking into account the perceptions of residents with regard to personal benefits and community impacts, and the associated level of wine enthusiasm and understanding of tourism characterization of wine trails (Xu et al., 2016). Furthermore, Ferreira & Hunter (2017) performed a geographical analysis of the development of wine tourism from a supply-side perspective, considering wine tourism product portfolio and its physical footprint, using nodes, network and winescape point of view. Regions with most developed wine routes showed stronger transformation levels of rural landscapes and called for higher-level protection legislation.

The provision of information about wine tourism is paramount on the Internet engaging both websites and social media. To illustrate, Duarte Alonso et al. (2013) conducted a study involving winery entrepreneurs and their usage of websites and social media. Results showed that wineries were not fully exploiting the potential benefits not only of websites but also of social media platforms, thus urging for the strengthening of promotion and marketing strategies to boost their destination image.

Another interesting study was conducted by Bruwer et al. (2013) who looked into the influence exerted by the winery tasting room experience onto brand loyalty of wine consumers, and found significant correlations of tasting room experience to both brand attitudes and brand loyalty, demonstrating how important is a memorable and enjoyable experience to generate higher purchase likelihood as well as word of mouth recommendations.

Since wine tourism involves tourists travelling between places within a region, itinerary mapping is quite adequate. Popp and McCole (2016) applied specifically paper-based itinerary mapping to a wine tourism area arguing this is a cost-effective way to provide guidance on investing limited resources to tourism planners, local officials and businesses.

Wine tourism experience was investigated (Thanh & Kirova, 2018) using the experience economy model, known as 4Es: educational (tourists enhance their knowledge or skills); entertainment (tourists are engaged by performances); esthetic (tourists are enriched by sensual environments); and escapism (tourists become engrossed by participating in a different time or place). Findings revealed that the predominant experiences were related to the educational and entertainment dimensions with the former involving wine tasting activities, and the latter wine museum visits. Although the study by Thanh and Kirova (2018) is still recent, it has been already cited more than a hundred times according to Google Scholar. From the citing articles, several have addressed the same subject using online reviews to compile data sources for the analyses. Sigala (2019; p. 315) concurs that the 4Es model “represents the most widely adopted tool for studying wine tourism experiences”. Therefore, we also adopted the 4Es model to compare our results and discuss on them.

The current COVID-19 pandemic may also have a role in leveraging wine tourism. As of July 2020, European countries are gradually lifting their confinement requirements (Paces & Weimer, 2020). Such process is done carefully, as there is still no vaccine or effective treatment. Thus, in general, large concentrations are still to be avoided or even prohibited by national or local legislation. The regional nature of wine tourism and its specificity as product-driven tourism (Karagiannis & Metaxas, 2020) may help Port wineries to reduce the disease outbreak impact and effectively making wine tourism among those recovering first.

### **3. Data and approach**

Online social media platforms have emerged since the dawn of the present millennium to enable users worldwide to share their opinions (Brochado et al., 2019a; Costa et al., 2019). Such phenomenon led to electronic word-of-mouth, with users influencing each other with their online written opinions. Tourism has been at the forefront of such revolution

through sophisticated online review platforms that capture the reader’s eyes and motivate them to contribute with their opinion while reading what others have written. Specifically, TripAdvisor is the most renowned online review platform and has been widely adopted to understand tourism phenomena (Brochado et al., 2019c; Moro et al., 2019a; Nilashi et al., 2021). As such, we collected a total of 824 online textual reviews from TripAdvisor written between 2015 and 2019. The reviews were written by visitors of four major cellars in Gaia, “Porto Calém”, “Caves Sandeman”, “Taylor’s Port”, and “Graham’s Port Lodge”. For all reviews, the title, written text, and rating (i.e., 1 to 5 integer score) were retrieved. Table 1 shows a summary that characterizes the set of reviews per each of the four cellars. For each review, the sentiment score of the title was computed plus the review text through sentiment analysis. The sentiment score is a numeric decimal number that represents a neutral sentiment in the analyzed text if equal to zero, or a negative/positive sentiment depending on the signal (the larger the absolute number, the stronger the sentiment, ranging from -1 to +1) (Moro et al., 2019b). Thus, the sentiment score complements the quantitative rating of TripAdvisor (Table 1), with both concurring that tourists are, in general, pleased with the experiences.

**Table 1** - Summary of the collected data.

Cellar	Nr. reviews	Sentiment score		Rating	
		Average	SD	Average	SD
Porto Cálem	198	0.35	0.24	4.27	0.83
Caves Sandeman	205	0.32	0.21	4.24	0.88
Taylor's Port	219	0.34	0.25	4.40	0.86
Graham's Port Lodge	202	0.37	0.17	4.70	0.51
<b>Total</b>	<b>824</b>	<b>0.34</b>	<b>0.22</b>	<b>4.40</b>	<b>0.81</b>

There are some reviewers who may use just a few words to express their opinions in TripAdvisor. In our dataset, the minimum words a review has is 10. There is some dispersion in the reviews, with an average of 77 words per review, but with a standard deviation high, of 53. This is another limitation of using reviews from TripAdvisor.

For the analysis of the textual reviews, a text mining approach was adopted. Text mining consists in a wide range of techniques aiming to provide relevant knowledge solely based on textual contents (Dickinger et al., 2017). One of the most adopted approaches of text mining consists in turning the unstructured text into a structured document-term matrix (DTM), in which the lines represent the documents, the columns represent the words,

while each cell contains the number of occurrences of a given word in a given document, or online review, in the current case (Calheiros et al., 2017). Yet, prior to computing such matrix, a set of functions need to be carried out to clean the text. First, part-of-speech tagging was performed, which consists in classifying each word according to its function within a sentence (e.g., noun, verb, adverb, pronoun, adjective). Since the aim was to focus on the elements, actions or qualifiers expressed by tourists, only the nouns, verbs, and adjectives were retained. Then, lemmatization over the words was executed, which consisted in reducing each to a reduced meaningful word (e.g., “rating” to “rate”). Such procedure facilitates matching similar words written in different formats. Finally, all words were converted to lower case, also to facilitate matching. In addition, all the above mentioned procedures help in reducing the dimensionality of the DTM, which can be quite large, given it contains as much columns as the number of different words in all the written reviews.

Based on the DTM, several other more complex tasks can be adopted to provide a comprehensive view of the textual comments. Topic modeling was chosen since it enables to capture the reviews based on their words into logical topics (Rossetti et al., 2016). Specifically, the model based on the latent Dirichlet allocation (LDA) algorithm was computed, which has already proved useful in summarizing online reviews (e.g., Taecharungroj & Mathayomchan, 2018). Each topic is characterized by a computed  $\alpha$  distribution that represents the distance of each review to such topic, and by a computed  $\beta$  distribution that represents the distance of each word to the topic. Given the significant amount of reviews, the focus was solely on the words characterizing each topic, similarly to the study by Calheiros et al. (2017). All the experiments described in this study were conducted using the open source R statistical tool, which provides a large set of free packages developed by an enthusiastic online community (Cortez, 2014). Specifically, the “tm” and “topicmodels” were adopted, which implement basic text mining functions (the former) and the LDA algorithm (the latter).

#### **4. Results and discussion**

Wine experience is at the core of tourism activities involving Port wine and the organization of wine tours are pivotal in this respect (Figure 1). Tourists perform them looking for guides in order to accompany the wine tasting with background information



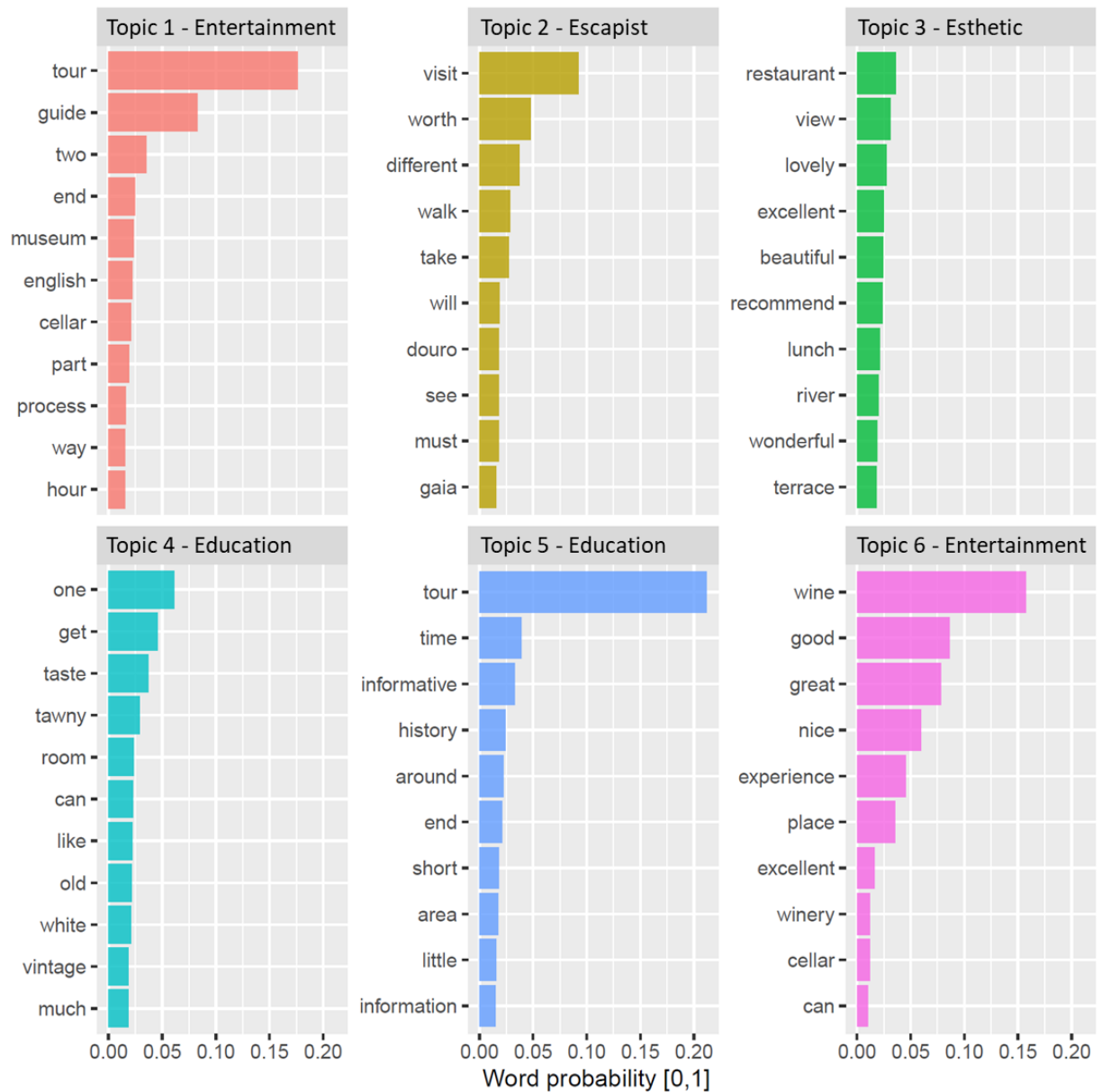


that value the diversity of wines presented in the tasting experience, which include “Tawny”, “white”, and “vintage”. Each individual topic is further analyzed in the following paragraphs.

Topic 1 (Figure 2) is mainly characterized by a focus on wine itineraries, tours and guides (e.g., Garibaldi et al., 2017) involving visits to Port wine cellars, often with pre-schedule appointments. Therefore, topic 1 appeals to the entertainment dimension from the 4Es model, as visitors are engaged by the service’s performance (Thanh & Kirova, 2018). Most of the times these tours take place in English due to the strong international origin of visitors. The historical background (“museum”) of Port wine and its associated Portuguese Douro region which is one of the three oldest protected wine region in the world established in 1756 is also highly emphasized. Evidence of words in this topic such as “process” and the “English” language emphasize its connectedness to entertainment in the conceptual model adopted.

The second topic underlines the visit to the Port wine cellars located in Vila Nova de Gaia overlooking the Douro river and the beautiful city of Porto as being worth it, differentiated, considered a must in the region. From the 4Es model perspective, this topic appeals to the escapist dimension by unveiling that “tourists become engrossed by participating in a different experience” (Thanh & Kirova, 2018; p. 32). This is further evidence that there is an opportunity of developing positioning strategies for this tourism product and its region (e.g., Cassar et al., 2018).

Topic 3 is primarily focused on “restaurant/lunch” thus looking at the combination of wine and food (e.g., Rachão et al., 2020). Experiencing dining at a restaurant terrace with a scenic view overlooking the Douro river is frequently mentioned. This experience is also often judged as lovely, excellent, beautiful and/or wonderful, being recommended by wine tourists to others. The words that best characterize this topic include “view”, “beautiful”, “wonderful”, “terrace”, which clearly position the topic within the esthetic dimension from the 4Es, with visitors highlighting the importance of the sensory of the environment (Thanh & Kirova, 2018) in the context of the tasting experience combining food and wine.



**Figure 2** - Discovered topics and keywords.

The fourth topic is strongly focused on Port wine tasting with two main types being the focus of attention: tawny, known as the “queen” of Ports, mature in small casks; vintage, the “king” of ports, matures in large wooden vats and then in bottle. White Port is also given some attention as well as the aging of the traditional red Ports (e.g., Morais et al., 2018) in which the vintage ones remain in vats for between four and six years. This means that visitors are eager to learn more about the Port and its tradition, which links to education within the 4Es model.

Topic 5 is very much addressing wine tours, time involved, background history and collection of information about Port wine. This internationally acclaimed Portuguese fortified wine is produced in Douro Demarcated Region and has received protected designation of origin. Prata-Sena et al. (2018) provide a recent account about the influence on Port wine attributes (color, aroma, flavor) given by geography, climate, soil, grapevine biological cultivars as well as vitivincultural practices. Similar to topic 4, this one also is related to the educational dimension from the adopted conceptual model. However, here the visitors show concerns for general historic information, while the previous topic was more focused on the Port wine product itself.

Finally, the sixth topic addresses wine experience in particular in wineries and cellars, classifying it as “good”, “great”, “nice” and even “excellent”. Due to its importance, researchers have attempted to model wine tourism experiences as done recently by Madeira et al. (2019) who found motivation influencing wine experience that in turn influenced also positively both destination image and tourist satisfaction. This topic can be traced to the entertainment (from the 4Es model) provided by the visits to cellars and wineries experience.

## **5. Conclusions and implications**

Wine tourism is likely to continue to be a key product-driven tourism in a post-COVID-19 era for regional settings where vitivincultural laboring takes place, including vineyards, wineries and cellars where the wine is processed (Karagiannis & Metaxas, 2020). The fact that visiting cellars can be done in small tours makes it ideal for maintaining social distance while enjoying regional tourism in an Europe where confinement measures are only gradually being lifted, and fear remains a key negative factor towards tourism recovery. Under such context, results from our study are helpful to understand the key-drivers behind wine tourism and use such knowledge to a full reopen.

The Port wine is a world-class fortified wine (Rebelo & Caldas, 2013), named after the city where it is produced, Porto, in Portugal. As such, it is an undisputable key element in the region’s tourism, which has made its path through all regional stakeholders to leverage the local economy. The tourism sector is also taking advantage of this noble product and, particularly, in Vila Nova de Gaia (the sister city of Porto, on the south side

of the Douro river), traditional cellars have developed tours where the guest is led through the wine fortification process, including a cultural and historical background as well as a tasting experience.

A comprehensive set of 824 online reviews to the four most widely recognized Port wine cellars were analyzed using a text mining and topic modeling approach (Oliveira et al., 2019). Findings showed that guests are attracted mostly by the experience as a whole in itself, including the tour and the wine culture, and not just on the wine tasting experience. Thus, managers need to invest in showing the wine process history, which has been widely appreciated by tourists. The six unveiled topics comprehend six distinct groups of guests with different preferences. While three of those groups emphasize the tour and visit experience, there are two groups of enthusiastic wine fans. From those two, one is more focused on the wine/winery/cellar experience, while the other enjoys a diversified wine carte. Also, there is one that aggregates tourists who value the food experience. By understanding the motivation drivers of those groups, cellar managers can offer tailor-made experiences, leading to more pleased guests which will eventually return in improved electronic word-of-mouth. By focusing on the Port wine cellar case, this study's contributions cannot be extended beyond such regional context. Also, the current COVID-19 context suggests that it would be interesting to replicate the same analysis with tourism reopening, to evaluate the aftermath impact in the Port wine cellar experience. Additionally, other sources from social media could complement the reviews collected from TripAdvisor. Even so, considering online comments tend to be biased, this study should be complemented with one based on primarily collected data (e.g., using surveys) to attest if the findings here reported remain consistent.

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