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What went right and what went wrong in my cellar door visit? A worldwide analysis of TripAdvisor's reviews of Wineries & Vineyards

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Abstract. The purpose of this work is to study the issues of service quality and service failure during visits to cellar doors in the five regions where wine tourism is most developed: Hunter Valley (AU), Mendoza (AR), Napa Valley (the USA), Stellenbosch (ZA), and Tuscany (IT). We propose a methodology based on a combination of sentiment analysis and natural language processing applied to 89,672 TripAdvisor reviews. The results indicate that the issues most linked to service quality and service failure are as follows (in the order of importance): the quality of the main wine product, the experience in the tasting room, the organized tours, the empathy of the staff, the reliability of the staff, and the setting of the cellar and landscape. These themes are common to all five wine tourism regions, but each region treats them differently. The results obtained confirm and expand the results of previous studies and may prove useful both to professionals (wineries, tour operators, and travel agents) and for the design of a product that meets the needs of wine tourists. The main limitation of the study concerns the application of the methodology to the five most developed wine regions in the world; therefore, the results obtained may not be immediately applicable to the wine regions that are starting to develop wine tourism.

Keywords: wine tourism, cellar door, service quality, service failure, TripAdvisor, sentiment analysis, natural language processing.

1. INTRODUCTION

Wine tourism industry has been shown to play a key role in regional rural development, and thus, tourism is one of the important and developing parts of the wine industry, even on an international scale [1]. The feature that most characterizes wine tourism involves visits to cellar doors [2] Visits to cellar doors create a direct relationship between producers and consumers of wine that can last over time [3]. Such visitors often research products when they return home, which results in positive word-of-mouth marketing to friends, family, and colleagues [4], [5]. From an economic point of view, direct sales in a cellar bring greater added value because of the minimum distribution costs and the consequent high associated margins [4]. Winery

visits are an important part of wine tourism and contribute to the development of the wine sector [6].

A key element in the success of winery visits is customers' perceptions of the quality of service. Quality of service is essential to develop the relationship between customers and brands and allows the implementation of relationship marketing strategies [5].

Although a range of tools is available to measure and evaluate the quality of service, only a few of them have been applied to the field of wine tourism. Such tools are predominantly based on questionnaires [5], [7], [8], mainly employing the well-known SERVQUAL model and its variants [9], adapting it to the specificities of the wine sector [5], [10]. However, the use of questionnaires has the limitation of poor generalizability of results. This is because case studies consider a handful of consumers attending one or a few wineries within a single wine tourism region.

There is also a lack of studies on the factors that determine service failure in winery visits. Poor service or service failure results in dissatisfaction, which, in turn, manifests in a series of responses that may include complaints and negative word of mouth. In the work of Magnini and Ford [11], service failures were defined as "any service-related mishaps or problems (real or perceived) that transpired during a customer's experience with a firm." By better understanding the causes of customer complaints, the number of problematic events can potentially be reduced, and better remedies can be provided. Therefore, attempts to develop a clearer understanding of problem areas benefit both winery owners and customers.

Researchers have recently started measuring the service quality and service failure of hotels through the analysis of reviews left by users on travel sites [12], [13]. Travel sites allow users to freely express opinions on the perceived quality of service, and from these reviews, a measure of the quality of service can be obtained through a semantic analysis of the content. These data can be considered complementary to questionnaires, as they have a very different nature. On the one hand, such data is not structured around variables or concerns, as it happens with existing validated questionnaires, so that it cannot be used to provide a summative assessment of quality. On the other hand, it has the potential to discover aspects of quality that are overlooked or given less importance in existing questionnaires.

A further gap that emerged from the analysis of the literature is that the research on the quality of service of visits to wine cellars is geographically limited to very few wine regions, located mainly in Australia. International travel sites allow reviews to be accessed from around the world [5, 6,7].

The research questions (RQs) that our work attempts to answer are:

RQ1: Is it possible to measure service quality and service failure through a semantic analysis of the reviews made by users on travel sites?

RQ2: What are the determinants of service quality that emerge from reviews made by users on travel sites?

RQ3: What are the determinants of service failure that emerge from reviews made by users on travel sites?

RQ4: What are the factors that determine the quality and failure of service that are common globally? What are the typical determinants of the quality of wine regions?

This article is structured as follows. First, the literature review provides an overview of past studies within the theoretical framework of winescape, service quality assessment, and the use of data from social media in the wine tourism industry. Then, the methodology section describes the research context, data collection process, and procedures used to perform content analysis of web reviews. The results section identifies the major themes of service quality and service failure. The discussion section focuses on the answers to the research questions and the comparison of the research findings with the results of other approaches, with reference to SERVQUAL. The last section reports the managerial implications, limitations, and possibilities for future research.

2. LITERATURE REVIEW

Wine tourism is a complex product that combines the purchase of a market good, wine, with the enjoyment of intangible assets, such as the landscape and the information provided by the guide and wine producers. The study of wine sales from wineries through the analysis of social media data encompasses four theoretical fields of research: wine tourism, winescapes, theories of quality of service, and content analysis/lexical analysis theory applied to social media. In this literature review, we provide brief references to these three research fields as applied to cellar door visits.

2.1. Wine tourism

The number of articles published on wine tourism has been steadily growing since the mid-1990s. Based on prior literature, a framework for wine tourism was explored by Carlsen [14], in which production- and consumption-based research can be placed. A classification of the wine tourism literature was then conducted by Mitchell and Hall [15], who identified eight themes:

1) wine tourism development; 2) winery and cellar door; 3) wine tourist behavior; 4) wine events and festivals; 5) marketing and promotion; 6) critical success factors; 7) wine tourism models; and 8) education and more. Between 2005 and 2014, there was an increase in theory building in wine tourism research, referring to theory to provide theory [15]. Theory-based research has focused on the analysis of wine regions' image [16] and service quality [5].

2.2. Winescape concept

One of the most prolific topics in wine tourism is the analysis of wine regions' image through the identification of wine tourism attributes [15], [17]. The dimensions of the servicescape (i.e., the atmosphere that enhances the customer experience and influences buyer behavior during the service encounter) were adapted and applied by Peters [18] in a winescape concept by highlighting attributes that are attractive to wine tourists. First, Peters [18] identified three fundamental elements that shape a winescape: "(1) the grapes and their needs, (2) the natural environments that best meet those needs, and (3) the viticulturists and wine makers who determine everything from the varieties of grapes, spacing of the vines, and trellising systems to the final product that enters the bottle."

Johnson and Bruwer's [19] conceptual definition specifically encapsulated the interplay of natural landscape and setting: heritage, architecture, and artifacts within a winery, winery's vineyard, cellar door, and wines; complementary products and services; signage and layout; and people at a winery.

The winescape scale developed in more recent studies is based on a plurality of theories: servicescape theory, multi-attribute theory [20], and destination choice (push-pull) theory [21]. Thomas et al. [22], from a meta-analysis of 70 supply related winery articles, defined seven key attributes of a winescape:

1. The natural environment and scenery such as the natural landscape, vineyards, and rural setting referred to in the current study as the winescape setting attribute.
2. Built environment such as wineries, cellar doors, and buildings, and the heritage that they convey were identified as the winescape atmospherics attribute.
3. Wine products such as reputable wines, wine variety, and value-for-money wines were referred to as the winescape wine product attribute.
4. Complementary services such as restaurants, accommodation as well as other local produce and craft were identified as the winescape complementary product attribute.
5. Signage and information such as signposting and informational materials were referred to as the winescape signage attribute.
6. Layout and infrastructure connecting the physical attractions such as wine routes and roads were identified as the winescape layout attribute.
7. Service staff who interact with wine tourists were referred to as the winescape service staff attribute.

2.3. Service quality in cellar door visits

Service quality (SQ) originates from comparing perceived expectations (E) of a service to perceived performance (P), resulting in the equation SQ = P-E [23]; service failure can be defined as service performance falling short of customer expectations [24].

Most of the research conducted in Australia on service quality at cellar doors is based on an adaptation of the SERVQUAL methodology. The SERVQUAL methodology, proposed by Parasuraman, Zeithaml, and Berry [9], constructs a measure of perceived quality and, therefore, of customer satisfaction through a comparison of customer expectations in approaching a type of product/service and the perceptions of the product/service after consumption. It is a highly standardized quantitative methodology designed specifically to measure clients' opinions on the quality of services. This makes it possible to compare the expectations and perceptions of users regarding a specific service. It consists of a series of 22 questions valid for each type of service that make it possible to measure perceived quality and expectations separately for five dimensions considered essential for judging service quality. The dimensions are as follows:

1. Tangible elements (appearance of physical facilities, equipment, and personnel);
2. Reliability (ability to deliver the promised service reliably and accurately);
3. Responsiveness (willingness to help customers and provide service promptly);
4. Reassurance (competence and courtesy of employees and relative ability to inspire trust and confidence);
5. Empathy (caring and personalized assistance given to customers and users).

Some authors have adapted and applied SERVQUAL's methodology to analyze the quality of service during the visits at cellar doors by assessing dimensions using Likert scales.

O'Neil and Charters [4], in a study in the Margaret River region (AU), implemented a two-stage methodology, the first stage being a qualitative descriptive analysis

through eight interviews with cellar door operators, and the second stage was based on 150 interviews through a specific questionnaire developed through an adaptation of the SERVQUAL methodology. Similarly, O'Neil et al. [5] applied the SERVQUAL methodology by adapting it to 10 wineries in the Margaret River region and in the Barossa Valley (AU). For both surveys, respondents were asked to rate their perceptions of the dimensions listed on a five-point Likert scale. The scale items were grouped according to whether they were "wine-related" or "staff-related," and represented many of the original SERVQUAL dimensions. The items that comprised each dimension were based on King et al.'s (1997) [25] service quality model for cellar doors, which emphasized the importance of product and service quality for cellar doors' success.

Griffin and Lopersch [26] applied a modified version of the SERVQUAL model in Canberra District (AU). The authors identified 23 quality attributes across six dimensions: external, internal, service, staff, wine, and convenience attributes. The external and internal attributes related to the physical qualities of wineries, with the former associated with the environment and surroundings of wineries, and the latter relating to the layout and character of tasting rooms.

Gill et al. [6], in research in the Margaret River and Swan Valley, instead, adopted a multidimensional model derived from Sweeney and Soutar's [27] PERVAL and Petrick's [28] SERV-PERVAL measures. The authors derived five dimensions from the SERV-PERVAL measures: quality (Q), emotional value (EV), price (P), social value (SV), and reputation (R). The questionnaires were structured on a seven-value Likert scale.

The only study we found outside Australia was carried out in Greece by Nella and Christou [29], who applied a structural equation model that incorporates three temporal dimensions of the winery experience: before the visit, on-site, and after the visit.

2.4. The use of social media data in wine tourism research

According to Lockshin and Corsi [30], social media marketing is an interesting field of research in wine tourism research. There is an increasing amount of social media research on wine. Initially, research focused on the microblogs of wine consumers [31] and then expanded to Twitter [32] and Facebook [33] platforms. In the last three years, social media has been used to study the behavior of wine tourists. Brochado et al. [34] used 4,114 online reviews of 52 wine hotels located in 27 wine regions across 11 countries to identify key themes related to wine hotel experiences. Brochado et al. [35] identified the sustainability dimensions of organized tours from the point of view of tourists by analyzing 878 reviews of 20 tours in Portugal, written on TripAdvisor. Terziyska and Damyanova [36] employed 118 reviews on TripAdvisor to define the attributes of winescapes, as seen from the perspective of travel arrangements for a wine tour company in Piedmont, Italy. Brochado et al. [37] collected 470 wine tourism reviews posted on TripAdvisor in the Douro wine region and used them to identify sensory perceptions during winery visits. Vo Than and Kirova [38] analyzed with netnographic approach 825 original reviews posted on TripAdvisor by tourists who visited Cognac (France). The results showed that the experiences were globally positive and that experiences related to the dimensions of education and entertainment were predominant.

Finally, in a recent study [39], social media was used to identify and characterize the behavior of the "Masters of Wine" community on Twitter, as well as to determine the impact of these renowned wine experts through this platform. All Twitter profiles belonging to the Masters of Wine's award-winning users were identified and analyzed. Additionally, a set of 35,653 tweets posted by the Masters of Wine were retrieved and analyzed using descriptive statistics.

3. METHODOLOGIES

3.1. Study areas

Wine, landscape, heritage, and tourism are all keywords that characterize wine tourism both in the Old World of Wine (Europe) and in the New World (the USA, South America, South Africa, and Australia). Currently, vineyards around the world represent not only a fundamental agricultural resource that guarantees rural development but also a great economic resource that allows the enhancement and maintenance of the same cultural wine landscapes and the development of the entire region [40].

According to the rankings on the TripAdvisor platform, based on the number of reviews, the top five wine destinations in the world are: Tuscany (Italy) in first place, followed by Napa Valley (the USA), Hunter Valley (Australia), Stellenbosch (South Africa), and Mendoza (Argentina). While Tuscany has a long tradition, the other wine regions of the New World were established and developed very quickly, but with great success.

In Chianti region, the integrated tourist offering is coordinated by eight wine routes. The wine routes, regulated by Italian Law n. 268/1999, bring together wineries, restaurants, hotels, wine bars, and other public and pri-

vate facilities, clearly using the typical wine of the area as a physical and cultural link between all the subjects involved. This joint management encourages tourists to organize their stay in a way that allows them to experience the territory on an oenological and intellectual level. The museums of wine and vines, which are in almost all Italian regions, help in promoting and communicating wine culture, although they differ in thematic approach, as well as in their size and history [41].

In Napa Valley, the wine sector presents itself as an economy in its own right with many services, wherein the business model focuses on the diversity and originality of the wineries' design, a new attractive resource to guarantee their reputation and draw the largest number of visitors, both oenophiles and lovers of contemporary art. The suppliers of wine tourism in Napa Valley also recognize the need to continue to evolve as people search for innovation and trends, while maintaining the brand that the region was built upon. This is manifesting itself in the addition of new restaurants, hotels, and wineries. Leaders and suppliers of the Napa wine tourism experience are also looking at creating dedicated bike trails, zip lines, and other activities to add to the physical and figurative landscape of the Napa wine tourism destination experience [42].

In Hunter Valley, food and wine represent one of the top three motivational drives for international tourists to Australia among the aquatic and coastal experiences, nature, and wildlife. In Australia, wine trails are not as developed as in Europe. However, regional and local government agencies have developed tourism routes where wine experiences are part of a broader tourism theme combined with other experiences [41].

The wine industry in Stellenbosch has an active wine tourism market, well-developed facilities, and infrastructure. However, despite the fact that the first South African wine road was established as early as 1971, association networks are currently non-existent or underdeveloped [43].

The vision of Mendoza's wine tourism development was based on the strength of identity, culture, and landscape. In particular, its architecture has contributed greatly to the prestige and attractiveness of wine tourism. It projects, by recognizing historical dynamics, nature, and society, the quality of life with identity [41].

Despite having different marketing strategies, these wine regions share the same aims: to enhance their heritage, grow their economy, satisfy the needs of existing customers, and attract new ones, in particular through wine routes, organization of events, and the combination of wine and food. Therefore, we have chosen the five main wine tourism destinations according to the TripAdvisor platform as study areas to understand their strengths and weaknesses and, in particular, to draw up useful guidelines at a global level.

3.2. TripAdvisor as an evaluation source

TripAdvisor is one of the most popular networks for sharing travel experiences. As of 2018, it had collected over 570 million reviews and opinions on over 1.2 million accommodations. TripAdvisor not only collects reviews on hotels and restaurants but is open to all tourist interest activities, including the specific category of winery visits.

One of the most appreciated features of TripAdvisor in marketing research is its reliability. The platform has an efficient, automated quality control and review reliability system that involves many parameters. The system compares incoming reviews for a given activity with the historical patterns already examined for that activity by identifying suspicious anomalies in the patterns (TripAdvisor, 2021, https://www.tripadvisor.com/TripAdvisorInsights/w3690). In addition, several studies have been conducted to analyze the credibility of this website [44].

When writing a review, guests also have the option to rate their overall experience on a scale of 1 to 5 "bubbles," with 1 being a poor rating and 5 being an excellent rating. Valdivia et al. [45], in recent research, showed that the TripAdvisor rating system presents a problem: users tend to rate the overall experience positively, but there may also be negative comments within a review. Likewise, in an average or negative evaluation, there may be positive evaluations of the relevant aspects of service quality. To analyze and evaluate reviews efficiently, it is necessary to separate positive and negative aspects. Taking this into account, we identified a methodology for identifying and separating positive from negative sentences in reviews. Positive sentences contain the relevant qualitative elements of service quality, whereas negative sentences contain the relevant elements of service failure. Once we obtained two series of subreviews, one with only positive sentences and the other with negative sentences through a text mining analysis, we identified the relevant elements of service quality and service failure.

3.3. Review processing

The methodology of this study is articulated in the following steps. First, we identified the most relevant wine-tourism regions at the international level. Then, we verified the reliability of the TripAdvisor platform for the identification of key elements of consumer satisfac-

tion using prior literature. Finally, we built an algorithm for the automatic collection of reviews and lexical and sentiment analyses.

3.3.1. Sentiment analysis

Sentiment analysis has been increasingly applied in recent years, especially to the contents of Web 2.0. Sentiment analysis measures the polarity and intensity of the mood of a person's opinion expressed in a text written in natural language.

Sentiment analysis methods can generally be divided into two categories: dictionary-based methods and methods based on supervised classification. The methods of the first category apply sentiment lexicons containing the semantic orientation of words to the sentences in the text. One of the biggest challenges of dictionary-based methods is that the sum of the semantic values of individual words does not necessarily correspond to the polarity of the entire sentence [46]. Therefore, it is necessary to extract further linguistic patterns of the text by conducting morphosyntactic analyses of the text [47]. However, too many specific extraction models limit the application of this method to a specific domain. The most recently applied second category of method uses unsupervised or supervised machine learning algorithms, such as machine learning-based methods and deep learning-based methods. These methods allow the development of more generic models but require data classified according to specific categories. Consequently, the quality of these models is strongly influenced by the reliability of the training and testing sets performed by human classifiers [48].

The literature reveals that there is no superior sentiment analysis method because all tools work differently depending on the specific context in which they are applied or based on the corresponding data source on which they were trained. One of the best sentiment analysis methods for analyzing poorly structured and simple texts, such as reviews in TripAdvisor, is AFINN [49]. AFINN [50] is a dictionary-based method that was initially created in 2009 for tweets downloaded for online sentiment analysis in relation to the United Nations Climate Conference (COP15). It has since been extended to other data domains. The version called AFINN-96 adopted in this work has 2,477 words and uses a score ranging from -5 (very negative) to +5 (very positive).

The sentiment scoring procedure is as follows:

1. Each review is broken down into its sentences $d_i=\{s_{i,1},s_{1,2},\ldots,s_{i,n}\}$ based on punctuation; subsequently, each sentence is broken down into words (w) $s_{i,j}=\{w_{i,j,1}),w_{i,j,2},\ldots,w_{i,j,l}\}$ using a semantic annotation procedure (Kiyavitskaya et al., 2006).

2. The words in each sentence, $\{w_{i,j,k}\}$, are searched and compared with the lexicon of polarized words, and each of them is assigned a negative or positive score. Not all words have a sentiment score; therefore, we obtain a subset of polarized words $\{pw_{i,j,k}\}\subseteq\{w_{i,j,k}\}$.

3. Finally, we sum the weighted context yielding an unbounded polarity score $\delta_{i,j}$ for each sentence.

We chose not to normalize the polarity score on the number of words because satisfaction or dissatisfaction with service quality is proportional to the number of positively or negatively polarized words used to write a review [49].

3.3.2. Co-occurrence network of high-frequency words

To extract useful information from the subreviews to understand the reasons for the quality and failure of the service, we used the co-occurrence graph method of the highest-frequency words. The first step of the analysis was the preprocessing of the sets of subreviews, called corpora. We carried out the following steps:

(i) Tokenization of the text that involves division into words of the text itself;
(ii) Removal of stopwords defined as words that do not carry significant information for analysis;
(iii) Stemming and rooting, which consist of reducing words to the root;
(iv) Removal of extra numbers and spaces;
(v) Removal of punctuations;
(vi) Part-of-speech tagging aimed to assign parts of speech to each word of a given text (such as nouns, verbs, adjectives, and others) based on its definition and context.

The co-occurrence network of the higher-frequency words was performed using the KH Coder software. We only used nouns and adjectives, as they are parts of speech with the highest information content [51], [52]. In the analysis, we took 50 words with the highest frequency in the review corpora of each of the five wine regions. The KH Coder provides choices of Jaccard, cosine, or Euclid for measuring the distance between terms; in this research, the distance cosine was chosen. To facilitate the reading of the results, the procedure applied the methods developed by Fruchterman and Reingold [53] and by T. Kamada and S. Kawai [54] to design the word-word network.

Community analysis is one of the most recent developments in network theory. A network has a community structure when it is possible to partition it into subnets (also called communities, subgraphs, or clusters) characterized by a density of internal connections (i.e., between

elements of the community itself) much greater than the density of connections between a community and the other community. Typically, in a network where there is a community structure, there are groups of highly connected nodes, nodes that are isolated, and others that act as a bridge between the different communities. To identify the subgraphs, we used the modularity method for its computational efficiency [55], [56].

3.3. Reviews processing

A flowchart of our procedure is shown in Figure 1. The procedure was divided into the following steps:

Step 1 (orange in Figure 1). In the first phase, we harvested the data relating to reviews based on the TripAdvisor URL of the five wine regions. For this purpose, we wrote a procedure in R language based on the "rvest" library (available as supplementary material). The data collected were the title of the review, review, and evaluation of the bubbles. The database obtained was divided into two subsets: positive reviews (PR) with a rating greater than three bubbles and neutral or negative reviews (NNR) with a rating less than or equal to three bubbles.

Step 2 (green in Figure 1). The reviews were divided into individual sentences. A sentence is the smallest lexical unit in natural language processing and is defined as a grammatical unit of one or more words that expresses an independent statement. A sentiment analysis procedure was applied to the sentences to assess the polarity (positive or negative) and the relative sentiment score of the perception of service quality or failure. Sentences with positive polarity express service quality, whereas those with negative polarity express service failure. In the subset of S_PR, only sentences with a sentiment score greater than zero were selected, while in S_NNR, only sentences with a sentiment score less than zero were selected. Finally, the sentences belonging to the same review were merged to obtain two sub-reviews, one with only the positive sentences and the other with only the negative sentences. Thus, we obtained two datasets: service quality subreviews (SQRs) and service failure subreviews (SFRs) for the five wine regions. In this study, sentiment analysis was conducted using the "syuzhet" library of R software.

Step 3 (cyan in Figure 1). The co-occurrence graph method is one of the most widely used methods for analyzing large databases of unstructured text from social media [57] [58]. The analysis of the co-occurrence network of words allows us to draw a network of relationships between words with a high degree of co-occurrence. This analysis allowed us to extract the most frequently recurring concepts for both service quality and service failure. A co-occurrence network of high-frequency words procedure was applied to the SQRs and SFRs to identify the factors and causes of service quality and service failure during the visits to cellars. The elaborations were carried out using the KH Coder 3 software.

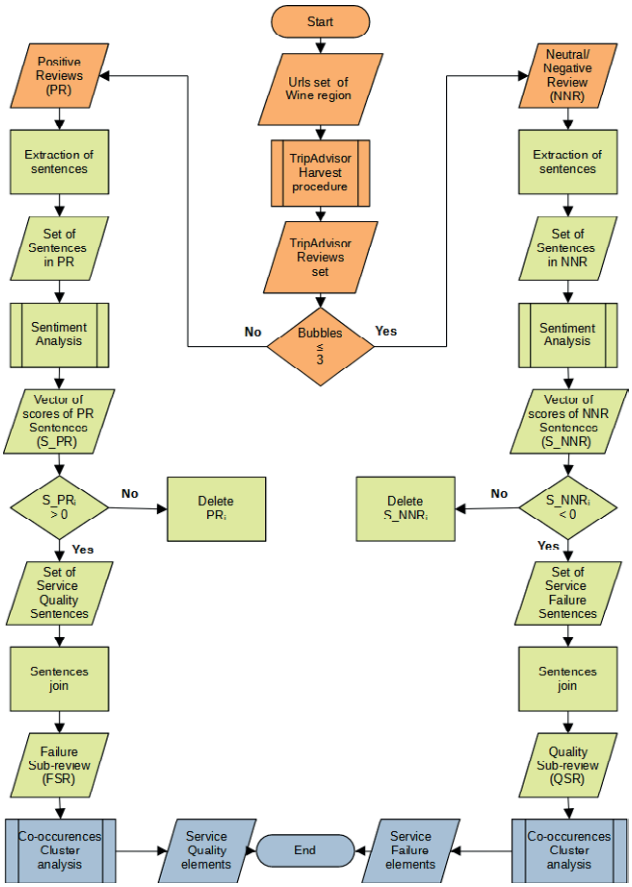

Figure 1. Flow chart of the proposed methodology.

4. RESULTS

4.1 TripAdvisor ranking and sentiment analysis

We downloaded reviews and rankings of five wine regions collected in the period from January 2010 to April 2021 for a total of 89,672 reviews of 1,074 wineries. The wine region with the most reviews was Napa Valley with 46,753 reviews related to 387 wineries, followed by Hunter Valley with 13,204 reviews of 118 companies, Stellenbosch with 8,232 reviews of 81 companies, Tuscany with 7,402 reviews of 414 wineries, and Mendoza with 3,581 reviews related to 74 wineries. To understand how users rated their winery experience on TripAdvisor,

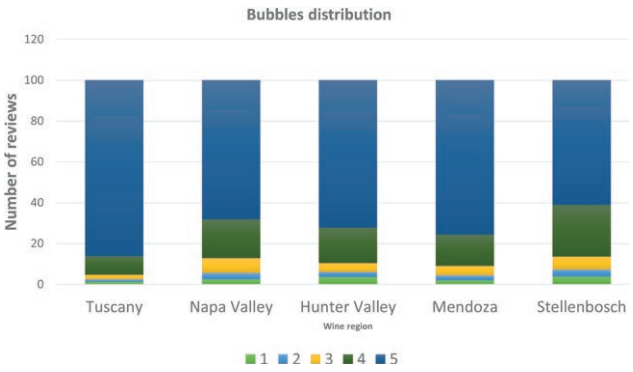

Figure 2. Distribution of bubbles ranking.

we analyzed the percentage distribution of the bubbles' scores (Figure 2).

The figure shows that, in general terms, positive evaluations with five bubbles prevail. In particular, Tuscany had the highest percentage of reviews valued at five bubbles (86%), followed by Mendoza (76%), Hunter Valley (72%), Napa Valley (68%), and Stellenbosch (61%). The four bubbles score was highest in Stellenbosch (25%), followed by Napa Valley (19%), Hunter Valley (17%), Mendoza (15%), and Tuscany (9%). The neutral score of the three bubbles was the same for Stellenbosch and Napa Valley (7%) and lower for Mendoza (5%), Hunter Valley (4%), and Tuscany (2%). Finally, two and one bubbles occurred at very low percentages in all five regions.

Table 1 reports the results of the sentiment analysis for the subreviews that express service quality (bubbles > 3 and sentiment > 0) and the subreviews related to service failure (bubbles ≤ 3 and sentiment < 0). For bubbles, the region with the highest perceived sentiment for service quality was Tuscany, followed by Mendoza, Napa Valley, Stellenbosch, and Hunter Valley. To validate the differences between the means, we performed a pairwise analysis with the van der Waerden test with the correction of the p-values according to the Bonferroni method. The advantage of the van der Waerden test is that it obtains a high efficiency of the standard ANOVA when the assumptions of normality are satisfied, but it also provides the robustness of the Kruskal-Wallis test when the assumptions of normality are not satisfied. The results reported in Table 1 show that the differences between the sentiment score of Tuscany compared to the other four wine regions and between the sentiment score of Mendoza compared to the other four regions are statistically significant. The differences between Stellenbosch, Napa Valley, and Hunter Valley are not significant.

For service failure, the region with the highest level of perceived sentiment was Napa Valley, followed by

Table 1. Statistics, mean, and standard deviation of the sentiment analysis of service quality and service failure.

		Hunter Valley	Mendoza	Napa Valley	Stellenbosch	Tuscany
Service quality	n	11304	3063	38298	6763	16431
	mean	13.07	14.29	13.64	13.85	15.13
	sd	6.39	7.32	6.99	7.03	7.70
	Pairwise comparisons using van der Waerden normal scores test					
		Hunter Valley	Mendoza	Napa Valley	Stellenbosch	Tuscany
	Mendoza	7.3E-14 ***	-	-	-	-
	Napa Valley	6.9E-10 ***	2.3E-5 ***	-	-	-
	Stellenbosch	9.8E-10 ***	0.067 *	0.246	-	-
	Tuscany	< 2e-16 ***	8.4E-08 ***	< 2e-16 ***	< 2e-16 ***	-
Service failure		Hunter Valley	Mendoza	Napa Valley	Stellenbosch	Tuscany
	n	871	190	3269	693	519
	mean	-5.31	-5.08	-3.97	-4.84	-4.36
	sd	4.29	4.14	3.40	4.06	3.42
	Pairwise comparisons using van der Waerden normal scores test					
		Hunter Valley	Mendoza	Napa Valley	Stellenbosch	Tuscany
	Mendoza	1.000	-	-	-	-
	Napa Valley	< 2e-16 ***	8.3E-04 ***	-	-	-
	Stellenbosch	0.108	1.000	0.000	-	-
	Tuscany	9.9E-05 ***	0.619	0.042	0.469	-

Tuscany, Stellenbosch, Mendoza, and Hunter Valley. The pairwise analysis shows that the perceived sentiment in the Napa Valley region was significantly higher than that in Stellenbosch, Hunter Valley, and Mendoza regions, but not significantly higher than that of Tuscany region. Tuscany, in turn, had a statistically significant difference compared only to Hunter Valley, while the difference with Mendoza and Stellenbosch was not significant. Finally, the perceived sentiment differences between Mendoza, Hunter Valley, and Stellenbosch were not statistically significant.

4.2 Co-occurrence network of service quality

The co-occurrence network and cluster analysis, based on databases with positive sentiment according to the AFINN dictionary (AFINN > 0) and positive bubble rankings (bubbles > 3), highlight the elements that characterize the service quality of the wineries in various wine regions, and how they are perceived by the different types of users.

The analysis was carried out separately for each wine region (Figures A.1-A.5 in the Appendix), with both datasets resulting from the union of all regions (Figure 3).

In general terms (Figure 3), the analysis identifies seven prevalent themes of service quality: "wine," which characterizes subgraph 1 in Figure 3; "tour," subgraph 4; "tasting," subgraph 5; "winery," subgraph 3; "service," subgraph 2; "view," subgraph 6; and "staff," subgraph 7.

The wine theme

The core product, wine, is central to the perception of service quality both in the global analysis and sepa-

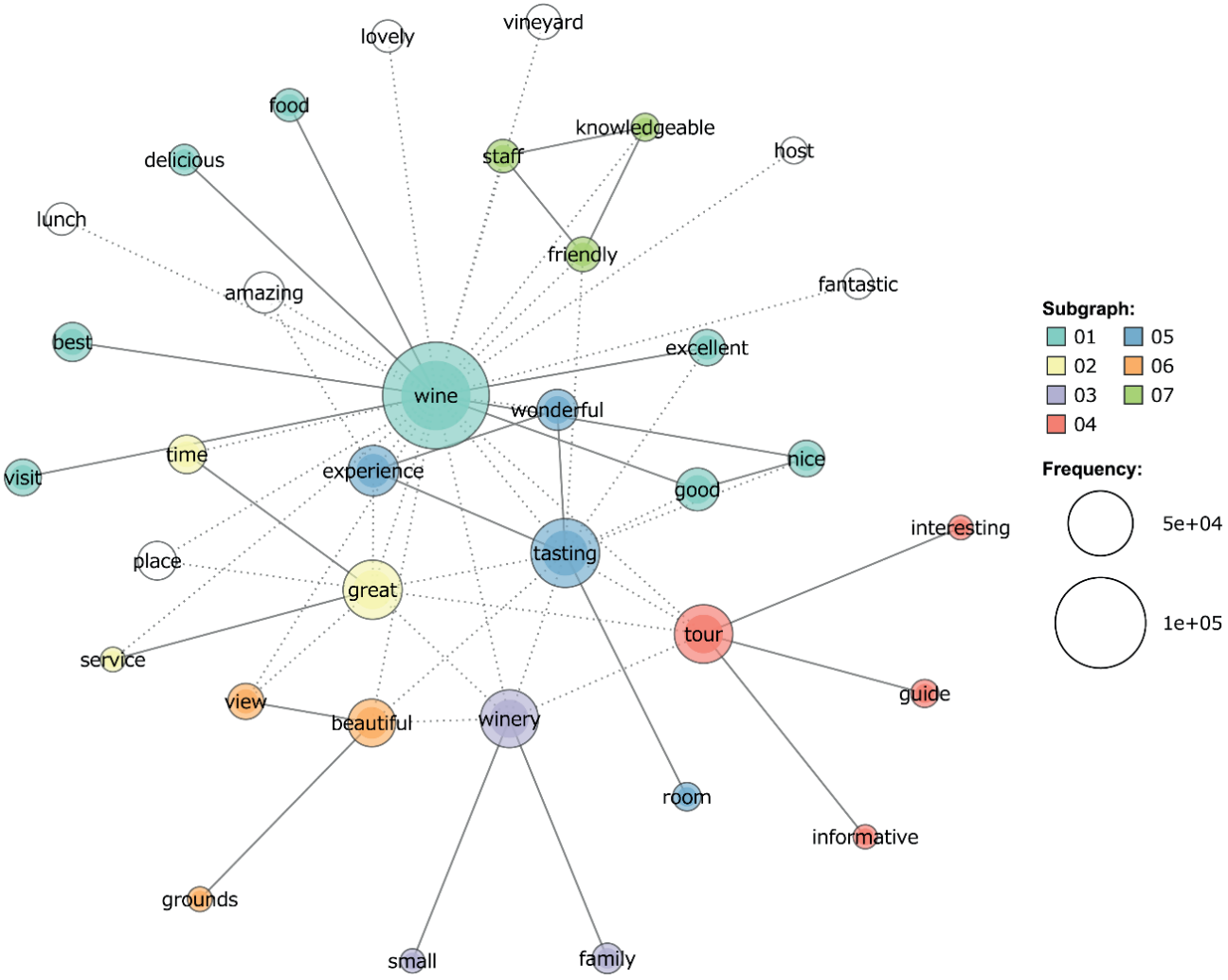

Figure 3. Co-occurrence of service quality subreview for all five wine regions.

rately in all five wine regions. In the global analysis, it is associated with the themes of "visit" and pairing with "food." The different regions express the theme in slightly different ways. The combination of "wine" and "food" on the occasion of the visit to a cellar can be found in Tuscany and Stellenbosch.

Hunter Valley associates "wine" with "winery" and the themes of landscape, "view," "travel," and "tour." Meanwhile, in Napa Valley, "wine" is connected to the "tasting" – "room" – "experience." Finally, Mendoza is characterized by the association of "good" – "wine" with the themes of the service: "amazing" – "service" and "nice" – "visit."

The staff theme

The staff theme is another theme that is present in all five wine regions. In the global analysis (Figure 3) for Mendoza (Figure A.2, Napa Valley (Figure A.3), and Stellenbosch (Figure A.4), the term "staff" is associated with the two complementary qualities of service: "friendly" and "knowledgeable." In the analysis referring to Tuscany, we find the subgraph "friendly" – "staff," while for Hunter Valley, the theme is expressed with the terms "staff" "helpful," "friendly" and "knowledgeable."

The tasting theme

The tasting theme is present as a separate subgraph for Hunter Valley, Mendoza, Stellenbosch, and Tuscany, while for Napa Valley, it is in the wine theme subgraph. In the global graph, it is clearly expressed as "wonderful" – "experience" in the "tasting" – "room." Similarly, for Hunter Valley, we have "great" – "fun" – "tasting" – "experience"; for Stellenbosch, "nice" – "good" – "experience" in the "tasting" – "room."

However, in the Mendoza graph, the theme is articulated in a much more complex way. The "excellent" experience in the "tasting" – "room" is associated with the "tour," with "guides" defined as "interesting" and "informative." The location of the theme is then specified: "family" – "small" – "winery.

The tour theme

The "tour" theme is present as a subgraph in the graphs of Napa Valley and Tuscany. In the Hunter Valley graph, it is part of the "wine" theme, and in the Mendoza graph, it is part of the "tasting" theme. It is not present in the Stellenbosch graph. In Tuscany, "tour" is associated with the theme of "lunch" and is defined as "informative" and "interesting." In the Napa Valley graph, the tour theme "tour" is associated with the typical "cave" theme. The history of wine cave construction in the United States dates back to the 1860s in Sonoma and the 1870s in the Napa Valley region. In 1982, the Far Niente winery completed the first "new age" wine cave in Napa Valley. The Far Niente Winery caves now comprise approximately 3,700 m² [59].

The service theme

The service theme is presented as a subgraph in the Hunter Valley and Napa Valley graphs. In the Mendoza graph, it is connected to the subgraph "wine." It is not present in the graphs of Stellenbosch or Tuscany.

In the global graph, it is linked to the terms "great" and "time." Hunter Valley associates the adjective "excellent" with "service" and in the Napa Valley graph with "great" – "time."

The view theme

The "view" theme is present in the graphs of Stellenbosch, Napa, and Tuscany. In the global graph, as well as in the Napa Valley graph, it is associated with "beautiful" and "ground." It is associated with "amazing" and "stunning" in the graph of Stellenbosch and with "amazing" and "beautiful" in that of Tuscany.

The regional themes of food and restaurant

The theme of food is not present in the global graph (either as a subgraph or as a high-frequency word). The theme features subgraphs in the graphs of Hunter Valley, Mendoza, Tuscany, and Stellenbosch. In Mendoza, the subgraph is highly articulated and includes the themes of the "course" and the "pairing" of wine with "food." In Hunter Valley, "food" is simply associated with "lunch." In the other two regions, the term food does not appear specifically but refers to gastronomic specialties, such as "olive" "oil" in Tuscany; "platter" of "cheese" and "wine" and "chocolate" "pairing" in Stellenbosch.

4.3 Co-occurrence network of quality failure

The co-occurrence network and cluster analysis, based on a database with negative sentiment according to the AFINN dictionary (AFINN < 0) and negative bubble ranking (bubbles < = 3), highlights the elements that characterize the failure of winery services in various wine regions and the problems experienced and encountered by consumers. Similar to the previous case, the analysis was carried out both globally (Figure 4) and separately for each wine region (Figure A.6- Figure A.10in the appendix), using only the most frequently used nouns and adjectives for a maximum number of 50 words.

The global graph includes six subgraphs: "wine" (subgraph 2), "tasting" (subgraph 3), "tour" (subgraph 1), "staff" (subgraph 4), "service" (subgraph 5), and "disappointing" (subgraph 6).

The wine theme

The wine theme is present in all the wine regions. Globally, the graph is not very articulated; "wine" is associated with the nouns "bottle," "place," "glass," "price," and with the bigram "drop" – "day." However, in the graphs of the individual regions, the theme is more articulated and diversified. In the Mendoza graph (Figure A.7), "wine" is frequently associated with "tasting" – "price" and "staff"- "worst"- "day" - "tour." In the Napa Valley graph (Figure A.8), we have a high frequency of co-occurrence for "bad" – "experience" in "winery" – "tasting" – "room." The Stellenbosch graph (Figure A.9) highlights a "disappointing" – "wine" – "tasting" – "experience," with also references to the "price." Even the graph of Tuscany reports "disappointing"-"wine" – "tasting" (Figure A.10). In the case of Hunter Valley (Figure A.6), we have a graph more similar to the global one in which "wine" is directly associated with "tasting," "place," and "glass."

The tasting theme

The tasting theme is present only in the global graph, but highlights a rather debated problem [60], [61]: whether or not to charge a "tasting" – "fee" at your cellar door.

The tour theme

The tour theme is presented as a subgraph in the Hunter Valley, Napa Valley, and Tuscany graphs. It is associated with the wine theme in the Mendoza graph. It is not present in the 50 most frequent words in the Stellenbosch graph. In the global graph, the "tours" in the cellars, "winery" and vineyards, "vineyards" cause "disappointment" for the "worst" - "guide," the loss of "time," and "money."

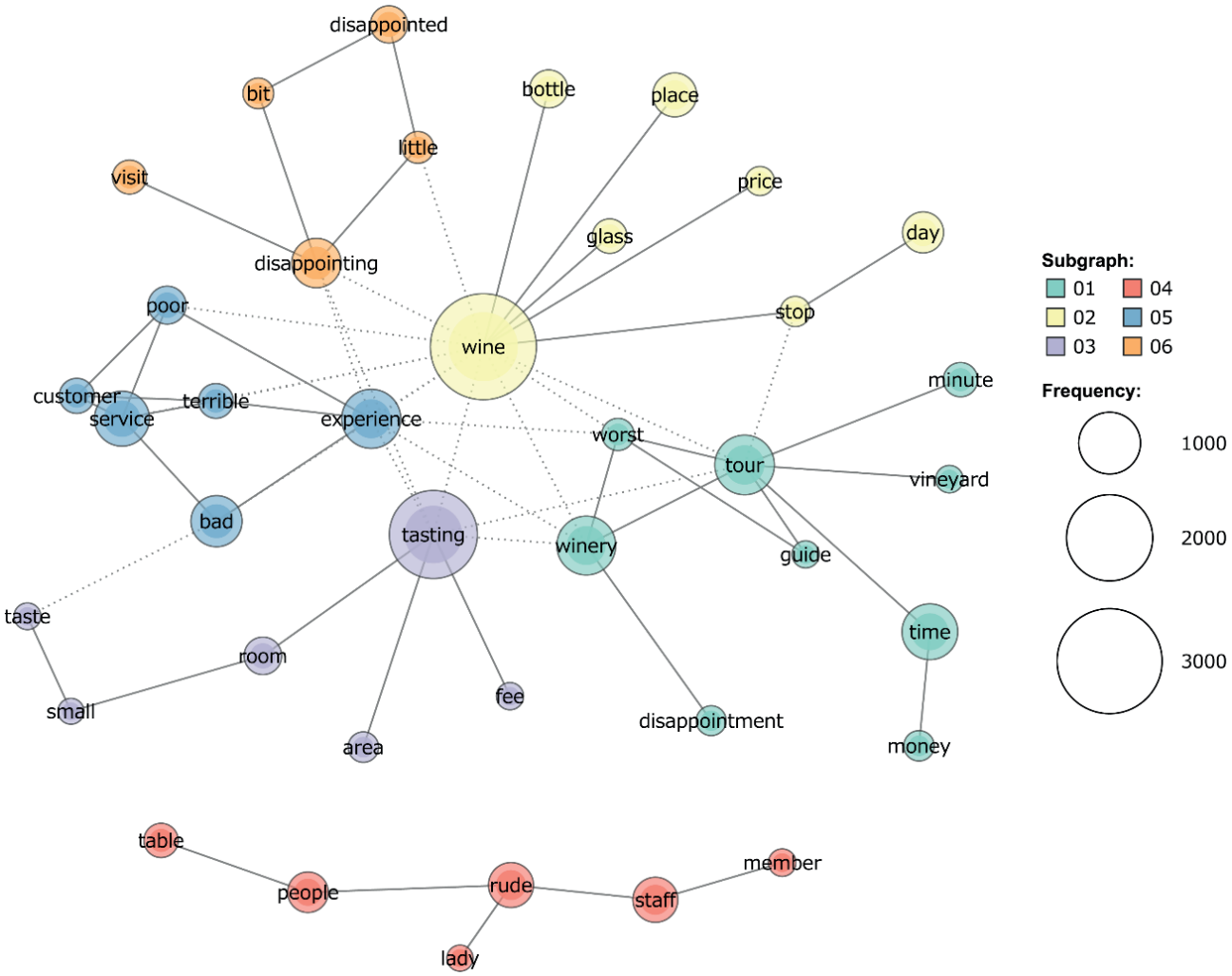

Figure 4. Co-occurrence of service failure subreviews for all five wine regions

The same themes of the global graph were found in that of Hunter Valley and Napa Valley. In the Tuscany graph, the tour subgraph is also associated with the subgraph "room" – "problem."

The staff theme

The staff theme is present in the graphs of Hunter Valley, Napa Valley, Stellenbosch, and Tuscany. In the global Hunter Valley, Napa Valley, and Stellenbosch graphs, the negative term to define a "staff" – "member" is "rude," often associated with "lady" (global graph and Stellenbosch). In the Tuscan graph, it is also associated with "restaurant."

The service theme

The service theme is present in the graphs of all wine regions, except in the graph of Tuscany. "Customer" – "service" emerges as a critical factor in the perception of service failure, as it is commonly referred to with strongly negative adjectives: "terrible," "bad," and "poor." In Stellenbosch, it is also associated with "restaurant" and in Mendoza with "course" – "meal."

The theme of disappointment

The negative theme of "disappointment" appears without relevant information content. It appears in the global Napa Valley and Hunter Valley graphs and is generically associated with "visit."

The restaurant theme

The restaurant theme does not appear in the global graph but is present as a subgraph in the Hunter Valley, Stellenbosch, and Mendoza graphs. This is because, on the global level, there are not enough negative phrases

referring to the term "restaurant" to form an independent cluster. In Mendoza, the theme "restaurants" is associated with terms like "food," "lunch," and the bigram "terrible experience." In Hunter Valley and Stellenbosch, tourists refer specifically to winery restaurants.

5. DISCUSSION

Previous research [61], [46] has shown that TripAdvisor reviews have inconsistencies regarding the overall experience rating through the bubbles method. Very often, high-rated reviews also have reports of low quality of service, and low-rated reviews also report positive aspects of an experience. This feature can lead to inefficiencies in the application of natural language processing procedures to identify service quality and failures. Our methodology combines sentiment analysis and natural language processing procedures and has allowed us to break down each review by isolating positive sentences (service quality subreview) and negative sentences (service failure subreview) by assigning them a scalar score (RQ1). We have applied our procedure to the reviews of visits to wineries in the five regions with the greatest development of the wine tourism sector in the world: Hunter Valley, Mendoza, Stellenbosch, Napa Valley, and Tuscany. The results showed that the five wine regions have very high levels of perceived quality, with an average sentiment score ranging from a minimum of 13 (Hunter Valley) to a maximum of 15 (Tuscany). In comparison, the sentiment scores of service failure are much lower in absolute values: from a minimum of -5.3 (Hunter Valley) to a maximum of -3.9 (Napa Valley). The pairwise multiple comparison of means allows for a ranking with significant differences for the first and last places. In the case of negative reviews, the values are decidedly lower, and the differences between the averages are not significant. These results are plausible, as we are dealing with regions specialized in wine tourism and, therefore, with an organization of complementary services for wine tasting (wine routes, festivals, events, etc.) that are substantially similar. Even the highest level of perception of quality in the case of Tuscany could be due to synergy with the landscape and historical locations. However, these hypotheses will have to be verified through specific investigations.

The results we obtained in identifying the themes of service quality and service failure are consistent and extend to the knowledge of previous research (RQ2 and RQ3).

The graphs of the results of co-occurrence (Figures 3, 1A-5A) assess the perception of the attributes of winescapes proposed by Thomas et al. [22]: winescape setting, winescape atmospherics, wine product, complementary product, winescape signage, winescape layout, and winescape service staff attributes. The "wine product" is certainly the most frequently perceived attribute in the evaluation of the quality of a visit to a cellar, and in the tasting experience, it is connected through the tasting room to the perception of the winescape atmospherics. The guided tour is the third most-cited theme in positive reviews. This theme is not present among the winescape attributes identified by the authors, and therefore constitutes a new additional attribute. In the global graph, themes refer to the winescape setting attribute ("beautiful-view") and the winescape service staff attribute ("customer" and "staff"). Finally, according to our results, complementary product attributes are not present in the global graph but appear in the graphs of all wine tourism regions with different denominations (see: Figures A.1-A.5).

The analysis of service failure (RQ3) is another original result of our study, as this topic has thus far been neglected in the literature. Despite the fact that reviews related to service failure are less (under 10%), evidence suggests that customers are more likely to remember service failures than excellent service [62]. The advent of social media has dramatically changed the way customers convey word-of-mouth information. Previously, customers shared experiences in person with a limited number of social contacts; however, currently, social networking sites allow them to share their experiences with more people [63]. As such, word-of-mouth communication influences network members' product and service choices [64]. In particular, negative word-of-mouth communication can adversely influence customers' attitudes and purchase intentions and a company's brand image [65], [66] and [67].

Thus, to ensure that quality is perceived in services and that critical episodes of service excellence are remembered better than defects, a comprehensive understanding of service failure processes is necessary.

The themes we identified were similar to those of service quality but expressed with useful information for stakeholders. In the graph of service quality, the staff theme is associated with the dimension of responsiveness for the adjective "knowledgeable" and with the dimension of empathy for the adjective "friendly"; in the service failure graph, instead, there is only the dimension of empathy with the negative adjective "rude" and there are no negative perceptions for responsiveness. This allows us to identify a critical issue and find out the best way to resolve it. The tour theme is also very different in the service failure graph compared to the service

quality graph. The criticalities that emerge are logistical and indicate a waste of time or lack of professionalism by the guide.

We can answer RQ4 by comparing the global graph with those of the five wine regions. Looking at Figures A.1-A.5, we find many similarities, but also some peculiarities. For the quality of service, six or seven themes are calculated for each chart. The themes "wine and tasting" and "personnel" are present in all the graphs and, therefore, represent elements perceived worldwide. Even "view" is another attribute of service quality on a global significance because it is present in four regions as the theme, and Hunter Valley is a word related to the theme "wine." Regarding peculiarities, Tuscany, and especially Stellenbosch, are characterized by the complementarity between wine and food, and Mendoza, Napa Valley, and Tuscany by the presence of organized tours.

In service failure, the differences between the global graph and those of the wine regions are more marked. The global graph identifies six themes, while in the regions, we find a minimum of seven (Napa Valley) to a maximum of 10 (Mendoza) themes. The only themes common to all the graphs are "wine" and "staff", while the tasting theme is always present as a linked word in the regional graphs. Tour failure is a common weakness only in Napa Valley and Tuscany, while many graphs highlight critical issues for the restaurant-food theme.

6. CONCLUSION

6.1. Theoretical implications

Our study proposed a model for analyzing the quality and failure of service in wine tourism and winery visits. It has filled a gap in wine tourism studies by adopting an approach based on the combination of sentiment analysis and natural language processing, as well as a global geographic perspective that has not been applied thus far. Our methodology, comparing five different wine tourism regions around the world, has allowed us to overcome the limitations highlighted by many researchers relating to the poor generalizability of results obtained by questionnaires [5], [26], [6], [28], [17].

6.2. Practical implications

The results obtained confirm and extend the findings of previous studies and are useful to both professionals (wineries, tour operators, and travel agents) and in the design of a product that meets the needs of wine tourists.

Analyzing well-developed wine regions for service quality helps to gain a comprehensive view of service quality, which could be useful for emerging wine regions that are just beginning to develop wine tourism services.

The results highlight the most important dimensions of wine tourism experience. In promoting new regions, entrepreneurs should emphasize the beauty of the wine landscape; they should take care of the settings of wineries and tasting rooms, as well as of historical villages, the quality of the enogastronomical offer, and the possibility of obtaining information from the winemakers of wineries.

Moreover, the results show the need to train operators in aspects relating to enology and psychology to effectively manage winery visits.

Finally, operators should use electronic word-of-mouth data to monitor tours' perceptions and thus continually improve service design and promptly resolve problems that create inefficiencies.

6.2. Limitations and future research

The main limitation of the study relates to the application of the methodology to the five most developed wine regions in the world. This choice made it possible to identify the fundamental themes of service quality, but the results obtained may not be immediately applicable to wine regions that are starting to develop wine tourism. Therefore, additional research will be needed in future to monitor the evolution of reviews in new wine tourism regions over time. Other limitations are common to research that is based on social media data: the results are based on the opinions of only those consumers who use TripAdvisor and, therefore, could be biased. The demographic and psychological data of the reviewers is also missing from the study.

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APPENDIX A

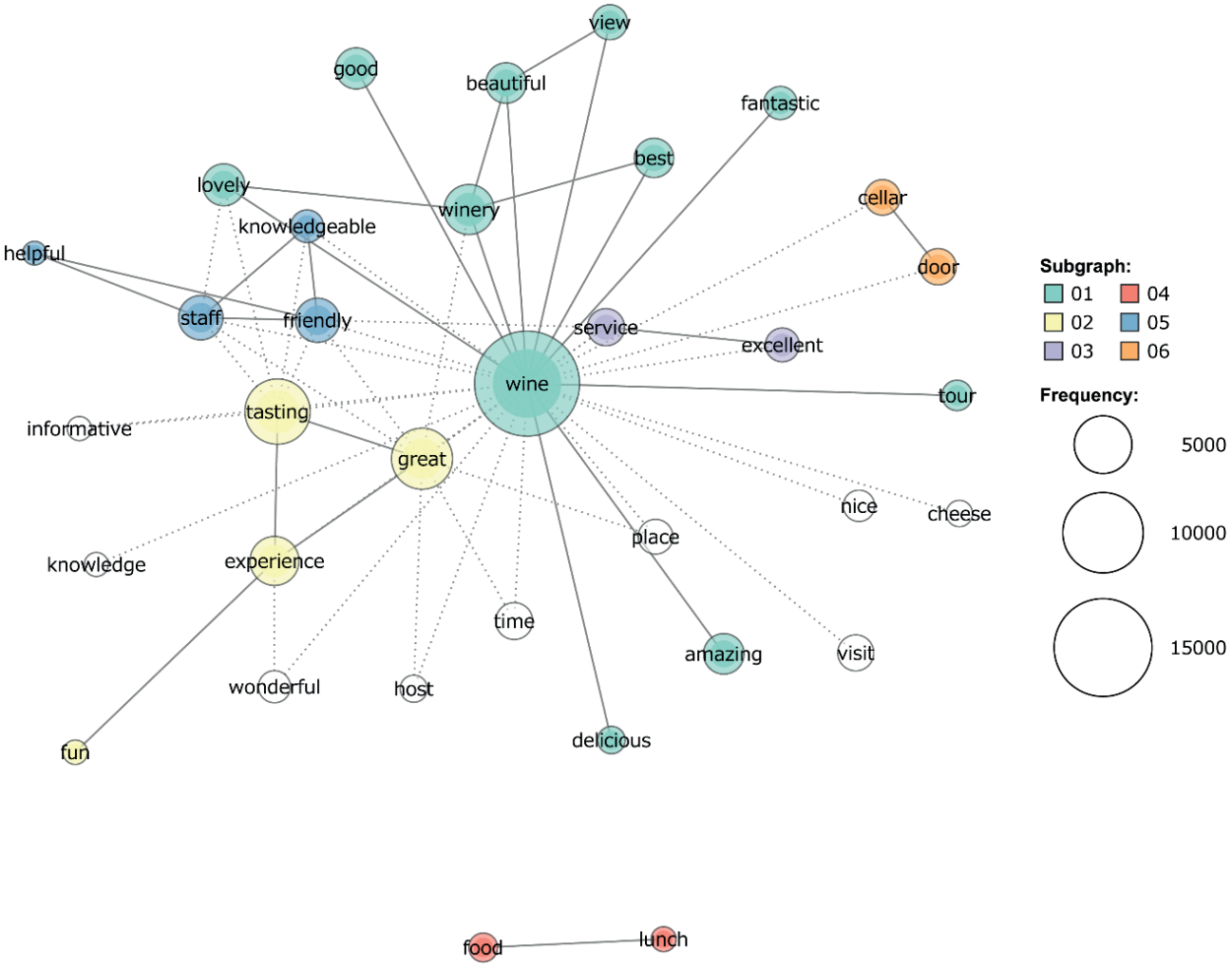

Figure A.1. Co-occurrence of service quality subreview for Hunter Valley region.

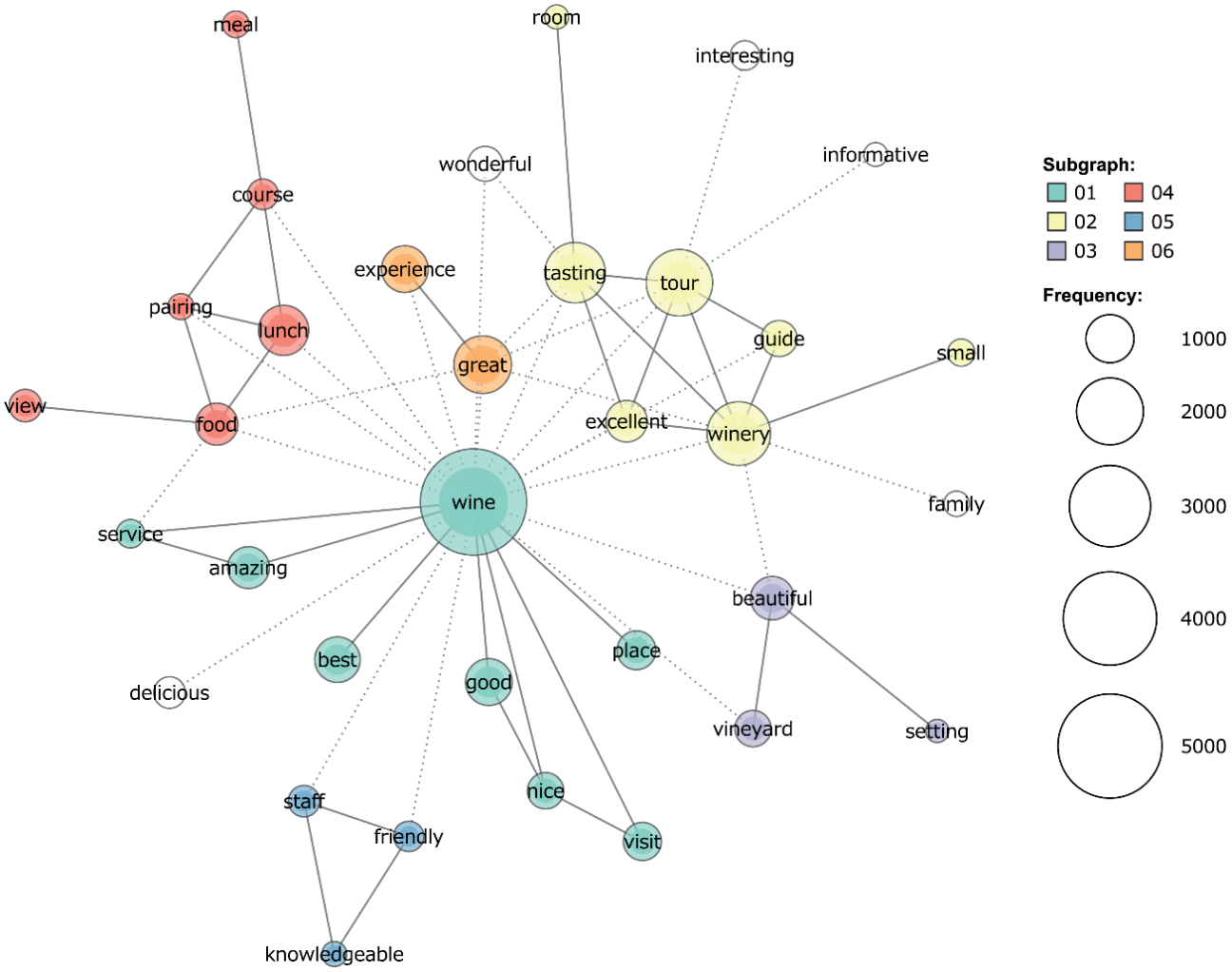

Figure A.2. Co-occurrence of service quality subreview for Mendoza region.

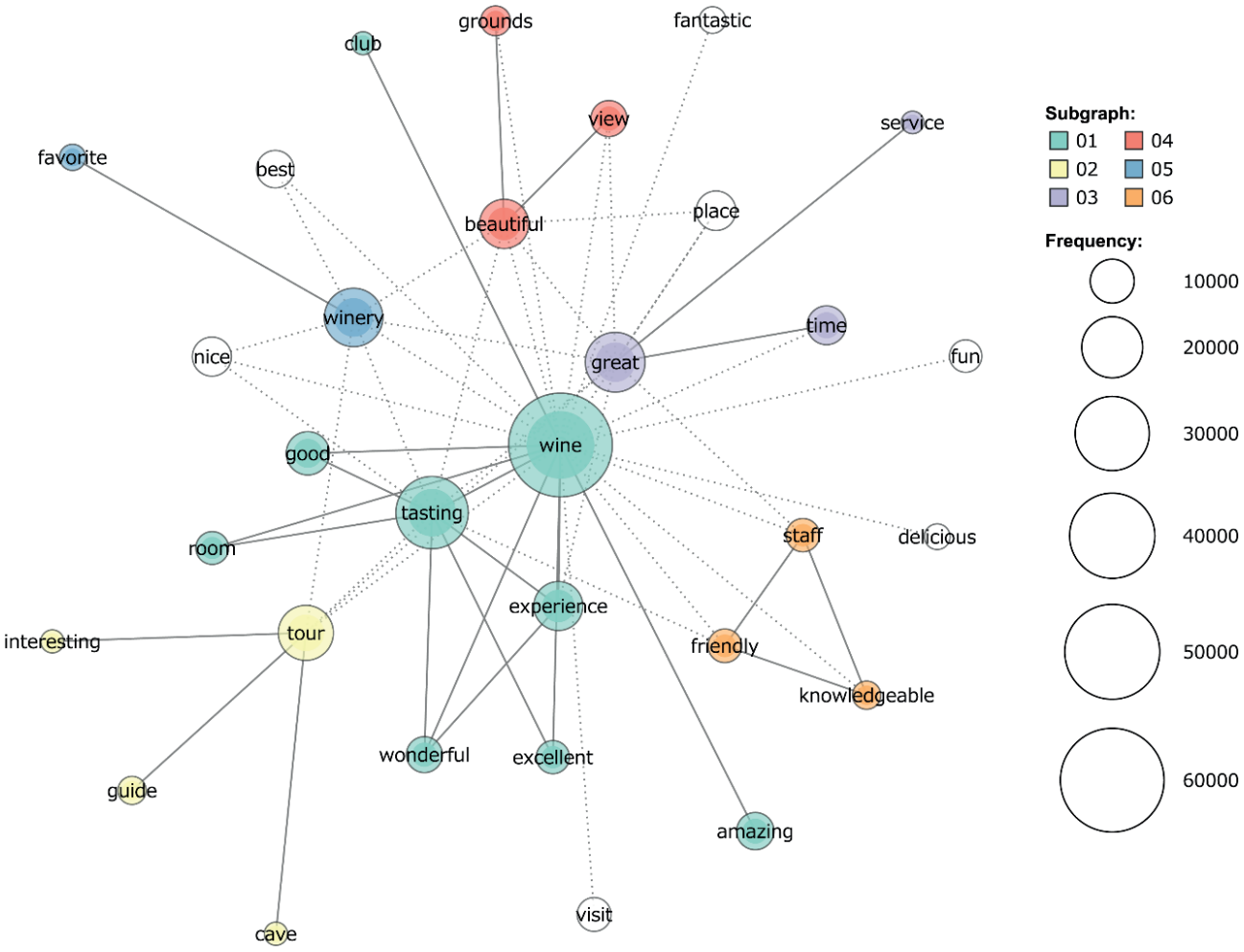

Figure A.3. Co-occurrence of service quality subreview for Napa Valley region.

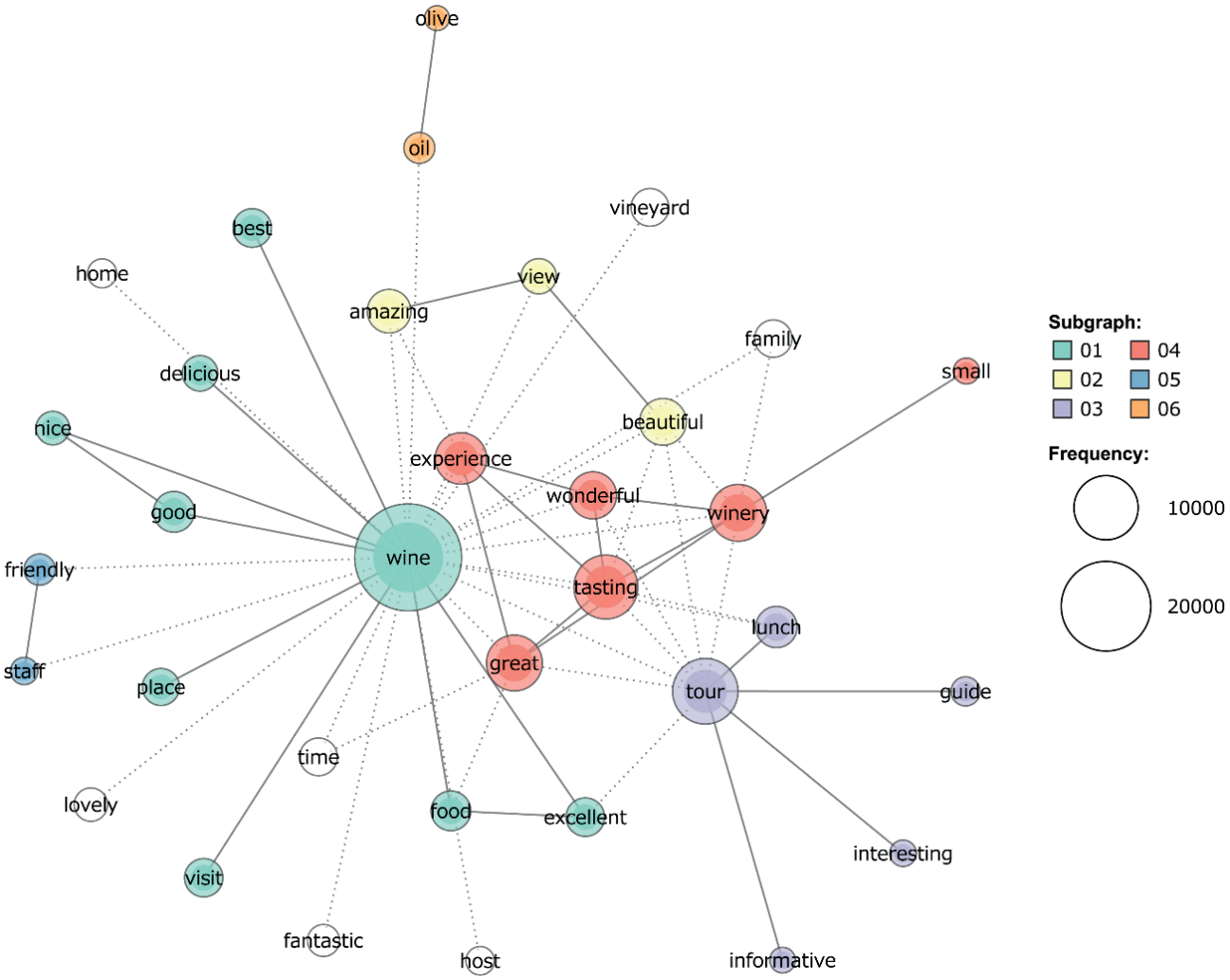

Figure A.4. Co-occurrence of service quality subreview for Stellenbosch region.

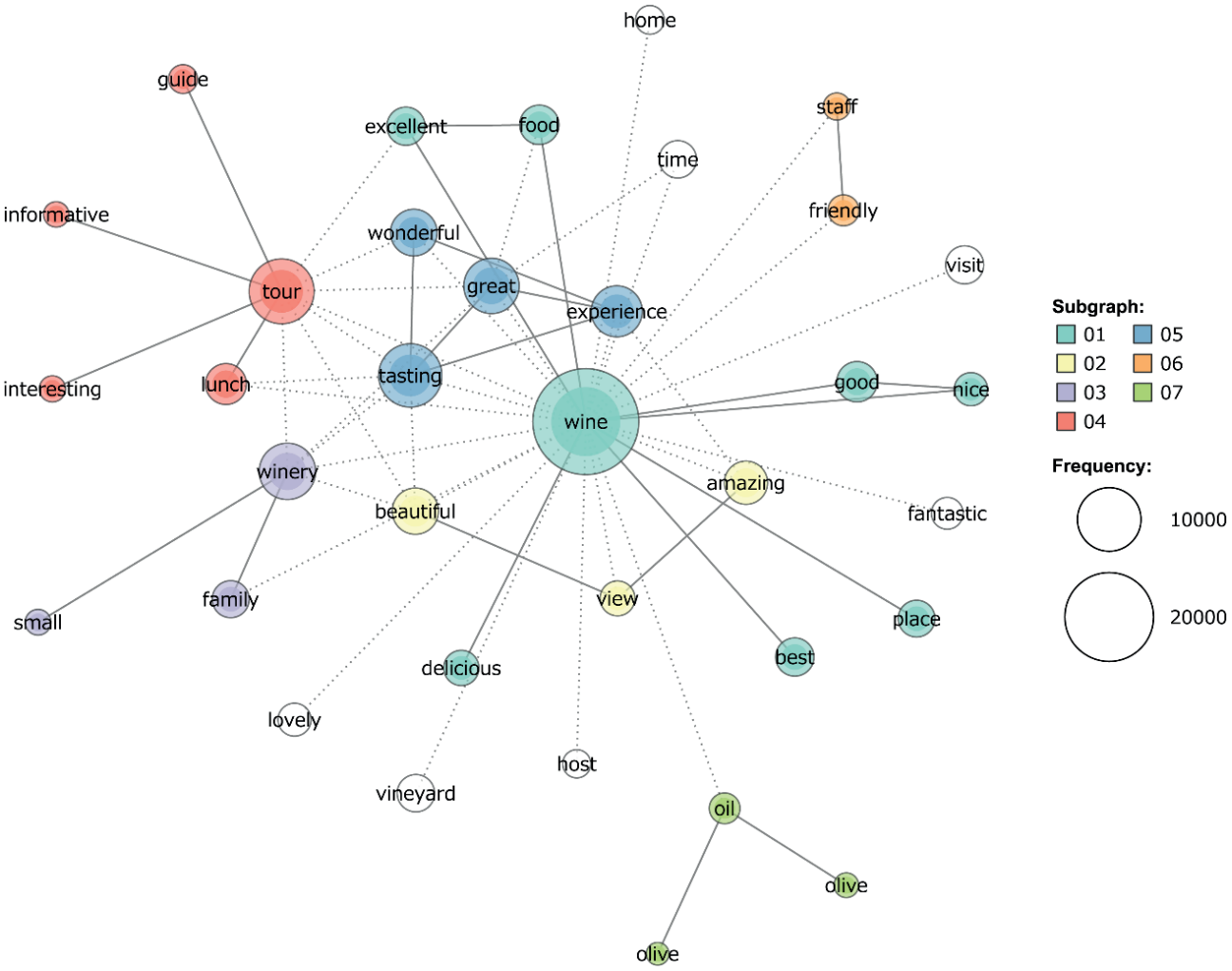

Figure A.5 Co-occurrence of service quality subreview for Tuscany region.

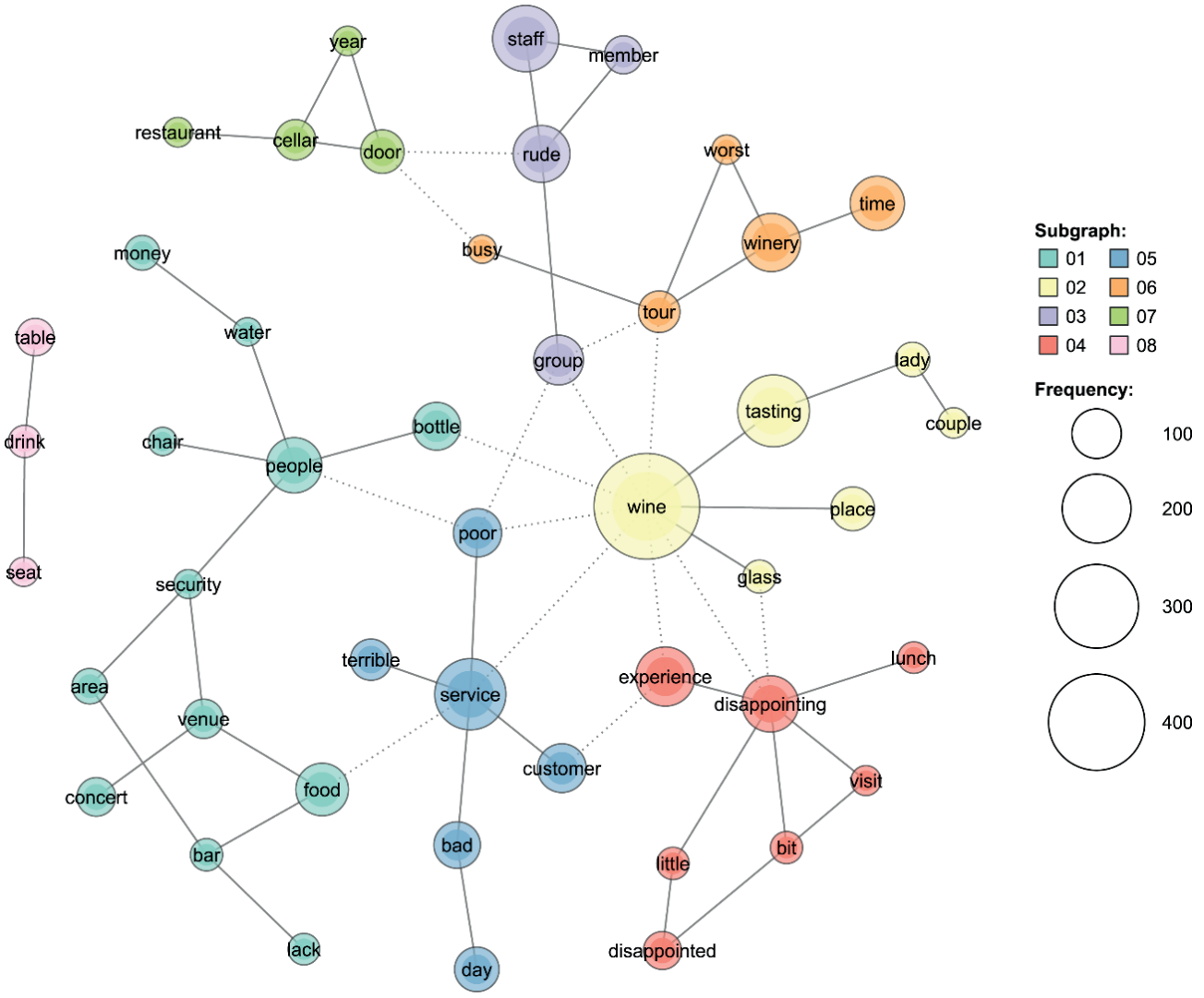

Figure A.6. Co-occurrence of service failure subreview for Hunter Valley region.

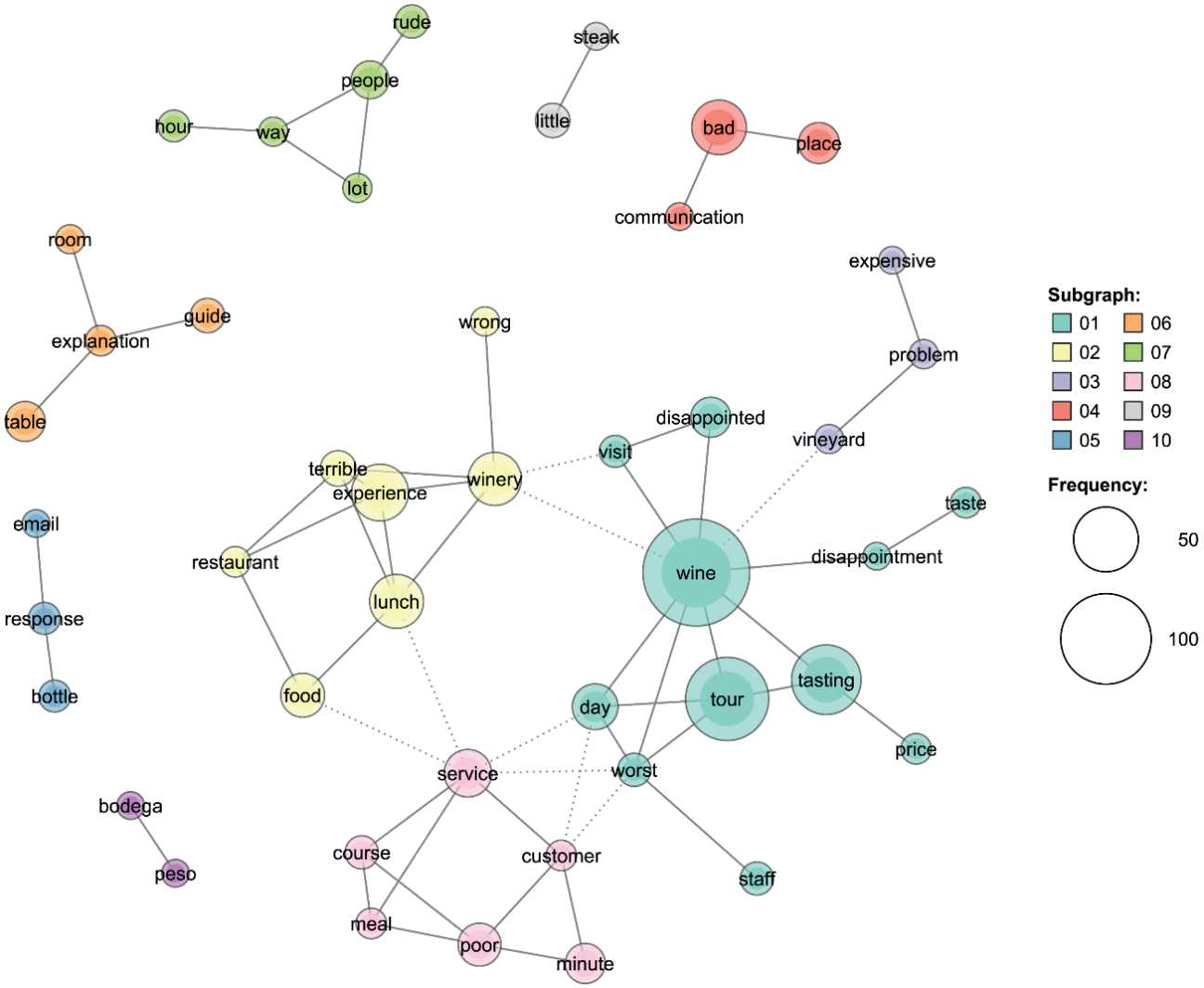

Figure A.7. Co-occurrence of service failure subreview for Mendoza region.

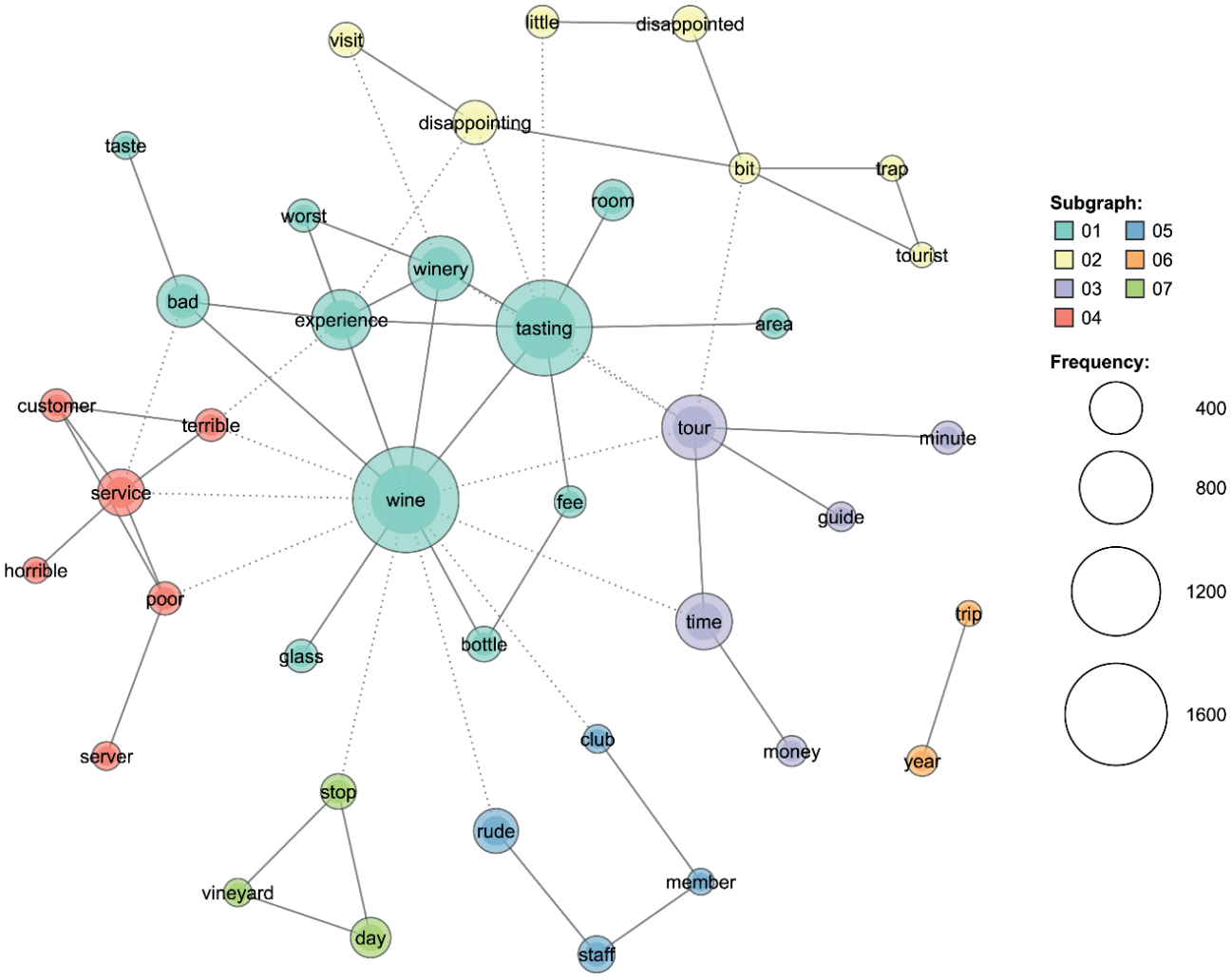

Figure A.8. Co-occurrence of service failure subreview for Napa Valley region.

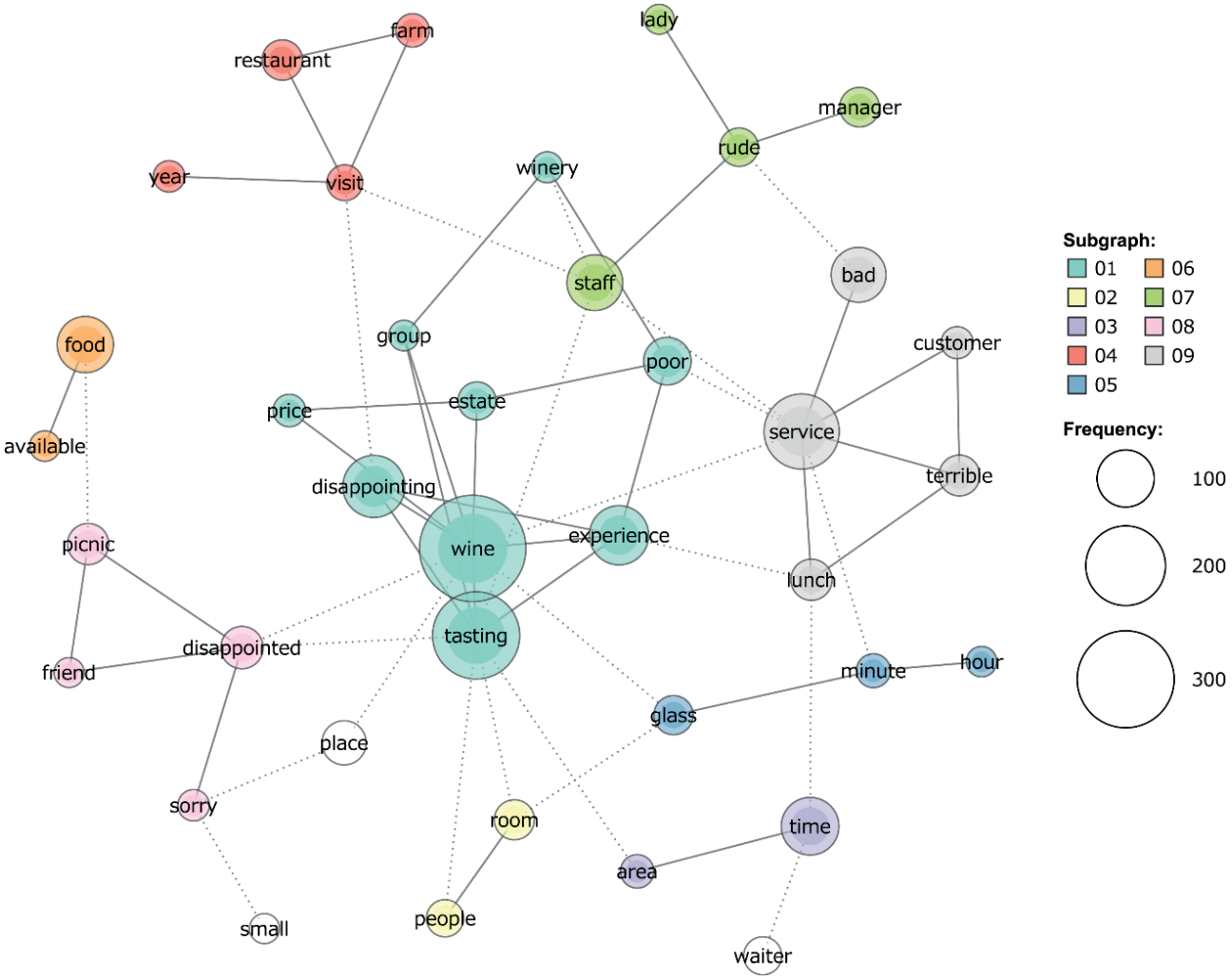

Figure A.9. Co-occurrence of service failure subreview for Stellenbosch region.

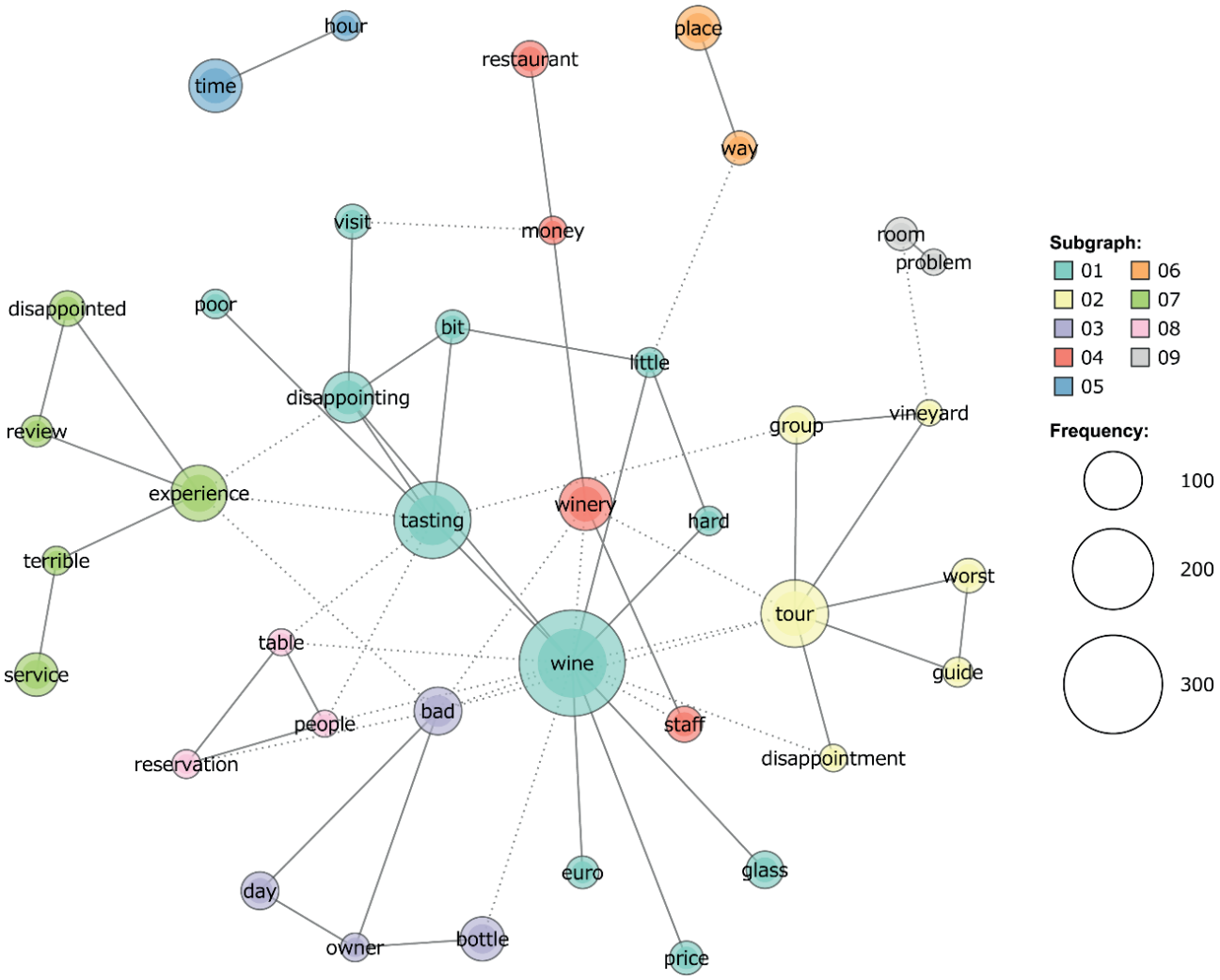

Figure A.10. Co-occurrence of service failure subreview for Tuscany region.