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of the Influence of the Country of Origin and
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Restaurant Reviews

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Authenticity Goes Digital: A Big Data Analysis Of The Influence Of The Country Of Origin And Authenticity Perceptions On TripAdvisor Ethnic Restaurant Reviews

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ABSTRACT

Authenticity perceptions are subjectively driven and rely on social constructions making the concept hard to be defined. The current study is following a big data approach to capture perceptions and beliefs concerning the authenticity of ethnic restaurants and also when online positive reviews are given about authenticity under the influence of a visit to the country of origin. The key idea of our method relies on the analysis of a 3-step characterization of a big data repository extracted from TripAdvisor. Step 0 concerns reviews made for Italian restaurants before consumers visit Italy, step 1 concerns the reviews made while consumers were in Italy and step 2 concerns reviews made after they visited Italy. This characterization exploits both sentiment analysis and graph data models. Our findings propose a depiction of authenticity for ethnic restaurants via e-word of mouth. With a big data analysis on TripAdvisor, we provided an analysis on both ratings and comments which showed the impact of authenticity. As such, consumers, after visiting the country of origin, were more critical while they provided lower ratings and they were also focusing more on authentic atmosphere and service, showing evolution of their online reviews.

TripAdvisor; country of origin; ethnic restaurants; authenticity; online reviews; big data

INTRODUCTION

In quest of defining a successful restaurant, the existing literature focuses mostly on financial factors (Di Pietro et al. 2007; Harrison 2011; Susskind 2010). Another measure of success is customer loyalty and customer satisfaction (Han and Ryu 2009; Harrington et al. 2011). Nowadays, customer satisfaction is often expressed on online reviews and seems to influence potential customers to visit and dine in a restaurant. Restaurant owners should know that consumers' driving force for sharing their positive opinion online is food quality rather than discussions about prices (Jeong and Jang 2011).

Apart from positive online reviews, ethnic restaurant success and customer attraction can be also achieved by offering authentic and high-quality products and services (Bryla 2015; Muller 1999; Namkung and Jang 2007; Sulek and Hensley 2004; Tsai and Lu 2012). If consumers perceive an ethnic restaurant as authentic they are more than happy to spread positive word of mouth (Lu et al. 2013). As such, consumers' perceptions of authenticity need to be defined and especially how these are expressed nowadays in a digital global setting.

Marketers have defined authenticity as a social and commercial construction for differentiation and positioning (Becuț 2011; Bryla 2015; Ebster and Guist 2005; Lu et al. 2015; Wood and

Lego Muñoz 2007). In this study, authenticity is approached as a social projection which permits “*various versions of authenticities regarding the same object*” (Wang 1999, p. 352). This type of authenticity is not objectively defined but symbolically and personally constructed (Reisinger and Steiner 2006). Authenticity for the constructivists is a perception of cultures, which includes deeper meanings and different interpretations for every human (Lu et al. 2015). Personal experience and identity can additionally contribute to the characterisation of food as authentic or inauthentic (Chatzopoulou et al. 2019). Individuals are in an endless interaction with society, and so their personal experiences create the relations which may define authenticity. In our research, we explore the construction of authenticity meanings by the consumers of ethnic restaurants before vs. after visiting the country of origin of these restaurants. Moreover, we explore how consumers’ visit to the country of origin affects their online reviews and what can restaurant owners learn from these reviews to improve their ethnic restaurant businesses.

We first propose a methodology to extract when positive reviews are made for ethnic restaurants and also to depict authenticity meanings through graph representations. Then, sentiment analysis of consumers’ online reviews is outlined and so, the combination of those steps aids the exploration of ethnic authenticity perceptions and positive online reviews about it. As such, an innovative methodology is followed which integrated authenticity meanings extraction with a big data analysis.

METHODOLOGY

Modelling tourism data requires to take into account locations information, users’ properties and their interactions. Data are based on a TripAdvisor extraction of locations, users and their reviews. In the *Neothentic* database, we propose a graph data model and data operators dedicated to authenticity extraction and consumers’ reviews. Some studies focused on graphs to model trips with graphs (Brandes 2001; Sang-Hyun Lee et al. 2013; Shih 2006). Those analyzes focus on various centrality measurement methods on networks that are combined with maps. It proposes to identify interaction that can characterize tourism behaviors. We go one step beyond by characterizing authenticity paths in such graphs.

Our database is composed of geolocalized locations, restaurant reviews and users. Thus, a first filter is applied to locations in order to get only relevant ones. They are identified by *type* a cuisine type (a list of denominations such that [“Italian”, “Pizza”, “Sea Food”]), *l* a localization (lat, long) and *rat* a rating ($rat \in \mathbb{R} \wedge rat \in [1.0,5.0]$).

To simplify localization, each location has been aligned with administrative areas (GADM). Each location is then linked to an area if its geolocalization (*i.e.*, lat, long) is contained into the area's shape (*SpatialPolygon* function *SP*), such that $area = SP(l.lat, l.long)$. This area is composed of a country, a region, a department and a city: *area* (*country, region, department, city*). Thus, each location *l* is identified by: $l \in \mathcal{L}(type, rat, area)$.

A user *u* is identified by his nationality and age, $u \in \mathcal{U}(country, age)$.

A review is a note ($n \in \mathbb{N} \wedge n \in [1,5]$) given by a user u on a location l at time t (t is in the discrete time domain \mathcal{T}). Each review is then defined by an event r_t such that: $r_t = (l, u, n)$.

The stream of reviews \mathcal{S} is a time serie of r_{t_i} events: $\mathcal{S} = \{r_{t_1}, r_{t_2}, r_{t_3}, \dots, r_{t_n}\}$

1.1 Graph Data Model

In order to extract the authenticity experience of users in this time serie, it is necessary to focus especially on users who have visited at least once the given destination (Italy) and have tested a “destination” restaurant in their country before and after the country of origin. To achieve this, we propose to model the time serie into a graph data model that represents the experience of each user corresponding to a given cuisine type (Italian).

1.2 Time Serie Specialization

Before producing a graph, we need to focus only on restaurants of a given cuisine type corresponding to the study. A filter $\sigma_{cuisine}$ on “destination” restaurants keeps only those which corresponds to the cuisine type parameter:

$$\mathcal{S}_{cuisine} = \sigma_{cuisine}(\mathcal{S}) \Leftrightarrow r_{t_i} \in \mathcal{S}_{cuisine} \Rightarrow \forall r_{t_i} \in \mathcal{S} \mid cuisine \in r_{t_i}.l.type$$

We also need to keep specific localization of restaurants according to the protocol of our study. In fact, only restaurants located in the destination country, and those from the consumers’ country are to be kept. Thus, the destination operator δ produces a new time serie \mathcal{S}^{dest} that verifies users’ country or review destination:

$$\mathcal{S}^{dest} = \delta_{dest}(\mathcal{S}) \Leftrightarrow r_{t_i} \in \mathcal{S}^{dest} \Rightarrow \forall r_{t_i} \in \mathcal{S} \mid$$

$$r_{t_i}.u.country = r_{t_i}.l.area.country \vee r_{t_i}.l.area.country = dest$$

Finally, to produce the required time serie to produce the corresponding graph, we can combine both operators with the cuisine type and the destination. We can notice that the combination of operators can be permuted in order to optimize the process of extraction.

$$\mathcal{S}_{cuisine}^{dest} = \delta_{dest}(\sigma_{cuisine}(\mathcal{S}))$$

For instance, $\mathcal{S}_{Italian}^{Italy}$ denotes the serie of events where users reviewed Italian restaurants both in Italy and also in the consumers’ country.

1.3 Online Reviews Analyzes Framework

We can manipulate more easily the sequence of nodes for each user or a group of users according to the required study. A query language *Cypher*¹ is available which allows manipulating the graph and to visualize how users behave on this graph.

We need to identify the experience before, during and after the user’s experience on a cuisine type. For this, we can execute queries on \mathcal{A} that extract the three sequences of circulation of users on the graph.

¹ Cypher: <https://neo4j.com/developer/cypher-query-language/>

Table 1 – Online reviews extraction in the Cypher query language

<p>MATCH p1 = (b1) -[*]-> (bn) -[u]-> (it1),</p> <p> p2 = (it1) -[*]-> (itn) --> (a1),</p> <p> p3 = (a1) -[*]-> (an)</p> <p>WHERE ALL(r in nodes(p1) where r.country<>"Italy") AND</p> <p> ALL(r in nodes(p2) where r.country="Italy") AND</p> <p> ALL(r in nodes(p3) where r.country<>"Italy") AND</p> <p> ALL(rev in relationships(p1,p2,p3) WHERE rev.user = u.user)</p> <p>RETURN u as user, AVG(p1.note) AS before, AVG(p2.note) AS during,</p> <p> AVG(p3.note) as after</p>
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Table 1 proposes a query that extracts for each user the review sequence containing 3 paths in the graph. It specifies how sequences are extracted and filters that are applied on each of them. Three clauses are given: MATCH to give the pattern for paths, WHERE for the filters, RETURN to give the final result.

Every edge is declared in the MATCH clause with a "-->" between nodes "()". Stars between brackets say that we accept any length of the path (from 0 edges to n). The red path p1 corresponds to all the edges that occur before getting to Italy (1st restriction in the WHERE clause) from nodes (b1) to (bn). Path p2 corresponds to the reviews in Italy (2nd restriction) from nodes (it1) to (itn), and path p3 after Italy (3rd one) from nodes (a1) to (an). Notice that those three paths are linked together by linked nodes *it1* and *a1* at the end of paths p1 and p2. Moreover, to specify that this long sequence of reviews is given by a single user, the 4th restriction in the WHERE clause says that all relationships are linked to user *u* (given at the end of path p1).

To finish with, the RETURN clause aggregates notes from reviews of each path in order to give the average rating *before*, *during* and *after* being in Italy. It will be called in the following the *authenticity vector*.

On top of that, we can refine queries by filtering the users' country. For instance, we can add in the WHERE clause that *u* must come from the UK (*u.user.country* = "UK"). Consequently, we will obtain the authenticity vectors from British citizens. The set of all authenticity vectors can be visualized to show the distribution of ratings for each step.

This final step will produce the 3-step vectors that will be used to extract both ratings evolution and comments extraction for sentiment analysis. The aggregation of such vectors helps to have a global understanding of customers' behavior on e-WoM.

1.4 Dataset

Global data were collected from TripAdvisor for the period 2010 to 2018 concerning reviews about 51,710 restaurants. The global study with the first filter ($S_{Italian}^{Italy}$) collected data from 786,896 users who have put at least one review on an Italian restaurant. We applied this filter to an initial source of over 54,572,165 users. As such, we got 16,901,269 corresponding reviews for analysis from an initial source of over 300,084,943 reviews.

FINDINGS

From the above described procedure, USA and UK reviewers' comments have been collected from TripAdvisor platform concerning their experience in Italian restaurants. Their comments have been categorised in three different sections: before visiting Italy (step 0), during their visit to Italy (step 1) and after their visit to Italy (step 2). The purpose of doing so has been to explore whether food perceptions differ before the visit in the country of origin vs. after. The sentiment analysis was conducted with the use of NVIVO 12. First, we run a word frequency query for step 0, then for step 1 and finally for step 2. The most commonly words used per step are depicted on tree maps below. Secondly, a sentiment analysis of each and every word was conducted from consumers' reviews in order to depict how these commonly used words are perceived by the consumers.

The sentiment analysis has shown that during their visit to the country of origin (Italy) the words pizza, pasta, Italian and friendly were missing from the 20 most frequent words of reviewers' comments. The words appeared in the top 20 before they visited Italy. The words pizza, Italian and time appear only before the visit to Italy and again after their visit. The words: friendly, staff and excellent are missing from the top 20 most frequent words of reviewers' comments after the visit to Italy even if they appeared before the visit in the country of origin. The words excellent and staff appear only in the top 20 of reviewers' comments before and during the visit to Italy but, not after. As such, we may conclude that the country of origin affects perceptions of food quality and excellence making hard to give excellent reviews to an ethnic restaurant after visiting the country of origin. This is also evident by the less 5's of reviews after the visit to Italy.

As can be seen in Figure 1, the distribution of customers' average ratings from authenticity vectors for UK and USA citizens is different from before to after visiting Italy. Their ratings are globally higher while dining in Italy. But we can notice that there are lower ratings after being in Italy as it tends to be more criticism between 4 and 5 average rating. As such, 57.14% of 4s and more for USA users (resp. 43.48% for UK) before visiting Italy become 42.86% after their visit to Italy (resp. 39.13%). It means that US customers tend to be more criticism on ethnic authenticity after their visit than British citizen. Moreover, we can see that British customers leaved a better experience while being in Italy. Concerning the 5s for UK users

before vs. after visiting Italy were reduced by 7,2% while for USA users the number of 5s witness a reduction of 5%.

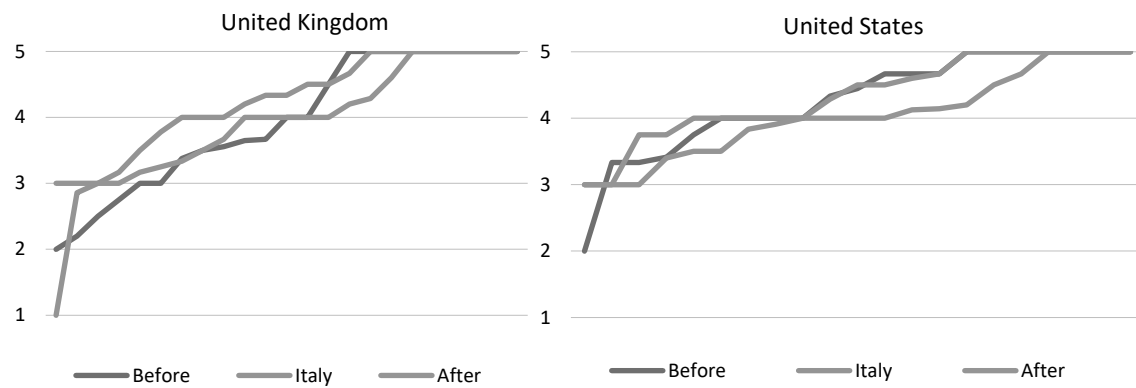


Figure 1 – Distribution of authenticity vectors from UK and USA citizens on Italian restaurants

Based on the analysis of all reviews the current study answers the question ‘when are positive reviews made for ethnic restaurants’? In order to do so, we conducted a sentiment analysis of the reviews before visiting Italy vs. after the visit. As it can be seen on the tree maps of step 0 and 2, we may conclude that different perceptions exist about food aspects and the use of words good, great, pizza and restaurant. Concerning food, in step 0 there were no reviews about simplicity which is highlighted in steps 1 and 2 as a main characteristic of Italian cuisine. Moreover, only in step 2 is highlighted the value of real bread and not in step 0. Comments about nostalgia and how food reminded the country of origin can be seen only in step 2. Concerning the use of the word good, in step 0 the phrase good bread is missing whereas it has been pointed out in step 2. Moreover, the phrase “good flavoured dishes” is only used in step 2 but, not in step 0. Concerning the use of the word great, great location seems to concern consumers only in step 0 as it is missing from step 2. Consumers seem to care more about food aspects rather than the location. Concerning reviews about pizza, consumers seek for pizza variety only in step 0 but, not in step 2. They also tend to compare pizza with the country of origin only in step 2: “the best pizza outside Italia”. Finally, when it comes to the use of the word restaurant, consumers make comparisons with Italy only in step 2: “reminds me of being in Italy”, “I would call it more a good trattoria than a restaurant and don’t get me wrong, this is a compliment”.

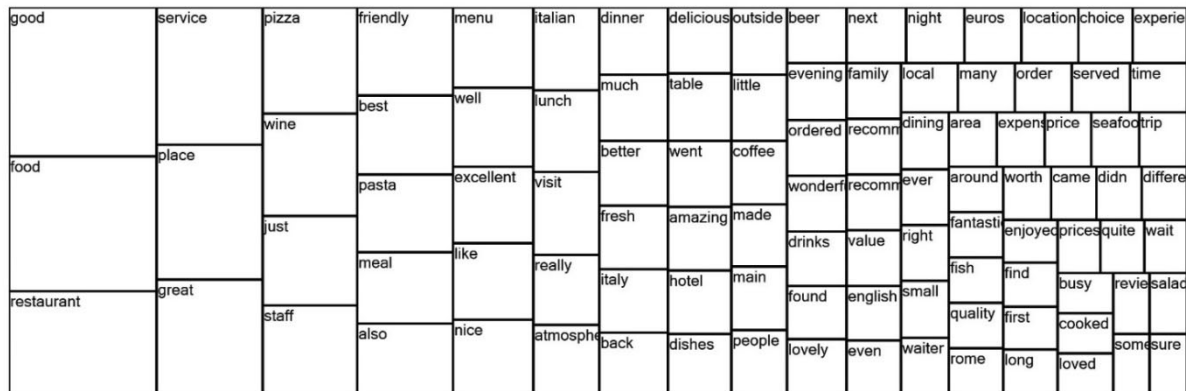
Tree map analysis of step 0 (reviews on TripAdvisor before visiting Italy):

USA - UK step 0 (word frequency)

food	service	pizza	staff	menu	ordered	friendly	busy	visit	first	bread	order	waiter	fresh	came	times			
									even	arrived	make	sauce	special	area	attentiv			
			nice	really	pasta	best	atmosph	going										
		italian							lunch	even	served	wife	husban	never	last			
	restaurant		just	wine	back	always	experien	went	wait	wonde			restaur	tables	family	happy	main	minute
good		place	well	table	meal	also	delicious	dishes	chicken	drinks	value	price	cooke	didn	peopl	since		
	great	time	like	excellent	dinner	made	much	little	better	many	friends	told	though	worth	dining	still		
						salad	night	small	enjoyed	recom	selectio	lovely	took	dish	take	chee		
										server	around	want	every			dessert		

Tree map analysis of step 1 (reviews on TripAdvisor while visiting Italy):

USA - UK step 1 - 100 word frequent - min 4 letters



Tree map analysis of step 2 (reviews on TripAdvisor after visiting Italy):

USA - UK step 2 100 word frequency 4 letters



Based on the analysis of all reviews the current study explores when are positive reviews made for ethnic restaurants. To do so, we conducted a sentiment analysis of the reviews before visiting Italy vs. after the visit (see Table 2, Appendix).

Concerning authenticity perceptions, a query was conducted in NVIVO 12 about the word authenticity and how this is used in the online reviews of consumers before (step 0) vs. during (step 1) vs. after their visit in the country of origin (step 2). A word cloud was created per step (Figure 2, see Appendix).

Authenticity perceptions are affected after visiting the country of origin and so the word clouds are different before, during and after the visit to Italy. For instance, pizza is perceived as part of the Italian food authenticity and so the word is included in the word cloud of step 0. However, after visiting Italy consumers realized that Italian cuisine does not necessarily include pizza but rather other food options. As such, the word pizza is not included in the word cloud of step 2. Gelato on the contrary is an important aspect for Italians and so it is included as part of authenticity in step 2 but, not before visiting Italy, step 0.

Finally, authenticity relies much on the actual food menu and authentic atmosphere which are depicted in step 2 but, not in step 0. Step 0 is more about the staff, the service and to feel closer to the Italian-like character whereas, after visiting Italy consumers perceive the core of authenticity to rely on great food, simplicity and the traditional menu choices.

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Appendix

Figure 2: Authenticity perceptions - Word clouds before, during and after visiting the country of origin

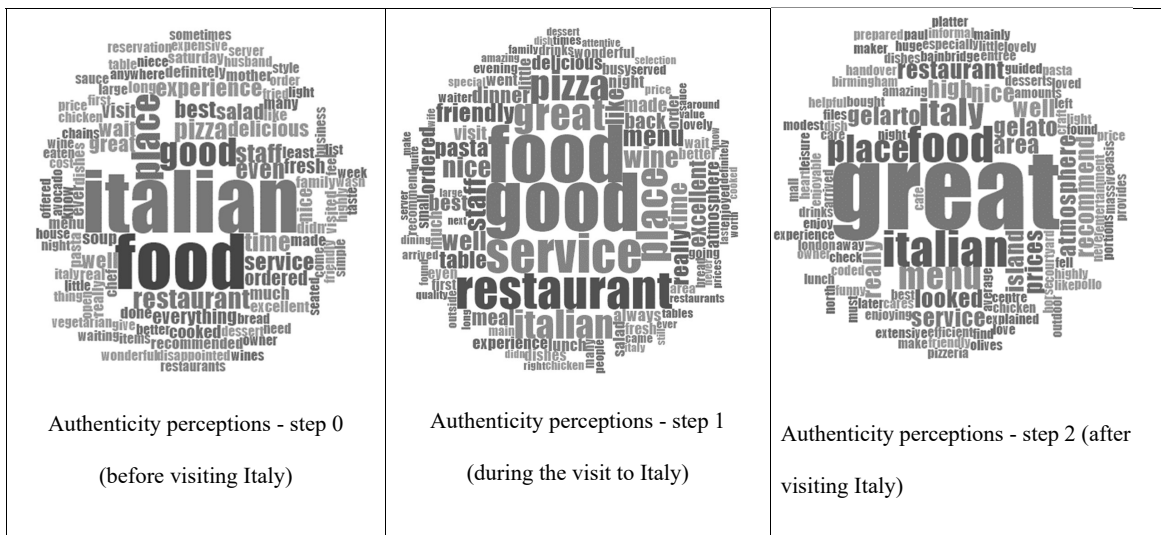


Table 2: Sentiment analysis – online reviews

MOST COMMONLY USED WORDS IN THE CONSUMERS ONLINE REVIEWS OF STEP 0	ANALYSIS
Food	Good quality, cooked properly, well presented, tasty, warm plates have to arrive warm and not cold, price has to be reasonable in relation to food, fresh ingredients, authentic recipes, comparisons with Italian ancestors' cooking, sufficient food choices/range.
Good	Food has to be good, good service, good staff (friendly is commonly used), good atmosphere, good price (value for money is commonly mentioned), good location, good menu, a restaurant to remain consistently good, good range of food, good portions.
Excellent	Excellent: menu, service, staff, food, value for money, wine, special dishes, desserts.
Great	Great: location, value, atmosphere, welcoming owners, staff, food, drinks, great range of dishes, great drinks selection, great food selection, bread, great time.
Italian	Authentic, traditional food, wine, my own Italian mother's cooking, Italian experience, Italian staff, traditional Italian cuisine, pasta done properly-the Italian way, Italian chef, real Italian food, Italian atmosphere and decoration style, songs, products (imported).
Menu	They change the menu once every ice age so it just gets boring, good range of choices, lunchtime special menu, value for money, traditional, Italian food suppliers (imported).
Pizza	Well-cooked, cooked as it should: very thinly sliced and delicious, value for money, variety of pizza types, local ingredients, handmade, fresh, its taste and quality are stable over the years.
Place	Cosy, pleasant, wonderful, well decorated, small/informal, friendly, quiet/for romantic meals, the place tries to give you an Italian experience, authentic.
Restaurant	Recommended, tasty food, authentic Italian cuisine, busy restaurant is a good sign as long as the service is good, serves customers' favourite dishes, good location, good portions, nice decoration, not too loud music, independent is preferred (not chains), reasonable prices, keep the quality stable over the years, clean.

Service	Low waiting time is a plus, efficient service, warm and friendly, polite staff, attentive staff but not too pushy, service with a smile, professional service (e.g. not part time students), knowledgeable staff, service charge normal (not too high).
Staff	Friendly, pleasant, attentive, helpful, welcoming, interested in customers' opinion/needs, Italian staff are preferred (perceived as a more authentic experience), well-trained staff, professional staff, quick/prompt, responsive to requests, able to explain each dish, not to bother too much the customers (e.g. interrupt their conversation).
Time	Low waiting time, visited the place several times (the restaurant and its food remain consistently good), allow time to customers to eat (not to kick them out quickly, avoid make them feel like fast-food), impress the customers since their first visit and make them regulars.
Wine	Take their time to enjoy the wine (not to feel rushed), house wine is much appreciated, variety of wine selection (thoughtful wine list not extensive though), Italian wine is expected to be in an Italian restaurant, the staff has to ask the customers to try the wine first before consuming it, good price, menu to be paired with wine suggestions helps customers to decide, wine decorations are liked by the consumers, if wine is served by knowledgeable staff is much appreciated, to be sustained properly otherwise it goes bad, to be served in clean and not too old glasses.
MOST COMMONLY USED WORDS IN THE CONSUMERS ONLINE REVIEWS OF STEP 1	ANALYSIS
Excellent	Service, wine and beer, fresh ingredients, food quality, food variety, location, service, atmosphere, staff (e.g. they could be city's ambassadors, friendly), bread, authentic meals, excellent value for money.
Food	Good quality, variety of food options, tasty food, good texture, good ingredients, value for money, tastier here than in their home country, care and effort put during food preparation, no photos of the food offered (as in touristic places), right portions (not too small neither too large), authentic Italian food, rustic, local food, well-cooked, well-presented, fresh (not microwave).
Good	Good drink choices (prosecco, beer, house wine), good coffee, good food quality, good desserts (tasty), good location, good service (good signs: no English menu, no fluent in English but,

	just enough to explain the dishes and make recommendations, locals are customers), good atmosphere and friendly, not stuffy atmosphere: just good, honest, traditional Italian.
Great	Great drink choices (wine, beers), great bread, great food (tasty, authentic, comes in good portions), great staff (friendly, helpful, treated customers with great care, knowledgeable, they make great recommendations for wine and specials), great place for dinner (atmosphere, view).
Menu	Comprehensive enough (choices for everyone, have options in order to return), menu is perceived as authentic if it is only in Italian (staff will do orally the translation), fresh ingredients.
Place	Busy but not noisy, nice setting, good location, good gelato place, clean, when owners run the place is much appreciated and is often characterised as personal and efficient service, relaxing place/cosy place, a place visited by locals is a good sign, from the outside the place seems inviting and traditional, value for money.
Restaurant	Cosy, convenient location, nice setting (not cheesy touristic), value for money, recommended by others (hotel reception recommendation, locals or eWOM), good service/efficient, friendly staff, nice atmosphere, good food quality, pasta made in the restaurant, fresh ingredients, good wine, traditional, family businesses are preferred, busy (good sign as long as the service is adequate), when locals are customers this is perceived as a good sign,
Service	Friendly, efficient, staff make suggestions when they are asked, attentive service (but not rushed), low waiting times, funny service (staff could be ambassador of the city).
Staff	Staff with joy (e.g. the waiter sang, he joked, he took pictures, he was charming), friendly, welcoming, assisting/helpful (provide suggestions when they are asked-not annoying), when menu is in Italian only it is a good sign/authenticity for the customers (staff is translating), knowledgeable (recommendations for wine pairing and the specials).
Wine	Sufficient choices, value for money, wine recommendations are made by the staff (knowledgeable staff is much appreciated), value for money, the dishes are accompanied with wine choices in

	the menu, house wine is much appreciated, local wine is preferred, high quality wine,
MOST COMMONLY USED WORDS IN THE CONSUMERS ONLINE REVIEWS OF STEP 2	ANALYSIS
Food	Good quality, sufficient quantity, well-cooked, value for money, tasty, fresh ingredients, authentic (not just Italian style), arrive at the right temperature (hot), real bread, traditional recipes, give a dessert for a special occasion.
Good	Good service, good food, good atmosphere, good flavoured dishes, good value for money, packed place (which is a good sign), good selection of wine, good desserts, good bread, good ingredients, good portions, good fresh ingredients, good experience.
Great	Atmosphere, food, service, staff, atmosphere, value for money, coffee, pizza, taste, bread, great variety of wine.
Italian	Italian chains are not preferred (independent restaurants are preferred), homemade Italian cuisine, friendly waiters, good atmosphere, authentic Italian food, traditional Italian food, Italian gelato, staff speak Italian.
Menu	Variety of options, reasonably priced, to be renewed, authentic.
Pizza	Large-sufficient portions, oven pizza, not frozen, fresh ingredients, tasty, served quickly, value for money.
Place	Visit the place because of WOM, the place is popular which is a good sign, visited by locals, clean, friendly place, to have character (not to be tacky).
Restaurant	Nice décor (not dated), lovely feeling, fairly busy, authentic, clean, with good food, helpful staff/friendly.
Service	Quick, efficient, a smile from the staff helps, helpful service, friendly, attentive.
Time	Not spending too much time waiting for the meal, service on time, great time/great experience, to be seated on time if a reservation is made, if visiting the restaurant for the first time to have a good impression.
Wine	Wine pairing with food, variety of wine choices, good quality of wine, reasonably priced, clean wine glasses, wine barrels or bottles to decorate the place, price range for wine options.