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**Value creation in wine tourism –
an exploration through deep neural networks**

Abstract

The aim of this paper is to explore what aspects create experiential value for wine tourists. We synthesize the extant literature into four dimensions for wine tourism value creation, namely, *product-related* aspects; *sensory and affective experiential* aspects; *cognitive and educational experiential* aspects; and *social-relational experiential* value-creating aspects. So far, most studies merely discuss product-related aspects whilst insights on experiential value are less known. Using online review data from wine tourists in Australia, we develop a novel deep neural network-based framework using an innovative AI-based exploratory design. Results of the case study reveal that in addition to product-related aspects, sensory- and education-related experiential aspects are also highly important for value creation in wine tourism. Theoretical and practical implications, as well as ideas for future research are discussed.

Keywords

Wine tourism, deep neural network, online review data, value creation, tourist decision-making, Australia

1. Introduction

Wine tourism has witnessed notable growth in the past decades worldwide, thereby becoming one of the most prominent tourism incentives in several wine-producing countries across the world and catalyzing significant economic growth for rural development in wine regions (Gómez et al., 2019; Gu et al., 2020). Wine tourism encompasses wine-related activities of tourists such as visiting wineries, vineyards, and wine shows for sensory, affective, educational, and relational experiences (Dawson et al., 2011; Hall et al., 2009; Kotur, 2022). Authors increasingly highlight the necessity to understand wine tourism experience not only for wine tourism providers—but also related to the development of the entire wine tourism destination (Gu et al., 2020). With the growing research interest in understanding what aspects create value for wine tourists and how wine tourist destinations can achieve and sustain competitive advantage (Brochado et al., 2021), innovative methodologies are necessary to capture these aspects holistically.

Value creation is a critical task for tourism providers (Gallarza-Granizo et al., 2020). Prior research has measured the aspects of individual experience and experiential value to some extent in the extant tourism and hospitality literature, such as in the contexts of food tourism (Tsai and Wang, 2017) or shopping tourism (Gallarza-Granizo et al., 2017) and more recently for quick-service restaurants (Gallarza-Granizo et al., 2020). These studies suggest that tourists' value perception commences from the time of experiencing and is shaped by the duration, intensity, and endurance of their experience.

This exploratory research aims to identify the aspects that create value for wine tourists and attempts to address two key problems that remain unresolved in the extant tourism literature: 1) the *underlying conceptual problem* is that it is unclear what experiential aspects create value for wine tourists (Barnes et al., 2020). Our literature review shows that existing studies on wine tourism only focus on specific value creation aspects. For example,

studies have revealed that product-related aspects such as wine, the cellar door and cultural heritage, as well as terroir—the place of taste—are of high importance for wine tourists (Beames, 2003; Charters et al., 2009, Kruger and Viljoen, 2021). It is also known that experiential value is considered an indispensable part of food tourism (Rousta and Jamshidi, 2020), however, surprisingly experiential value creation has been less discussed in the existing wine tourism literature. This void exists perhaps since the discussion of experiential value just surfaced in tourism research over the past few years (Brochado et al., 2021; Thanh and Kirova, 2018).

2) The *related methodological problem* that this study addresses is the absence of a holistic approach to capture value-creating aspects. The majority of existing studies have adopted the post-validation survey research, which is less effective in understanding the dynamic nature of wine tourists' value expectations and satisfaction (Carlsen and Boksberger, 2015; Deng, 2017). Based on this instance, our research aims to contribute to wine tourism and broader culinary tourism literature by offering new insights into both product-related and experiential value-creating aspects with an innovative AI-based methodology. User-generated data and advanced artificial intelligence technologies were used to integrate big data analysis techniques to capture these changing aspects. Online tourism platforms, such as Agoda¹, TripAdvisor,² and Booking³, have accumulated large volumes of user-generated data (Xia et al., 2019), these data provide efficient, non-intrusive methods for tourism researchers to understand tourists' behavior and satisfaction (Li et al., 2015; Liu et al., 2013; Vu et al., 2019).

The main challenge in utilizing user-generated data for wine tourists' value creation analysis is the lack of models to automatically extract aspects that create value during

¹ <https://www.agoda.com/>

² <https://www.tripadvisor.com/>

³ <https://www.booking.com/>

tourists' journeys and their emotions toward these aspects. The methodologies introduced in previous studies were designed elaborately and specifically to capture tourists' behavior in specific contexts, such as hotels and restaurants, and thus are not applicable to understanding what creates value for wine tourists. This paper fills this research gap by introducing a novel deep neural network-based framework that can holistically identify important aspects in various value-creating dimensions that create value for wine tourists from online review data.

2. Literature Review

2.1. Value creation in wine tourism

Wine tourism is often part of tourists' broader travel plans to a destination. It is frequently paired with culinary experiences or potentially combined with shopping activities (Alant and Bruwer, 2010). Yet, a visit to a winery includes a complex set of value-creating aspects for tourists (Mitchell and Hall, 2004). This complexity and the resulting value result from various aspects that matter to tourists and this paper contends that these value-creating aspects need to be investigated in a holistic sense. Although wine tourism has attracted a significant number of tourism studies, a clear understanding of what creates value and satisfies wine tourists, and what creates negative value and dissatisfies wine tourists remains unclear (Carvalho et al., 2021; Gómez et al., 2019). Thus, scholars have called for more studies to better understand the underlying experiential aspects that generate value for tourists (Nassivera et al., 2020).

Product-related aspects that create value for wine tourists have been emphasized by early wine tourism literature. It includes the quality of the wine offered; the attractiveness of the landscape (Dodd et al., 1997; Mitchell et al., 2012), the winery, cellar door, the historical context of the wine region, and the regional cultural heritage (Charters et al., 2009). Carmichael et al. (2005) found that the rural landscape is important for contributing to wine tourists'

enjoyment. Hall et al. (2000) further noted that supplementary culinary products, wine production, and manufacturing facilities are key value drivers of tourist satisfaction. Further, Dawson et al. (2011) revealed that wine tour packages including fine dining and overnight accommodation are important activities that trigger tourists' on-site purchases. More recently, research began to emphasize terroir—the place of taste—as another set of product-related aspects that creates value for wine tourists (Kruger and Viljoen, 2021). For wine tourists, these product-related aspects create value through commodification and further add symbolic and cultural values (Picard et al., 2018).

Sensory and affective experiential aspects that create value for wine tourists come in the form of tourist satisfaction (Prayag et al., 2020; Roberts et al., 2016). To conceptually explain the process, the stimulus (S)-organism (O)-response (R) (S-O-R) paradigm (Gupta et al., 2019) is often used to rationalize how external sensory stimulants trigger internal processes within a person, which then produces behavioral and/or affective responses. Stimulants of tourists' culinary experiences are the result of the interplay of a variety of stimulants. Sensory and affective-related values arise from sensory stimulants of food and wine, such as taste and smell (Hwang and Zhao, 2010), social warmth, and staff friendliness, as well as visual stimulants from the environment and ambiance (Muskat et al., 2019).

Cognitive, educational experiential aspects that create value for wine tourists are discussed in another set of studies (Carvalho et al., 2021; Nella and Christou, 2021). Thanh and Kirova (2018) examined 825 reviews posted on TripAdvisor by using the experience economy model and found that the dimension of education (in addition to entertainment) was the dominant aspect in the experiences of wine tourists. Nella and Christou (2021) also found that visiting a winery includes the experiential value of learning about wine and winemaking; this finding was also concluded by Charters and Ali-Knight (2002), who identified that learning about wine attracts a high number of tourists to wineries.

Social-relational experiential value-creating aspects that matter for wine tourists are emergent in the most recent literature (Gu et al., 2020). For example, Carvalho et al. (2021) presented a systematic literature review that showed that interactive participation and engaging activities were essential in wine tourist experiences, yet they also noted that these co-creational aspects only remain vaguely understood. Prayag et al. (2020) highlighted the shift in importance from product-related aspects to social experiential value, noting that “culinary tourism is not solely driven by the quality and variety of food on offer, but also experiential aspects of consumption related to physical and social characteristics of the ‘places’ that facilitate leisure activities.” (p. 2). However, to date, the empirical and conceptual studies on co-creation and relational experiential value in food and wine contexts are still scarce (Carvalho et al., 2021).

In summary, we reviewed the extant wine and culinary tourism literature and concluded that four dimensions of value-creation for wine tourism can be derived, namely, product-related aspects; sensory and affective experiential aspects; cognitive educational experiential aspects; and social-relational experiential value-creating aspects. We further conclude that although product-related value-creating aspects are well established to understand the experiences of wine tourists, the experiential aspects that create value for wine tourists remain underexplored. Besides, extant studies examined the product and experiential value in isolation rather than holistically and have predefined scales and categories (Barnes et al., 2020). The survey and conventional data analysis methods adopted in these studies were also complained to have limited potential to capture tourists’ emotions and satisfaction accurately (Vu et al., 2019). As such, our study uses an exploratory methodology to shed light on value-creating aspects of wine tourism. Subsequently, we convey our research from this value-creating perspective and seek to understand what aspects may affect wine tourists’ winery selection.

2.2. Analysis of tourists' online reviews

The availability and accessibility of online tourism platforms have changed the way that tourists interact and communicate with tourism providers significantly (Xia et al., 2020). An increasing number of tourists are willing to share their experiences and opinions about their journeys through the review functions provided by these tourism platforms (Xu et al., 2021). The reviews and ratings posted have now become the primary information source for tourists. Many tourists have acknowledged that online reviews exhibit a significant influence on their travel decisions (Li et al., 2021) because the reviews posted on tourism platforms enable tourists to evaluate the quality of service and reduce their purchase uncertainty (Chen et al., 2021). Positive reviews can affect other tourists' attitudes and increase potential purchase intentions. In contrast, negative reviews can lead to a low subsequent purchasing rate and are detrimental to the reputation of the service providers (Beneke et al., 2016).

Aware of the importance of online reviews, extensive research efforts have been expended to utilize this novel data to investigate tourists' behavior and satisfaction for strategic planning and decision making (Vu et al., 2019). For instance, Li et al. (2015) utilized online hotel reviews on TripAdvisor to capture the hotel selection preferences of international travelers. Luo et al. (2020) studied the online reviews of Disneyland theme parks and assisted the park managers in understanding their customers' perceptions to enable strategic reformulation and improve individual turnout. Vu et al. (2019) proposed an online review-based dining preference analysis framework to support the strategic planning of tourism practitioners by finding insights into the dining preferences of tourists. Liu et al. (2017) investigated Chinese hotel reviews to extend the understanding of determinators that could affect tourists' hotel satisfaction. Li et al. (2021) adopted association rule mining and cluster analysis to detect tourist groups reflected in online reviews.

With this background, this exploratory research aims to identify aspects that create

value for wine tourists to enhance the understanding of how these aspects contribute to tourists' satisfaction by leveraging online review data.

3. Methodology

As shown in Figure 1, the proposed framework has three major components: 1) wine tourists' online review data collection; 2) value-creating aspects identification; and 3) value creation and subsequent satisfaction analysis. The details of these three components are presented in the subsequent sections.

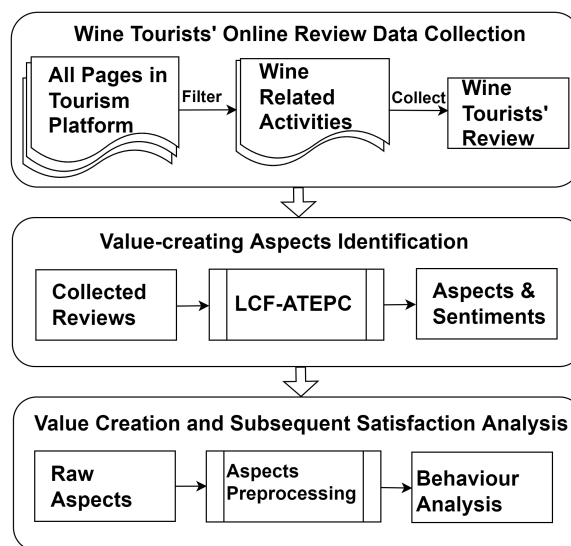


Figure 1. Wine tourists' value creation and satisfaction analysis framework

3.1. Wine tourists online review data collection

Online reviews are a type of novel user-generated data available on a variety of online tourism platforms. With the increasing popularity of e-tourism in recent years, these online tourism platforms have attracted an extensive userbase and accumulated large numbers of tourist reviews. These reviews significantly influence potential tourists' purchase decisions and

thus have been extensively used as the data source in a large amount of tourism research (Luo et al., 2020; Li et al., 2021). This study aims to utilize extensive wine tourist reviews on these platforms to expand the present understanding of the combination of aspects and value-creating dimensions that creates value for wine tourists.

To collect wine tourists' reviews that describe the real experiences and emotions of wine tourists, winery tour-related activities provided by the online tourism platforms in the case study region should be retrieved first. The filters provided on these online tourism platforms could help in gathering all the winery tour-related activities together. Once all the winery tour-related activities were retrieved, wine tourists' review data can be collected by browsing the detailed page of each activity. Activities without tourist reviews were excluded from the data collection process because not all winery tour-related activities on these tourism platforms have reviews. Overall, we decided to adopt an exploratory research design, as it is best suited to explore novel insights for a novel research topic (Stebbins, 2001). One important feature of an exploratory research design is that little or no prior knowledge is required to conduct the study, making it suitable to explore new topics and new insights (Elman et al., 2020).

3.2. Value-creating aspects identification

This component is the core of our proposed framework, which aims to extract aspects that create value for wine tourists and measure their satisfaction toward these aspects because value creation in tourism is operationalized in the form of tourist satisfaction (Gallarza-Granizo et al., 2020). For the example review "The winery is beautiful, but the wine is awful to drink" this component aims to identify the aspects of "*winery*" and "*wine*" discussed in the example review and the sentiment polarity toward these two aspects, namely, "*positive*" and "*negative*" for further analysis. We formulate this aspect identification and sentiment analysis task as an aspect-level sentiment analysis problem. Different from traditional sentiment analysis

technologies that aim to detect the sentiment of sentences, aspect-level sentiment analysis aims to detect the sentiment of aspects in each sentence. It is a fine-grained sentiment analysis technique that requires the model to extract aspects from text and predict the sentiment toward these aspects.

In aspect-level sentiment analysis, aspect extraction is formulated as a sequence labeling task that aims to label the IOB labels for input sentences. For the example review, “The winery is beautiful, but the wine is awful to drink” the output of the labeling task will be a sequence $Y = \{0, B_{asp}, 0, 0, 0, 0, B_{asp}, 0, 0, 0, 0\}$, where 0 and B_{asp} represent the outside and beginning of the aspects term. The aspect sentiment prediction is formulated as a multi-class classification task that aims to classify the aspect term sequences into suitable sentiment classes, namely, *positive*, *negative*, and *neutral*.

The state-of-the-art aspect-level sentiment analysis technology, which is referred to as LCF-ATEPC (Yang et al., 2021) was adopted in this paper to extract the aspects and satisfactions reflected in reviews for the value-creating analysis of wine tourists. LCF-ATEPC is a deep neural network that jointly trains two units of sub-network to complete the tasks of aspect extraction and aspect sentiment prediction individually. As shown in Figure 2, the first unit of LCF-ATEPC is the *Local Context Feature Generator* on the left part, which aims to extract the semantic information of local context by utilizing a local context focus layer and a multi-head self-attention (MASA) encoder. The second unit is the *Global context Feature Generator* on the right part, which adopts one MASA encoder to extract the global context feature. The local context feature generator and the global context feature generator contain a pre-trained BERT layer (Devlin et al., 2018) to extract high-quality feature representations.

Local context is a novel concept that is recently used in many NLP tasks (Yang et al., 2021). LCF-ATEPC utilizes local context to improve the performance of aspect-level sentiment analysis by taking advantage of the local context information of the target aspects. Local

context is determined by semantic-relative distance (SRD) which is designed to measure how far a token is from its aspects. Two popular SRD-based local context implementations, namely, context-feature dynamic mask and context-feature dynamic weighting, are integrated into LCF-ATEPC to capture the local context. These two units of LCF-ATEPC are concatenated by the feature interactive learning (FIL) layer in the top left of Figure 2 to predict the sentiment of the extracted aspects.

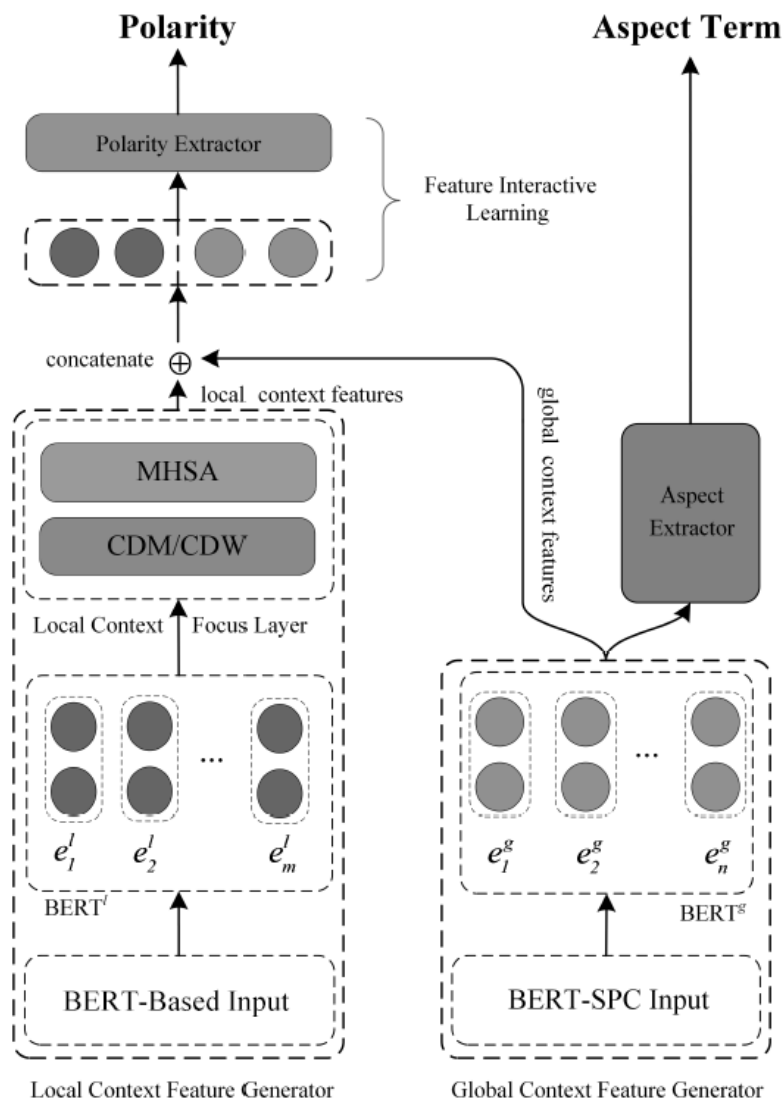


Figure 2. LCF-ATEPC framework

3.3 Value creation and subsequent satisfaction analysis

Intuitively, the inputs of the *Value-creating Aspects Identification* component are the collected reviews of wine tourists. The corresponding outputs are the detected aspects that create values for wine tourists and the sentiment polarity toward these aspects. However, given that the reviews posted by wine tourists on online tourism platforms are a form of verbal text, typographical errors and special characters, such as emoji, frequently occur. The aspects extracted by the *Value-Creating Aspects Identification* component are thus required to be pre-processed for wine tourists' value creation and satisfaction analysis. As such, similar to standard NLP tasks (Kannan et al., 2014), we employ the following text pre-processing strategies to clean noise aspects for value creation and satisfaction analysis.

First, we filter out non-meaningful aspects, such as emojis, stop words, and all characters in languages other than English. Second, we proceed by fixing typographical errors and performing lemmatizations for all aspects. Lemmatization aims to reduce the aspects to their "lemma" using lexicon combined with regular conjugation rules. For instance, "wineries" will be reduced to "winery." Finally, we cleaned up non-noun aspects and aspects that are not related to wine tourism, thereby leaving only noun aspects related to wine tourism for subsequent analysis. Once the extract aspects have been pre-processed, we then count the frequency of each different aspect and the number of aspects within each sentiment class to generate discrete probability distributions for understanding how different aspects create value for wine tourists. The following example shows the processing flow of this component.

Example. Suppose raw aspects extracted in the *Value-creating Aspects Identification* component are ["scenery": "positive", "wine": "negative", "e": "neutral", "food": "negative", "scenery": "positive", "food": "negative", "bottled": "negative", "staff": "neutral"]. In the aspect pre-processing stage, we first filter out noise aspect *e* then fix the typos for aspect *scenery* and clean up the non-noun aspect *bottled*. As such, the aspects after pre-processing will

be [“scenery”: “positive”, “wine”: “negative”, “food”: “negative”, “scenery”: “positive” “food”: “negative”, “staff”: “neutral”]. With the cleaned aspects list, we achieved the total aspect distribution [“scenery”: 2, “wine”: 1, “food”: 2, “staff”: 1], positive aspect distribution [“scenery”: 2], neutral aspect distribution [“staff”: 1], and negative aspect distribution [“food”: 2, “wine”: 1]. By analyzing these distributions, we receive detailed knowledge regarding how different aspects create value for wine tourists. Based on this example, we conclude that the *scenery*, *food*, and *wine* aspects create value for wine tourists, more specifically, the *scenery* aspect creates positive value, while the *food* and *wine* aspect create negative value.

With these results, we wish to highlight the novelty of our approach, i.e., the proposed framework inductively discovers insights from textual data. With the AI-based sentiment evaluation and analysis, we introduced a novel inductive method performing with an exploratory research paradigm that is best suited to discover meaningful patterns.

4. Case study

4.1 Data collection

The wine tourists’ review data used in this study were collected from *Agoda*, one of the most popular online tourism platforms in Australia. *Agoda* showcases millions of activities across the world and enables tourists to comment feedback on their experiences in engaging in an activity or enjoying a service. The reviews posted on *Agoda* are considered real tourists’ experiences and have been used in numerous tourism research (Octavia and Tamerlane, 2017; Phung et al., 2021; Wu et al., 2017). A “things-to-do” tab exists on the top of the *Agoda* website, which organizes and displays destination-level activities for tourists. Tourists can easily locate available activities of a destination by simply entering its address in the search box.

Wine and beer-related filters under the *Food tours* section in *Agoda* were used in this paper to retrieve all wine-related activities in Melbourne, Australia (the data were retrieved in

October 2021). Melbourne was selected as the case study region because of the prominence of its wine tourism, which is internationally recognized. Notable wine destinations in Melbourne include the Yarra Valley and Mornington Peninsula, and each has hundreds of wineries and attracted a significant number of wine tourists every year (Strickland, 2013). Two of the co-authors analyzed the page details of each filtered activity to ensure that all collected reviews were relevant to wine tourism (i.e., contain keywords such as “wine,” “beer,” and “winery”). The activities irrelevant to wine tourism were coded as ‘noise’ activities. The calculated Cohen’s Kappa coefficient (0.91), indicates that two co-authors achieved high agreement regarding the inter-coder reliability. After filtering out noisy activities and activities that have no wine tourist reviews, we collected 3449 reviews from 41 activities. For privacy concerns, we only collected reviews, user profiles were excluded from our data collection process.

4.2 Aspect extraction and pre-processing

The primary objective of the aspects extraction and pre-processing stage is to extract aspects that create value for wine tourists and their emotions toward these aspects. As described in Section 3.2, the main element in finishing this task is the aspect-based sentiment analysis deep neural network LCF-ATEPC. Theoretically, LCF-ATEPC could be trained on any domain-specific text data. However, considering the cost of labeling sequences for training such a sophisticated network, we resort to pre-trained models. Yang et al. (2021) provided various pre-trained models on their website for public use. These models were trained on different large-scale datasets, and we selected the relevant model trained on review datasets for wine tourists’ value creation aspects and satisfaction analysis. The collected tourists’ review data were then fed into the selected model for aspect extraction and sentiment prediction. After obtaining the original aspect output, the pre-processing strategies presented in Section 3.3 were adopted to filter out noise aspects.

Figure 3 shows the statistics of the extracted aspects. In total, 281 different aspects were extracted by the *Value-Creating Aspects Identification* component. A total of 43 noise aspects were filtered out in the aspect pre-processing stage, leaving 238 clean aspects for subsequent analysis. Among which, 230 are positive aspects, 10 are negative aspects, and 3 are neutral aspects.

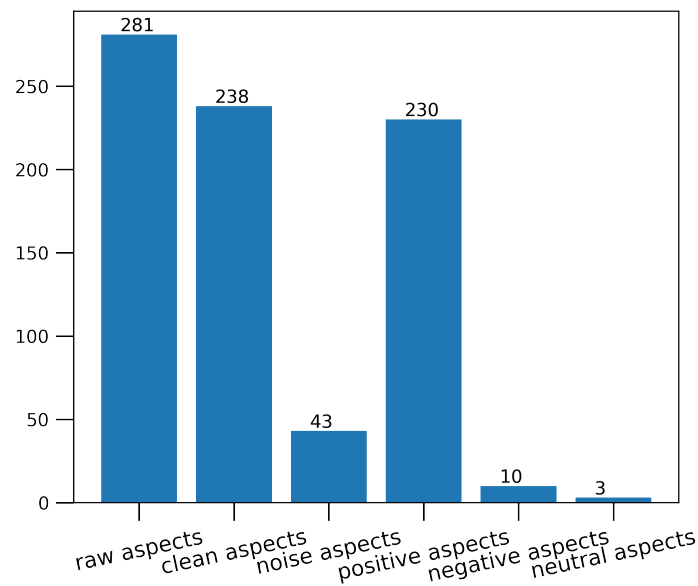


Figure 3. Statistics of the extracted aspects

To understand the value-creating aspects that contribute to wine tourists’ satisfaction of specific wine destinations and to answer research questions, such as “what aspects create the most positive or negative value for a specific wine destination?”, we also analyzed the reviews of two notable wine destinations, namely, Yarra Valley and Mornington Peninsula in Melbourne. The statistics of the aspects after pre-processing in these two wine destinations are presented in Figure 4. In total, 125 different aspects were extracted for Yarra Valley, while 36 different aspects were extracted for Mornington Peninsula. Additionally, no neutral and negative aspects of Mornington Peninsula were extracted.

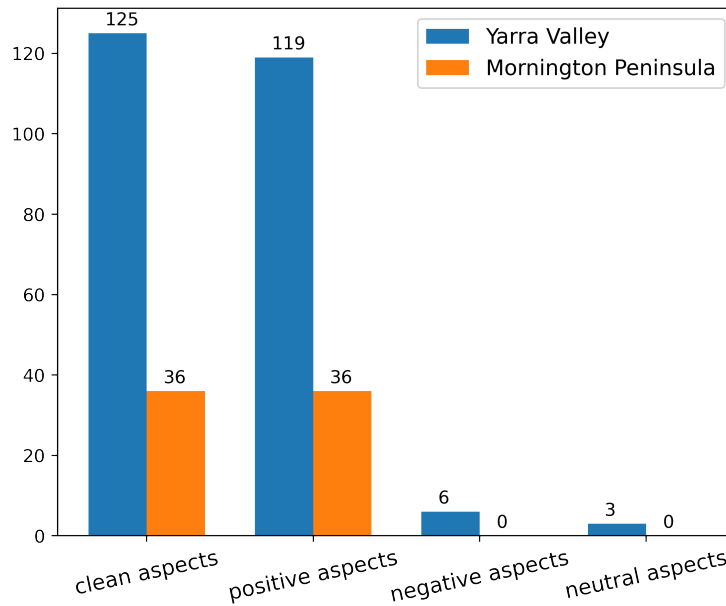


Figure 4. Statistics of the extracted aspects of two popular wine destinations

4.3 Value creating aspects analysis

We now present the results of our analysis on aspects that create value for wine tourists (i.e., contribute to wine tourists' satisfaction). To receive deep insights into the aspects that create value for wine tourists, we visualize the distribution of 281 extracted aspects using a word cloud. The result is depicted in Figure 5.

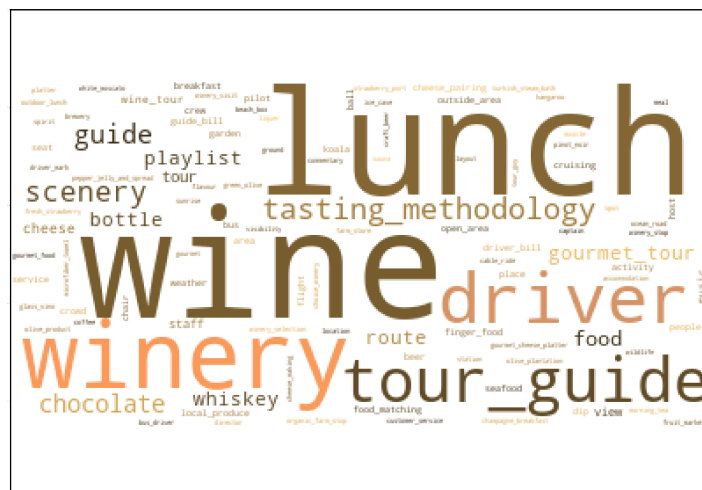


Figure 5. Word cloud of the extracted aspects

The larger a word is, the more wine tourists value this aspect. From this figure, we can find

that the majority of wine tourists consider product-related aspects (e.g., “wine”, “lunch”, “chocolate”, “scenery”, and “bottle”) more important for value creation, followed by socio-relational experiential value-creating aspects (e.g., “tour guide”, “driver”), educational experiential aspects (e.g., “tasting methodology”), and lastly sensory and affective experiential aspects (e.g., “playlist”).

To further understand value-creating aspects of wine tourism, the normalized frequency of each value-creating aspect is calculated. The normalized frequency in Table 1 reveals that nearly half of tourists consider product-related aspects creating value for them, and this figure is significantly larger than other value-creating aspects. The number of tourists who value social-relational experiential value-creating aspects is slightly larger than that of cognitive, educational experiential aspects. Only a few tourists value the sensory and affective experiential aspects.

Table 1: The normalized frequency of different value creating aspects

Value creating aspects	Normalized Frequency
Product related aspects	0.4747
Social-relational experiential value-creating aspects	0.2731
Cognitive, educational experiential aspects	0.1890
Sensory and affective experiential aspects	0.0630

To understand the wine tourists’ detailed emotions toward these aspects, we then count and visualize the distribution of **top-10 positive, negative, and neutral aspects** in Figures 6, 7, and 8, respectively. Figure 6 shows that the majority of wine tourists (exceed 147) express positive sentiment polarity (i.e., satisfaction) to aspects such as “wine”, “lunch”, “winery”, “driver”, “tour guide”, and “scenery.” This discovery explains why Melbourne is popular for wine tourism, as the wineries demonstrated proficiency in providing satisfying experiences to their tourists. Most wine tourists consider aspects that

matter to them creating values and making them feel satisfied. One interesting observation in Figure 6 is that except from the wine itself, the bottle is also considered important in wine tourists' value creation, which means it is worthy for the wineries to pay effort in improving the wine bottle's aesthetic sensory.

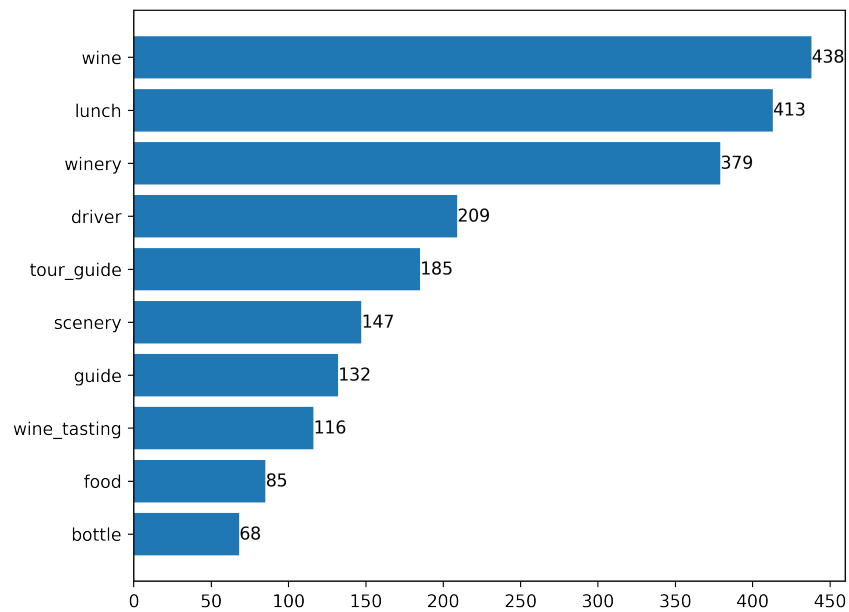


Figure 6. Distribution of the top-10 positive aspects

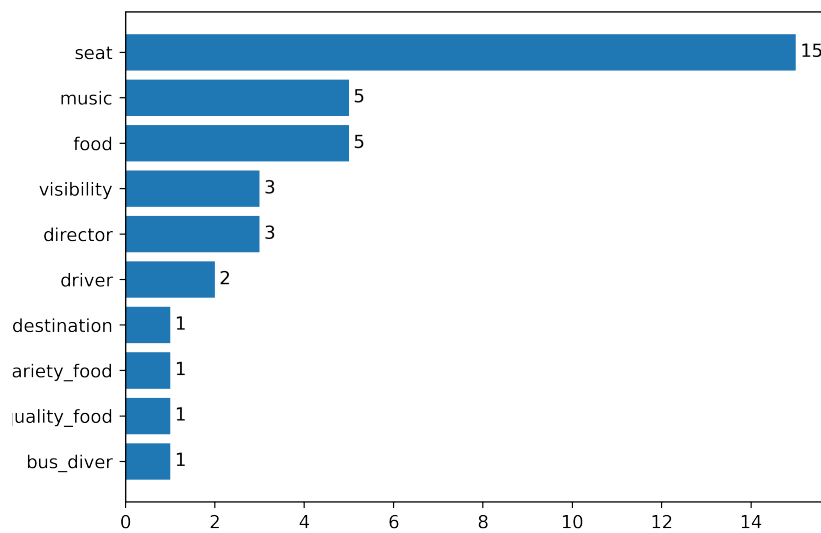


Figure 7. Distribution of the top-10 negative aspects

Figure 7 showcases that some tourists were dissatisfied with the aspects of “seat”, “music”, “food” (more specifically, variety and quality of the food), and “director” aspects during their journey. That is, these aspects, especially for “seat” aspect, create negative value for some wine tourists. Figure 8 indicates that some tourists argue the “wine”, “pizza” and “cheese appetizer” aspects create no value for them.

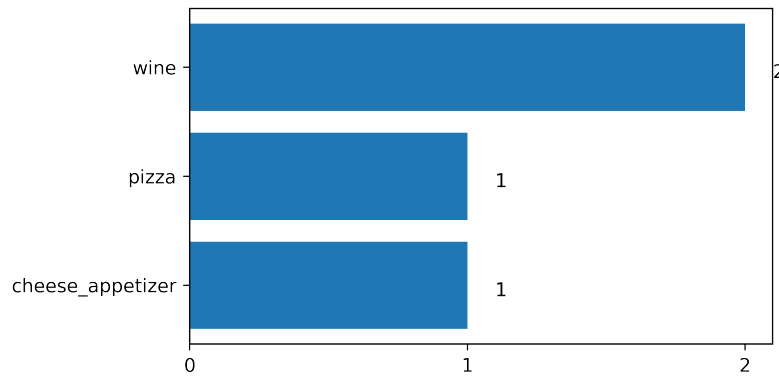
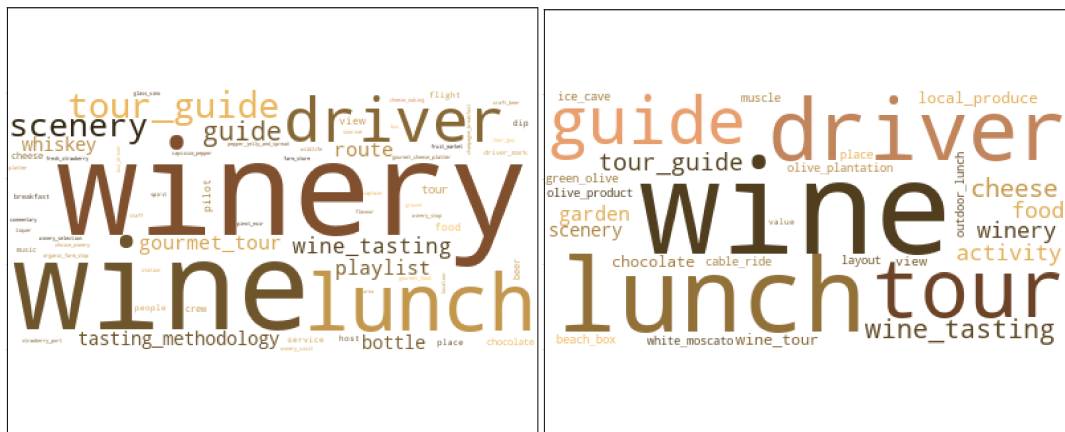


Figure 8. Distribution of the top-10 neutral aspects

To demonstrate the proposed framework’s ability to capture value-creating aspects for wine tourists, we also analyze the reviews of two popular wine destinations, namely, *Yarra Valley* and *Mornington Peninsula*. Figure 9 shows the distribution of the positive aspects of these two wine destinations. We can observe that tourists prefer *Yarra Valley* because they were satisfied with most of the aspects they had experienced in their journeys, such as quality wine, amazing lunch, great drivers, beautiful scenery, and professional tasting method. The tourists who prefer *Mornington Peninsula* highlight its enthusiastic drivers, delicious lunch, professional guide, quality wine, gourmet chocolates, and beautiful olive plantation. By contrasting the above discoveries, we find that the *Yarra Valley* is preferred by wine tourists who focus on cognitive and educational value (e.g., learning professional tasting methods) and social-relational experiential value (e.g., beautiful scenery). Whereas *Mornington Peninsula* is only preferred by wine tourists who focus on relational experiential value (e.g., enjoy visiting olive plantations and relaxing in gardens). The operators of these two wineries could recognize

and highlight these differences to attract potential tourists.



(a) Yarra Valley

(b) Mornington Peninsula Winery

Figure 9. Distribution of the positive aspects of two popular winery areas

Figure 10 plots the distribution of negative aspects of *Yarra Valley*, and it indicates that some tourists are dissatisfied with *seat*, *visibility*, *tour director*, *car boarding destination*, *variety*, and *quality* of the food in their journey (i.e., these aspects create negative value for the wine tourist). The operators of *Yarra Valley* could further improve these aspects to satisfy their tourists' preferences and thus attract more potential tourists. There are no negative and neutral aspects of Mornington Peninsula, indicating nearly all tourists were satisfied with their experiences in Mornington Peninsula.

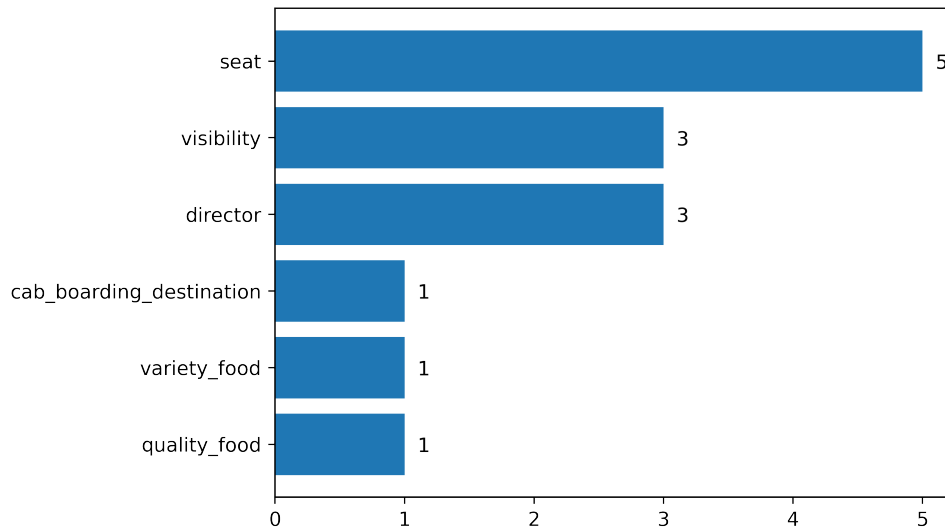


Figure 10. Distribution of the negative aspects for Yarra Valley

5. Discussion

5.1 Theoretical Contributions

The purpose of this study is to explore how aspects in different value-creating dimensions create value for wine tourists holistically. With our results and exploratory research design, we make important theoretical contributions: *First*, we found that product-related aspects create the highest value for wine tourists, including *wine*, *lunch*, *bottle*, as well as *chocolate*, and *scenery*. Yet, other than *wine* and *scenery* that extant literature (e.g., Carmichael et al., 2005; Hall et al., 2000; Mitchell et al., 2012) already identified as key-value creators, our study complements *lunch*, *bottle*, and *chocolate* as important product-related aspects for wine tourists' value creation. *Second*, the literature review showed that *taste* is the most important sense in wine tourism (e.g., Hwang and Zhao, 2010; Brochado et al., 2021). Surprisingly, our findings clearly point to the importance of the auditory sense: we found that *playlist* was a key value-creating aspect in our case study. With this finding, we elucidated the need to conceptualize the senses in wine tourism from a more multisensory experiential perspective.

Third, our results confirm the importance of educational value in wine tourism (e.g., Charters and Ali-Knight, 2002). We found that *tasting methodology* was mentioned of high importance by online reviewers. Furthermore, two aspects, including the *driver* and the *tour guide*, were highly important. Both roles indicate that the educational value is combined with co-creative relational experiential value aspects and point to the importance of relational experiential value in and outside the winery. By delving deeper into the reviews, we discovered that the drivers are responsible not just for driving in the winery tour but are instrumental for educating wine tourists on winery history and services. This finding confirms existing work that suggests wine tourists expect pleasure-seeking and educational experiences and typically have a strong interest in wine and winery culture (e.g., Carvalho et al., 2021; Thanh and Kirova, 2018).

Fourth, our results show that emotional experiential value (e.g., indulgence, pleasure, and relaxation) (Carlsen and Boksberger, 2015) was not explicitly mentioned. Yet, it may be assumed that this is related to the above factors (e.g., winery, lunch, chocolate, and scenery). However, this might not be directly articulated in reviews.

To conclude, our study confirms the importance of product-related aspects in the value creation of wine tourism. We complement existing studies with novel product-related aspects such as lunch, bottle, and chocolate. Besides, we identify several new sensory (e.g., playlist) and educational (e.g., driver, guide, and taste methodology) aspects that create value for wine tourists and find that the emotional experiential value was not explicitly mentioned in the tourist's corpus. Our findings also demonstrate the complexity of the experiential value creation analysis. For instance, the results in Section 4.3 show that although the majority of tourists acknowledge some specific aspects (e.g., wine and music) that may create value in their journey, a small proportion of tourists will still argue that these aspects create no value or negative value in their journey.

5.2 Methodological Contributions

Our research offers an important methodological contribution and develops an innovative wine tourist value-creating aspect analysis framework. Drawing on online review data, we found that prior studies typically used survey and conventional data analysis methods (Deng, 2017). These studies have been criticized for their limited ability to capture wine tourists' emotions and satisfaction accurately (Carlsen and Boksberger, 2015). In this study, we adopted an exploratory research design and offered a new deep neural networks-based methodology that can identify multiple aspects that contribute to tourists' satisfaction and dissatisfaction at the same time. Compared with existing methodologies, our proposed framework innovatively identifies value creation aspects for wine tourists in a holistic way.

5.3 Practical Implications

Our study elucidates important insights and implications for winery operators and destination managers to focus on strengthening communication and the design of aspects that create value for wine tourists. For example, we discovered several new product-related and experience-related aspects, including "lunch", "chocolate", "bottle", and "playlist", that are important in value creation. We suggest that winery operators could assess and prioritize each of these value-creating aspects to ensure high satisfaction among their tourists.

Moreover, our results provide valuable resource allocation guidance for winery operators and wine tourist destinations on improving negative aspects that matter for wine tourists. We suggest to redevelop or reconsider offering aspects that bring negative value or no value for tourists, such as "seat" discovered in our case study, many tourists complain there have not enough seats when having the buffet. Although preferential differences of individual tourists may contribute to negative emotions in some aspects, the frequent negative correlation in some aspects indicates that these aspects are insufficient for satisfying tourists' requirements and thus need to be improved further.

Furthermore, our results encourage winery operators to reflect, build and/or sustain their unique competitive advantage. In the past, the strategies to create unique value for wineries were merely focused on developing specific elements belonging to the winery such as wine, cellar door, and branding (Koch et al., 2013). However, our discoveries suggest that winery operators should consider the tourists' satisfaction during the whole visiting experience holistically. Because tourists' satisfaction in one aspect may have an important influence on their overall experience and future visiting intention (Della Corte and Aria, 2016).

6. Conclusions

Wine tourism is an important part of tourism development in wine tourist destinations and understanding value creation is necessary for winery operators and DMOs alike. To enhance strategic planning and decision-making, tourism suppliers require a comprehensive grasp of the aspects that create value for the tourists. Since prior research had rarely holistically identified aspects in different value-creating dimensions and included the broader wine tourism destination (Back et al., 2020; Carvalho et al., 2021; Gu et al., 2020; Nella and Christou, 2021), the aim of our paper is to analyze the value creation aspects in a multi-dimensional perspective. As a result, we propose a novel deep neural network-based framework to capture aspects that create value for wine tourists in a holistic manner using online review data. Additionally, with sufficient review or other tourist feedback data in text format, the proposed framework could also be used to analyze the tourist value-creation aspects in other tourism and hospitality businesses, such as national parks, restaurants, or special events. A case study on winery tours in Melbourne, Australia was conducted to illustrate the effectiveness of the proposed framework. Beneficial insight and knowledge regarding the aspects that create value for wine tourists in product and experiential dimensions were identified.

Other than the contributions made, our study acts as a preliminary foundation that could inspire future work. The data utilized in this study are limited to online reviews. However, aside

from reviews, online tourism platforms contain other different facets that are rich sources of information for understanding the behavior and satisfaction of wine tourists (e.g., photos and ratings). Future research could incorporate these various forms of online data to analyze the value creation of wine tourists. Furthermore, future studies could extend our framework's generalization ability by integrating reviews in languages other than English. Considering that individuals who use various languages typically have different cultural backgrounds and preferences, the discovered knowledge may then change when reviews in different languages are considered. Future studies also could apply customer experiences and touchpoint theory (e.g., Lemon and Verhoef, 2016) to evaluate and provide additional insight into the aspects that create value for tourists from their destination-level experiences (Gu et al., 2020).

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