Topic Modelling of Tourist Dining Experiences Based on the GLOBE Model

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Abstract. The needs of travellers vary across cultures. When it comes to culinary aspects, there is a strong connection between gastronomy and culture. To optimise service offerings, investigation of the essential aspects of dining experiences in relation to cultural backgrounds is of great importance. In the age of digitalisation, tourists share their dining experiences throughout their multi-phasic travel journey via online platforms. By considering nine distinct cultural backgrounds, this research aims to investigate tourist experiences based on TripAdvisor restaurant reviews through topic modelling, using the city of Salzburg as its study context. Depending on one's cultural circumstances, the findings demonstrate that the most important aspects include staff, food-menu items, value for money, restaurant physical appearance, food authenticity, overall service, menu offers, food quality, atmosphere, and recommendations. This study advances the state-of-the-art knowledge of societal culture as a variable in the target market analysis of restaurant customers. Findings allow restaurant owners, other tourism service providers, and destination management organisations to analyse and adapt their service offerings and strategies accordingly.

Keywords: TripAdvisor · Dining experience · Societal culture · GLOBE

1 Introduction

Visitors from different countries vary in their service expectations and travel behaviours due to cultural backgrounds, which subsequently influences their travel experience [1, 2]. Thus, identifying those needs is essential in order to contribute to up-to-date services and products [3]. Literature has provided insights on service quality and customer satisfaction in a restaurant setting based on widely used models such as SERVQUAL [4] and DINESERV [5, 6]. However, in this process, guests fill out a predefined questionnaire before and after the service, leading to mostly small sample sizes caused by the challenge of persuading guests to participate [7].

Seeing that the rapid development of information and communication technologies allows visitors to share their experiences in the form of user-generated content (UGC) on various online platforms [8], researchers and marketers can take this as a valuable opportunity since these technologies facilitate deeper access to a broad range

of insightful data [9]. For instance, existing studies have examined TripAdvisor reviews to define the sentiment of customers' feelings towards dining experiences [10] and online ratings on Yelp to uncover different motivations as well as the satisfaction of customers coming from the USA and China [11]. Such investigations refer to predefined themes from existing service quality models to unveil customers' feelings, satisfaction, or perception of a dining experience and then correlate it to countries or continents. A worldwide cross-cultural comparison is, however, widely missing. Hence, this research seeks to contribute to the field of dining experiences by analysing online reviews from a bottom-up approach in order to discover which aspects of the dining experience are critical for visitors in relation to their cultural backgrounds.

To achieve the stated objectives, this study adopted the city of Salzburg as its research context for the following reasons: Salzburg ranked first on the "Best in Travel 2020" list of the world's most attractive cities thanks to its historical sightseeing spots and local cuisine [12]. In the summer season of 2019, nearly 2 million arrivals and more than 3 million overnight stays were recorded in the city of Salzburg. In addition, Salzburg attracts international visitors from a wide variety of countries, including Germany, followed by the Netherlands, Arab countries, Czech Republic and USA [13], currently gaining momentum again after the COVID-19 pandemic. In this study, we apply a mixed method approach by conducting data visualisation, data mining, and topic modelling techniques, to transform unstructured online reviews into interpretable patterns.

2 Literature Review

2.1 Tourist Dining Experience

During this era of the experience economy [14], businesses should design their products and services while also taking into consideration the full range of effects that can be evoked from an interaction between consumers and service offerings [15]. This is particularly important in the tourism and hospitality industry, which is heavily based on experiences [16]. In the context of restaurants, scholars have established different service quality models to identify elements that are influential to customers' satisfaction and experiences, among which the SERVQUAL instrument represents the most widely used model [4]. More specifically, service quality is evaluated based on five dimensions, namely, reliability, responsiveness, assurance, empathy, and tangibles [4]. Despite its popularity, the SERVQUAL model was primarily developed for banks as well as credit card, repair, maintenance, and telephone companies [4]. Therefore, since scale items should be adjusted to fit specific industries [17], scholars subsequently developed the DINESERV model so as to investigate visitors' expectations of quick-service, fine-dining, and casual-dining businesses [18].

A modified version of the DINESERV model showcases further factors of customers' expectations and perceptions at restaurants. The implementation of the overall categories, price and satisfaction, explains customers' thoughts on paying more than expected and the price of food items, while the satisfaction of the dining experience can be confirmed through customers revisiting the restaurant and in the recommendation

itself. Other tangible factors include a clean parking area and nice building exterior, restaurant decoration, easily readable menu, comfortable seating, clean dining area, and neat staff [7]. Concerning the environment, evaluation of physical and human surroundings in a restaurant emphasises the aesthetics of the facility, ambiance, table setting, lighting, and the service staff [19]. Moreover, current literature reinforces that, in order to achieve high customer satisfaction, the interaction between customers and employees should not be overlooked [20]. In addition to the service itself, beverage and food attributes are also found to be critical factors in relation to customer fulfilment and post-dining behavioural intention [21]. Today, tourists have more opportunities to share their holiday experiences on social networks [10], allowing individuals to express their thoughts and opinions and make them accessible to the online global community [22] via review platforms such as TripAdvisor. Not only do these review platforms play a key role in tourists' decision-making processes [23], but they also provide managers with a tremendous amount of data that can be used to better understand customers [10] through advanced text mining techniques [24]. A recent study, for instance, explored customers' feelings shared on TripAdvisor when dining in local restaurants [10]. The importance of location and service quality was explored using topic modelling; however, such experiences cannot be standardised, nor do they apply to everyone. Albeit the significance of acknowledging that expectations regarding food, environment, and interpersonal interaction vary across cultures [11], understanding customer experiences from different countries remains scarce.

2.2 Cultural Dimensions and Clusters

To classify people with different cultural backgrounds, one of the most common approaches is based on Hofstede's cultural dimensions theory [25]. This cross-cultural communication framework covers the dimensions of individualism-collectivism, uncertainty avoidance, power distance, masculinity-femininity, and long-/short-term orientation. Subsequently, other researchers modified and transformed the Hofstede model into the GLOBE model [26, 27], with the dimensions uncertainty avoidance (fear of ambiguity), power distance (acceptance of an unequal distribution of power), institutional collectivism (more validation of broad societal interests than of individual goals), in-group collectivism (loyalty towards families and organisations), gender egalitarianism (equal treatment of genders), assertiveness (level of directness, forcefulness, or aggression), future orientation (planning, delaying gratification), performance orientation (appreciation for setting and reaching goals), and humane orientation (fairness, generosity, kindness) [26, 28, 29]. In order to make the GLOBE model applicable for practical use in multinational societies, a model of regional clusters across the world was developed as well. The clusters and their characteristics [28] are outlined in Table 1 below.

Table 1. The GLOBE model.

Cluster	Country	Characteristics
Anglo	Canada, USA, Australia, Ireland, England, South Africa (white sample), and New Zealand	High in performance orientation; low in in-group collectivism
Confucian Asia	Singapore, Hong Kong, Taiwan, China, South Korea, and Japan	High in performance orientation, institutional, in-group collectivism
Eastern Europe	Greece, Hungary, Albania, Slovenia, Poland, Russia, Georgia, and Kazakhstan	High in assertiveness, in-group collectivism, gender egalitarianism; low in performance orientation, future orientation, uncertainty avoidance
Germanic Europe	Austria, The Netherlands, Switzerland (German speaking), and Germany	High in performance orientation, assertiveness, future orientation, uncertainty avoidance; low in humane orientation, institutional, and in-group collectivism
Latin America	Ecuador, El Salvador, Colombia, Bolivia, Brazil, Guatemala, Argentina, Costa Rica, Venezuela, and México	High in in-group collectivism; low in performance orientation, institutional collectivism, future orientation, uncertainty avoidance
Latin Europe	Israel, Italy, Switzerland (Francophone + Italian speaking), Spain, Portugal, and France	Mostly moderate scores in dimensions, low in humane orientation and institutional collectivism
Middle East	Turkey, Kuwait, Egypt, Morocco, and Qatar	High in in-group collectivism, low in future orientation, gender egalitarianism, and uncertainty avoidance
Nordic Europe	Denmark, Finland, and Sweden	High in future orientation, gender egalitarianism, institutional collectivism, and uncertainty avoidance; low in assertiveness, power distance
Southern Asia	Philippines, Indonesia, Malaysia, India, Thailand, and Iran	High in humane orientation and in-group collectivism
Sub-Saharan Africa	Zimbabwe, Namibia, Zambia, Nigeria, and South Africa (black sample)	High score in humane orientation

3 Methodology

3.1 Study Context

The city of Salzburg thrives from the tremendous amount of income generated by the gastronomy branch, with over 3,502 culinary businesses currently running in Salzburg [30]. Thus, with highly concentrated tourists, this destination offers sufficient data for

this study to explore tourists' perceptions of dining experience from different cultural backgrounds by mining their content with regards to travel expectations, motivations, and satisfaction on TripAdvisor.

3.2 Data Collection, Pre-processing, and Analysis

The web scraping software *Octoparse* was used to collect restaurant reviews and attributes from TripAdvisor. Restaurant attributes include names, review content, restaurant URLs, published dates and reviewers' locations. All available restaurant reviews, written in English, from the city of Salzburg were scrapped, resulting in 27,626 reviews. This study selected only reviews published between May 1 and October 30, 2019, leading to a total of 1,901 reviews. This timeframe was chosen because of school holidays within and around Austria, where high tourism activities take place, and to view data before the outbreak of the COVID-19 pandemic. Afterward, based on reviewers' nationalities, all reviews were classified into different cultural clusters according to the GLOBE model. Customers who did not disclose their locations on TripAdvisor were removed, resulting in a final dataset consisting of 1,461 reviews.

Next, *Orange 3*, an open-source machine learning toolkit, was applied for data pre-processing and analysis. To transform unstructured reviews into structured forms for analysis [31], the following three steps were conducted: (1) tokenizing texts and turning all the text into lowercase, (2) removing punctuations, numbers, stop words, and, in addition to general stop words, a list of custom stop words specifically developed for this study, and, lastly, (3) normalising words by removing suffixes.

In order to discover hidden topics in online reviews, this study applied Latent Dirichlet Allocation (LDA), one of the most popular topic modelling techniques in tourism and hospitality [32]. LDA was conducted on each of the cultural clusters so as to uncover a corresponding set of attributes or themes through the corpus-based guest reviews. To determine the number of topics in each cluster, multidimensional scaling was applied to analyse each topic's distance between each other and to investigate duplicate or recurring topics. Thus, different clusters yielded various numbers of topics. Finally, a list of keywords, which represent a topic in the topic modelling process, was used as a reference for labelling its representative topics. Subsequently, the extracted keywords of the respective geographical areas were vectorised using document embedding (fastText), followed by a dimensional reduction using tSNE (Perplexity = 15, Exaggeration = 1, PCA components = 25, Normalised Data, and preserved global structure) in order to visualise the GLOBE spaces. The optimal tSNE hyperparameters were chosen after a visual inspection with the Tensorboard Embedding Projector.

4 Findings

4.1 Overview of the Topic Modelling Results

Table 2 outlines the ten identified topics generated from LDA for a total of nine cultural clusters, as the Sub-Saharan Africa cultural cluster was dropped due to scarce data sampling.

Table 2. Identified topics per cultural cluster.

Cluster	n	Identified topics
Anglo	924	(1) Staff, (2) Food Menu Item, (3) Restaurant Physical Appearance, (4) Recommendation
Confucian Asia	34	(1) Value for Money, (2) Staff, (3) Food Authenticity
Eastern Europe	68	(1) Staff, (2) Food Authenticity, (3) Food Menu Item, (4) Value for Money
Germanic Europe	153	(1) Restaurant Physical Appearance, (2) Staff, Menu Offers, (3) Food Quality
Latin America	21	(1) Food Authenticity, (2) Menu Offers
Latin Europe	73	(1) Value for Money, (2) Overall Service, (3) Food Menu Item
Middle East	32	(1) Food Menu Item, (2) Staff, (3) Recommendation
Nordic Europe	45	(1) Overall Service, (2) Food Quality, (3) Menu Offers, (4) Atmosphere
Southern Asia	111	(1) Restaurant Physical Appearance, (2) Food Menu Item, (3) Value for Money, (4) Overall Service, (5) Staff

The naming of the topic was based on a list of keywords contributing the most to a specific topic. Additional topics/themes were also added due to a prevalent theme, which had not been previously found via topic modelling, being discovered in the reviews. Yet, it is important to note that the number of reviews was not equally distributed and may have influenced the number of the extracted topics. Overall, *Staff*, *Food Menu Item*, and *Value for Money* presented themselves as the top aspects when tourists shared their dining experience.

4.2 Topic Modelling Results per Cultural Cluster

The topics per cultural cluster shown in Table 2 are based on up to 5000 keywords. Figure 1 shows the topics per cultural cluster after tSNE dimensionality reduction and locates them on a map. Interestingly, the word embeddings of these keywords reflect the proximity of the individual GLOBE spaces very well. As such, the two Asian clusters can be seen grouped very close to each other on the left side, while the Middle East is strongly separated from all other areas on the bottom left, and the Anglo-

American area on the opposite top right is also entirely homogeneous. In between, Latin Europe and Latin America are separated but in close proximity, and the European regions are somewhat mixed but still clearly recognisable. This confirms that the cultural features described in detail below can indeed be clearly teased apart from each other and can be perceived as their respective typical characteristic.

Fig. 1. Topic keywords word embedding across GLOBE cultures

Anglo

For Anglo cluster, the staff plays an important role which can be seen from several comments (e.g., “*The chef was very accommodating to our gluten free needs*” and “*The staff was friendly and attentive*”). Food menu items display a high degree of significance and seen to be followed with critiques and recommendations such as “*Choice of 3 dishes, had the sardine pasta, and it was fantastic*”. This observation is consistent with the GLOBE Model findings of the Anglo cluster which possess a high-performance orientation, showing appreciation for an achieved standard. This cluster is attentive to a restaurant’s physical setting which shares similarities with the Southern Asian cluster. Different from the Southern Asian cluster, the Anglo finds the restaurant setting and location more important than the décor, which is represented by (e.g., “*We ate outside and had a delightful dinner*” and “*Not too far from the centre of the city*”).

Confucian Asia

For this cluster, value for money is an important aspect, observed in “*We think the pricing of the food was reasonable*”. This characteristic is similar to the Southern Asia cluster, where the price paid outweigh the food portion. Also, Staff is considered an integral part, proved by “*The owner is very friendly*”. Congruent with the GLOBE model, the performance orientation, more specifically, their deliberate expression of

appreciation to the staff seems up to par. Meanwhile, food authenticity is another prevalent factor, which can be observed in the excerpts: *"We went there for dinner and food is good traditional Austrian"* and *"Very authentic and delicious Korean food!"*. It is worth noting that, interestingly, Confucian Asian tend to search for their own culture's cuisine, and it should also meet their authenticity expectation. This is consistent with the GLOBE model's high score of institutional and in-group collectivism, by showing loyalty to their own origins despite being outside of their home country.

Southern Asia

This cluster considers the physical restaurants appearance most important, emphasising on the decor or interior, as seen in *"richly decorated"* and *"friendly US-style diner"*. Food menu items are another prevalent topic which can be seen from the specific mentions of food, such as *"Dal Tarka"*, *"Beef Pho"*, followed by a recommendation to visit, echoing this culture's humane orientation nature. *"Reasonable rate"* and *"value for money"* represent value for money aspect, which is also mentioned by the Confucian Asia, Latin Europe, and Eastern Europe. Interestingly, not only the attitude of the staff, but also on the appearance and facial expression is important, (e.g., *"Served by a bearded guy with several tattoos"* and *"The owner around with a very unhelpful angry expression"*). Lastly, several dissatisfied expression emerge, *"lousy service"* and *"aggressive staff"* in addition to positive experience reviews such as *"comfort"*, *"the service was very friendly"*, and *"humble servings"*.

Eastern Europe

Interaction with the staff and their friendliness is crucial for this cluster, as seen in: *"The waiter in the lounge was very grumpy"* and *"That manager was very impolite"*. Notably, the presence of negative reviews towards the staff are in line with the characteristics of assertiveness given in the GLOBE model. Nevertheless, this cluster appreciates food authenticity, *"I would recommend it for anyone visiting Salzburg and wants to enjoy a traditional Austrian dish"*. Food menu items with implicit reference for or against recommending the place also emerge, as seen in: *"Very nice options for platters to have with your wine"* and *"If you are looking for a great schnitzel off the beaten path, this is the place"*. Finally, value for money is a vital aspect for the Eastern European contrasting with the Asians where price sensitivity outweighs portion generosity, proved in *"It's a little pricey but, given the rest of the prices in Salzburg"*.

Latin America

For Latin Americans it is important for businesses to deliver their brand promise in terms of (food) authenticity, for example, *"Make sure you go to this typical Austrian restaurant. Serve good Austrian food"* and *"The food is really good. Austrian dishes and drinks"*. Another salient aspect is the menu offers, e.g. available options, types of drinks, and cuisine types (e.g., *"The menu was excellent- it was hard to decide what to order"* and *"All kind of seafood and in any possible way"*). The findings show consistency with GLOBE model in terms of the low score in performance orientation (whether people are rewarded for delivering good performance) due to the fact that important dining aspects revolve around the food itself rather than the staff.

Germanic Europe

The appearance and location of restaurants are evidently important aspects for this cluster, as seen in *“One of the most modern restaurants in Salzburg”* and *“The restaurant has a very good flair”*. This implies that this culture appreciates the comfort and pleasant atmosphere. Concerning the staff, attentiveness and attitude are the most appreciated traits, for instance, *“We were greeted by a nice waiter who showed us to our table”* exhibiting deliberate expression of appreciation which is congruent with their high performance orientation’s GLOBE characteristic. Moreover, menu offers and food quality (e.g. *“Excellent meat dishes. Good selection of drinks”*) are important but inconsistent food availability is not appreciated, as seen in *“Limited menu”*. The quality of the food served in terms of flavour, presentation, and ingredients are also notable, *“The creamy spinach was so good and the meat had a high quality”*.

Latin Europe

Value for money is the most important aspect, as seen in *“Good service at a reasonable price”* and *“Pizzas are really huge, tasty and at a very good price”*. Although this is consistent with the Southern Asian and Eastern Europeans, the Latin Europeans emphasise price points rather than the food generosity. Food menu items are mostly followed with a critique, for instance *“Burger was good though not amazing”* and *“We chose white asparagus which was excellent”*. This cluster recognises service as a significant factor, encompassing larger spectrum of a dining experience: staff-, food-, and restaurant-related, seen in the generality of review contents such as, *“The place is nice and the court is a great place, but the food was mediocre (restaurant- and food-related)”* and *“The staff is very friendly and the wiener schnitzel was one of the best we’ve had (staff- and food-related)”*.

Nordic Europe

The overall service (e.g., *“service is immaculate”*, *“super service”*, and *“quick service”*) with a strong focus placed on services provided by the staff emerge, as seen in *“The two women who run it are super kind and really cares about their food”*. The flavour, ingredients, and the presentation thereof are key factors for this cluster, for instance *“Traditional food with lots of flavour!”*. Moreover, menu offers are equally important, proved by frequent references to modern Austrian kitchen, vegetarian food, local wines, home-brewed beer, and gluten-free beer, e.g. *“Amazing little beer garden with solid food and amazing home-brewed beer”* and *“Nice place for some typical Austrian food, gluten-free beer available and a few but very tasty food options”*. Lastly, the atmosphere is proved to be as important, as seen in *“historical environment”* and *“hidden gem”*, which is congruent with the GLOBE model’s uncertainty avoidance characteristic, since authentic local atmosphere meets this cluster’s expectations.

Middle East

Food menu items are of great significance for this cluster (e.g., *“Shrimp pizza at the bar, and it tastes lovely”* and *“Beautiful wholesome food”*). The interaction with the staff is as influential, as seen in *“The host has been the perfect one in all way”* and *“The owner of the restaurant and staff are friendly and accommodative”*. Recommendations are significant for the Middle Eastern cluster, for instance *“We went to this restaurant on recommendation”* and *“We found this restaurant from TripAdvisor”*. This finding

transpires the common practice among Middle Eastern tourists to go to places upon recommendation and correspondingly recommend places to others upon dining satisfaction. In line with the GLOBE model, this aspect displays a certain degree of consistency for high in-group collectivism since, by giving honest opinions about their experiences, this behaviour shows loyalty towards their own family or organisation.

5 Discussion

Seeing that various aspects of touristic experiences, such as dining or visiting sights, can be sourced from online review portals, and connections to a place of origin or culture can be drawn from the differences in behaviour [33], this study analyses online restaurant reviews so as to make generalisations regarding different cultures. In this way, when addressing and catering to a certain country or culture, one can resort to a set of recommendations on what specific aspects they tend to pay attention to. Overall, the most important aspects related to customer dining experiences are staff, food menu items, value for money, restaurant physical appearance, food authenticity, overall service, menu offers, food quality, atmosphere, and recommendation.

The study's findings partly differ from the literature in that food was mentioned regularly in reviews, with food even being considered the most important factor for those who enjoy dining. Unlike the dimensions in the SERVQUAL and DINESERV model, which focus more on the interaction between customers and employees rather than the products themselves (e.g., food items), this research is consistent with other scholars who emphasise that attributes of food, regarding the quality, freshness, tastiness, and temperature, are seen as the most influential criteria among customer fulfilment and post-dining behavioural intention [20, 21].

Yet, notably, the priority of these aspects varies across cultures. This study shows that societal cultures can provide valuable insights, e.g., for gastronomy businesses when trying to target a certain market. Moreover, it might aid in guiding employee training, especially in regard to the specific treatment of certain target groups (grooming recommendations, welcoming rituals, etc.). The analysis further reveals that societal culture might be a new variable in market research, especially in target market analysis, in addition to established ones such as demographics and lifestyle milieus. Finally, this study supports results from recent literature, suggesting that machine learning can give valuable insights by processing large amounts of UGC from review sites [33].

To conclude, this study is novel in that cultural background was incorporated, using an established scientific concept, namely, the GLOBE clusters. Different from previous literature focusing on limited cultural groups [33], the findings of this research allows for the generalisation of all regions within a given cluster. By using machine learning and drawing connections to the culture of customers, this study concludes that analysing online restaurant reviews can give valuable insights for professionals in the field.

6 Conclusion

This research contributes to the tourism industry through the use of machine learning techniques, thereby showcasing the possibilities of transforming UGC into structured patterns so as to reveal tourist experiences shared online. As such, the revealed insights provide restaurant managers with the exact gastronomical preferences of their target groups, which, in turn, can be used to optimise business strategies and service offerings. On a wider scale, this study is also beneficial for destination management organisations to promote gastronomy in foreign countries. More specifically, destination marketers now have the opportunity to check the exact aspects of a dining experience that a certain cultural cluster may be interested in and tailor promotional texts, images, and videos accordingly. Ultimately, this research expands upon the existing knowledge of the use of text mining and machine learning to process and analyse large amounts of user-generated data in tourism contexts.

Regardless, this study is not without its limitations. First, the sample was narrowed down to include English reviews only, and the city or country of residence was taken from TripAdvisor. As such, the assumption that a reviewer belongs to a particular cultural cluster is solely based on his/her stated place of residence. Whether or not that region represents their “true” culture, or if they were merely expatriates living in a certain place at that time, cannot be validated. For future research, it is recommended to investigate the preferences of the cultures from where large data density, that represent all 10 GLOBE cultural clusters, can be obtained, for instance major cities e.g. New York or Tokyo. This will increase the robustness of the cultural cluster analysis. Moreover, further studies could explore other aspects of tourism, such as accommodation or attractions, that can benefit from this approach in similar ways.

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