Are guests of the same opinion as the hotel star-rate classification system?

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Abstract

Hotel classification systems have been questioned on some occasions due to the loss of credibility of stars as a quality standard and because they are sometimes subject to outdated criteria. In any case, this system allows reducing the adverse effects of asymmetric information, characterized in a market such as the hospitality industry.

With a sample of more than 14,000 hotels in 100 cities around the world taken from two of the most important tourism websites as are Booking and TripAdvisor, we ascertained whether the star-rating classification system of hotels, room price, or even hotel size, match user satisfaction measured from the point of view the scores awarded by past users.

The results confirm that despite the differences in criteria in implementing the hotel star-rate classification system throughout the world, a relationship does exist with user satisfaction, based on the scores awarded by former customers both on TripAdvisor and on Booking. In turn, price is related to hotel category and with satisfaction. However, the number of rooms does not influence the score awarded, although depending on the region, there is a relationship between hotel size and category.

We conclude that the hotel classification system adequately fulfils its function as customer ratings increase with each additional star, just as price is also related with both aspects.

The main contribution of this study is that the results concern hotels from around the world comparing them with the views of customers expressed on TripAdvisor and Booking.

Keywords: eWOM, star-rate system, room price, hotel size, Booking, TripAdvisor

Highlights (3-5)

- Customer satisfaction coincides with the hotel star-rate classification system.
- A relationship exists between customer satisfaction, hotel price and classification.
- There is no relationship between satisfaction and number of hotel rooms.
- The conclusions are taken from the analysis of a large number of hotels (over 14,000) in 100 cities around the world.

1. Introduction

In a market in which one of the parties involved in a buying/selling transaction does not have the same information as the other concerning a product or service, so-called information asymmetry occurs (Akerlof, 1970). In the services, given their intangible nature, it is difficult to evaluate their quality (Zeithaml, Berry, & Parasuraman, 1993).

Recent studies related with the hospitality industry indicate that the prospective customers of a hotel rely on recommendations by friends and family to solve their informational disadvantage because tourism services cannot be tried or tested before purchase (Fernández-Barcala, González-Díaz, & Prieto-Rodríguez, 2010) and that has been substituted, on certain occasions, by the role of the travel agent, who acts as an intermediary in a market characterized by this asymmetry (Clerides, Nearchou, & Pashardes, 2005; Jeacle & Carter, 2011).

The phenomenon of recommendations is especially important with the Internet and is known as electronic Word of Mouth (eWOM) and is defined by Litvin, Goldsmith, & Pan, (2008) as being "all informal communications directed at consumers through Internet-based technology related to the usage or characteristics of particular goods and services, or their sellers".

eWOM, thanks to web-based consumer opinion platforms (Hennig-Thurau, Gwinner, Walsh, & Gremler, 2004), can have a significant influence on travel-related decisions (Gretzel & Yoo, 2008) and both positive and negative reviews have the potential to influence customer purchase decisions (Sparks & Browning, 2011). The web-based consumer opinion platforms can also contribute to attenuating the negative effects of asymmetric information, perhaps such as opportunistic behaviours on the part of the supply side.

Information asymmetry can be compensated using other elements such as price, the star-rate classification system (Nicolau & Sellers, 2010; Öğüt & Onur Taş, 2012), customer review ratings, number of recommendations and average display rank (Cezar & Ögüt, 2016).

The aim of this research is to confirm whether, indeed, such elements as the star-rated classification system of hotels determined by a third party, the price of a room fixed by the supply side, or even hotel size, match user satisfaction measured from the point of view of the ratings obtained by past users' scores on two of the main websites used by the hospitality industry (Booking and TripAdvisor) in the hotels of the 100 top city tourist destinations.

This introduction is followed by a review of the existing literature on the subject and the study objectives are set out. Then the methodology is presented, paying special attention to data collection, the results are put forward, leading finally to a section for discussion and conclusions.

2. Literature review and research aims

The review of the literature is divided into three sections. On the one hand the standard system of hotel categories is analysed, while on the other, the importance of electronic Word of Mouth in the hospitality industry is studied, and finally, the existing studies are shown on the relationship between hotel price and size with the star-rating system.

2.1. Standard system of hotel categories

Hotel ratings are used to classify hotels according to their quality using laws approved by national or local governments, or by applying criteria established by independent organizations, hotel associations, national consumer travel organizations, guidebooks, travel websites and volunteer organizations (Denizci Guillet & Law, 2010). Thus, rating systems can be classified into official and non-official (Zhan-Qing & Liu, 1993). The hotel star-rating classification is universally recognized and the most common system for classifying hotels is from 1 to 5 stars.

The system for classifying hotels is different in each country and even hotels from the same country follow different criteria because there are local regulations, like in Spain where the autonomous governments are empowered to legislate in this regard and use different criteria to assign stars to the hotels.

On an international level, there is no common standard concerning what a hotel from each category should provide. What seems clear is that obtaining different stars is based on objective criteria such as infrastructure, services, amenities, and the sizes of the rooms and common spaces.

As Fang, Ye, Kucukusta, & Law, (2016) point out, the overall quality of hotels can be inferred from their stars that are assessed by an official organization according to a unified standard, and hotel star-rating is most often employed by consumers in their choice of hotel (Núñez-Serrano, Turrión, & Velázquez, 2014) and the star-rating classification mechanism is the most common customer segmentation pattern in the hotel industry (Dioko, So, & Harrill, 2013). Additionally, a higher star-rating can be considered as being an indicator of higher quality (Abrate, Capriello, & Fraquelli, 2011) and can be useful to reduce the adverse effects of asymmetric information (Nicolau & Sellers, 2010; Öğüt & Onur Taş, 2012).

Moreover, a study carried out by Bulchand‐Gidumal, Melián‐González, & González López‐Valcárcel, (2011) with a data from more than 10,000 hotels from TripAdvisor, confirmed that each additional star enhances a hotel's score.

Not all research studies confirm the relation between the star-rating classification system and quality. According to Núñez-Serrano et al., (2014) there has been a deterioration and loss of the reliability of the star-rating system as a quality standard, from their analysis of 7,783 hotels from the Official Guide to Hotels in Spain (OGHS).

A study conducted by Torres, Adler, & Behnke, (2014) confirmed that there were powerful reasons why hotel rating systems might become obsolete, an opinion expressed by General Managers interviewed in their research.

Furthermore, López Fernández & Serrano Bedia, (2004) conclude in their study consisting of personal interviews with customers from 54 hotels in Cantabria, Spain, that there are significant differences between expectations, perceptions and the various hotel categories, so the ranking of the groups does not correspond with the categories.

To find out whether the hotel star-rating classification system determined by the supply side or by a third party that is different all over the world has a relationship with customer satisfaction measured by votes in the form of ratings in two of the main websites used by the hospitality industry (Booking and TripAdvisor), the following research hypothesis is posited:

H1. The higher (lower) the category of hotel, the better (worse) the score and, therefore, the better (worse) the position in the ranking.

2.2. Electronic Word of Mouth

In services, the importance of recommendations, known as Word of Mouth (WOM), has been widely discussed by many researchers (Butler, 1980; Cohen, 1972; Dellarocas, 2003; Hu, Bose, Gao, & Liu, 2011; Liu, 2006) and WOM occurring in digital environments, known as electronic Word of Mouth (eWOM) is especially important because of the magnitude recommendations can acquire.

According to Cantallops & Salvi (2014), research on eWOM in the hotel industry can be divided into two groups: review-generating factors (previous factors that cause consumers to write reviews) and impacts of eWOM (impacts caused by online reviews) from the consumer perspective and the company perspective.

eWOM influences travel-related decisions and consumers' reviews generate more trust than communications from the company itself (Gretzel & Yoo, 2008). Positive eWOM increases the probability of booking a room in a hotel (Vermeulen & Seegers, 2009), leading to an increase in the rooms sold for each additional point on the TripAdvisor rating scale (Anderson, 2012) or a 10 percent increase in traveller review ratings boosting online bookings by more than 5 percent (Ye, Law, Gu, & Chen, 2011), resulting in a better conversion rate (Petz & Greiner, 2014) and high numbers of recommendations increase online hotel room sales (Cezar & Ögüt, 2016), while negative eWOM generates the opposite effect (Hong, 2006; Karakaya & Barnes, 2010; Lee, Park, & Han, 2008; Steffes & Burgee, 2013).

For some authors, positive or negative eWOM is not the only important element of this phenomenon. Also important is the number of reviews (Viglia, Furlan, & Ladrón-de-Guevara, 2014), giving belief to the theory that volume is more important than valence (Liu, 2006) and stating that a large number of reviews may encourage potential consumers to decide to buy a product that many other people have also acquired (Dellarocas, Zhang, & Awad, 2007; Godes & Mayzlin, 2004; Park, Lee, & Han, 2007) and because it is a sign of popularity (Zhang, Zhang, Wang, Law, & Li, 2013 and Zhu & Zhang, 2010 cited in Xie, Zhang, & Zhang, 2014).

2.3. Room price and hotel size

Hotels upgrade to higher star categories, thereby generating more revenue (Leung, Lee, & Law, 2011) because the hotel star-rating system has the most significant impact on price dispersion, and hotels with a higher star-rating can charge more flexible room rates (Zong, Tang, Huang, & Ma, 2008).

Research conducted in Israel demonstrates that the star-rating system is still a stable and consistent predictor of room prices (Israeli, 2002), and it is traditionally used to rate hotel quality. Abrate & Viglia, (2016) have identified three groups of variables that are based on dynamic pricing which are: tangible (physical attributes), reputational (stars and online) and contextual (booking time, free cancellation, competition).

As pointed out by Ben Aissa & Goaied (2016), there is also a growing body of literature investigating the relationship between hotel size and hotel financial performance leading to different findings.

A study comparing hotels from London and Paris on Booking reveal that the star-rating of hotels significantly affects the sensitivity of room prices to customer ratings, as less price-sensitive customers value quality higher (Öğüt & Onur Taş, 2012).

Some studies have investigated with hedonic price methods the relationship with quality in the hospitality industry (Chen & Rothschild, 2010; Hamilton, 2007; Masiero, Nicolau, & Law, 2015; Monty & Skidmore, 2003). Some results show that the most relevant characteristics are cleanliness, location and facilities in the 8,000 hostels analysed worldwide (de Oliveira Santos, 2016) or revealing price differences between hotels depending on the category (Saló, Garriga, Rigall-i-Torrent, Vila, & Fluvià, 2014).

Noting that the hotel classification system can be a predictor of room rates gives rise to hypothesis:

> H2a. The higher (lower) the hotel category, the higher (lower) the price of the room.

Furthermore, observing that quality signals have a positive effect on price setting (Abrate et al., 2011) and that factors associated with consumer sensitivity to price are gaining importance in research (Cantallops & Salvi, 2014), hypothesis posits

> H2b the higher (lower) the price of the room, the better (worse) score and therefore the better (worse) position in the ranking generated by the ratings of past guests.

Moreover, according to research conducted in the Israeli hospitality industry, the results indicate that star information is perceived as more relevant for pricing than brand name (Danziger, Israeli, & Bekerman, 2006), and the number of rooms per hotel was also significant, suggesting that larger hotels demanded higher prices (Israeli, 2002).

As pointed out by Claver-Cortés, Molina-Azorín, & Pereira-Moliner, (2007), various studies have classified hotels according to their size (Baum & Mezias, 1992; Chung & Kalnins, 2001; Ingram, 1996; Lant & Baum, 1995) and they confirm that size and category are strategic variables to increase hotel performance, together with type of hotel management.

Research analysing hotels on the Costa Brava, Spain, concluded that the effects on price of some characteristics related to location differ for each type of accommodation and other attributes with a significant effect on price are town, hotel size, distance from the beach and availability of parking spaces (Espinet, Saez, Coenders, & Fluvià, 2003).

In addition to studying the relationship with price, we intended to test whether there are other attributes related to hotel category and customer ratings, such as hotel size measured from the point of view of the number of rooms. Hence

> H3a: the higher (lower) the hotel category, the higher (lower) the number of rooms
> H3b: the higher (lower) the number of rooms, the better (worse) the score.

3. Methodology

Having considered the existing literature and given that the price of a hotel room or the number of hotel rooms is set by the service provider, the classification of hotels by stars, in most cases determined by a third party such as official authorities based on existing regulations, or unofficial institutions with objective criteria, the aim of this research is to ascertain whether hotel category, number of rooms and price match user satisfaction measured from the point of view of the opinions expressed by previous customers in two of the most influential businesses in the tourism industry in recent times, which have significant differences in their business models. One, TripAdvisor, a web-based consumer opinion platform, and other, Booking, one of the leading online hotel brokerage companies in the world.

Booking.com B.V., part of the Priceline Group, is world leader in booking accommodation online with 857,403 active properties in 223 countries and territories with over 1,000,000 room nights reserved on Booking.com each day (Booking.com. 2016).

TripAdvisor is one of the most important web-based consumer-opinion platforms (COPs) enabling travellers to plan and book the perfect trip. TripAdvisor-branded sites make up the largest travel community in the world, reaching 350 million unique monthly visitors, and 320 million reviews and opinions covering more than 6.2 million accommodations, restaurants and attractions (TripAdvisor, 2016).

In this study, we analysed the hotels of the Top 100 city tourist destinations in the world, according to the Euromonitor Ranking (Geerts, 2016). The 100 cities were divided into 4 regions following the denominations of Banerjee & Chua, (2016): America (AME), Asia Pacific (ASP), Europe (EUR) and Middle East Africa (MEA).

During February 2016 we collected the information of the hotels from Booking and TripAdvisor (see Table 1): number of reviews, ranking and score on both websites, and from Booking: hotel category, number of rooms and price rank.

We filtered the results by “property type” in Booking as “Hotels” and we selected the review score of Booking with the option rated by “All reviewers”. Once gathered, all the hotels of each city were compared with TripAdvisor. On this website we took into account only the type of accommodation “Hotels”, discarding other options, and we ordered them according to “Ranking”.

The data were collected using a web browser automatically controlled that simulated a user navigation (clicks and selections) for TripAdvisor and Booking. Once the data was available, a new data set was created by joining together corresponding data for a given hotel from both websites. The join criteria used was, for every city: 1) If hotel name was exactly the same. 2) Else if the hotel name from one site was contained, entirely, on the name from the other site (the choosing of container and contained was depending on name length, container chosen as the longest name available). 3) If no match was found, then the Ratcliff/Obershelp (Ratcliff & Metzener, 1988) similarity was computed between each possible pair of names (one from Booking and one from Tripadvisor), the list of distances was then sorted, and the greatest one (best match) was chosen, if that similarity was higher than 0.85 (that is 85% of letters match considering position), the pair was chosen, and the names removed from both lists.

The data collected from each city and platform were taken simultaneously, in order for the score and the number of reviews to undergo the minimum variation, because the websites are active and their data are modified day after day.

The price variable in this study is not an absolute value (currency), but ranges from 1, the cheapest, to 5, the most expensive, these data being obtained from Booking.

Some values were missing from our dataset because not all managers provide hotel category or number of rooms or price, and some properties had not received any ratings by users.

According to the Booking.com B.V. website, "the information disclosed is based on that provided by accommodation providers. As such, the accommodation providers are given access to an extranet through which they are fully responsible for updating all rates, availability and other information which is displayed on the website, even the star classification".

As highlighted in the review of the literature, the star-rating system is different in every country and hence it is difficult to compare hotels from all over the world. For this reason we considered the star-rating provided by Booking as being useful for comparing hotels, as well as price ranking and room numbers provided by Booking used in other research (Öğüt & Onur Taş, 2012).

Moreover, with a random sample of 2.5% of the hotels all from our dataset, the star-rated classifications shown in Booking were checked with the official websites of the hotels and in most cases, 92.1%, the stars matched. Discrepancies were found in hotels from ASP, 3.8%, AME, 2.5% and EUR, 1.6%.

Table 1. Sample data

	Booking	TripAdvisor
Region	4	4
Country	48	48
Destination	100	100
Hotels	49,315	85,274
Hotels on both websites	14,726	14,726
Reviews	8,264,853	6,272,634
Min. Review	5	1
Max. Review	16,300	16,110

Source: Compiled by authors based on data from Booking and TripAdvisor

4. Results

To test H1: The higher (lower) the category of hotel, the better (worse) the score, Spearman's rank correlation test between hotel category and score was conducted for TripAdvisor and Booking.com as hotel category is displayed as a ranking from 1 to 5 stars. This nonparametric test is used to check the first hypothesis because category of hotel is an ordinal qualitative variable and the score is a quantitative variable. The results indicate for the total sample that the correlation between hotel category and score is moderate: 0.4255 ($p < .001$) on Booking and 0.4316 ($p < .001$) on TripAdvisor (see Table 7).

Table 2. Proportional contingency table between ranking brackets and hotel category for Booking and TripAdvisor

Category	1*		2*		3*		4*		5*		Total	
Ranking	TA	Bk	TA	Bk	TA	Bk	TA	Bk	TA	Bk	TA	Bk
1-50	0.00	0.00	0.01	0.01	0.04	0.08	0.07	0.10	0.07	0.08	0.19	0.27
51-100	0.00	0.00	0.01	0.03	0.06	0.09	0.06	0.09	0.02	0.03	0.15	0.24
101-300	0.01	0.01	0.06	0.08	0.16	0.17	0.12	0.10	0.03	0.02	0.38	0.38
>300	0.01	0.00	0.08	0.04	0.12	0.04	0.06	0.02	0.01	0.00	0.28	0.10
Total	**0.02**	**0.01**	**0.16**	**0.16**	**0.38**	**0.38**	**0.31**	**0.31**	**0.13**	**0.13**	**1**	**1**

Source: Compiled by authors based on data from Booking and TripAdvisor

Table 3. Pearson residuals between ranking brackets and hotel category for Booking and TripAdvisor

Category	1*		2*		3*		4*		5*		Total	
Ranking	TA	Bk	TA	Bk	TA	Bk	TA	Bk	TA	Bk	TA	Bk
1-50	-5.38	-6.29	-14.83	-16.7	-13.59	-9.44	4.1	5.36	34.99	29.08	5.29	2.01
51-100	-1.99	-2.1	-9.01	-4.82	-1.02	0.64	6.2	6.11	2.78	-4.2	-3.04	-4.37
101-300	0.67	5.6	0.32	6.81	5.75	7.61	1.25	-4.67	-12.3	-15.69	-4.31	-0.34
>300	5.09	2.59	18.39	20.64	5.21	-0.25	-9.39	-8.77	-16.42	-10.22	2.88	3.99
Total	**-1.61**	**-0.2**	**-5.13**	**5.93**	**-3.65**	**-1.44**	**2.16**	**-1.97**	**9.05**	**-1.03**	**0.82**	**1.29**

Source: Compiled by authors based on data from Booking and TripAdvisor

Table 4. Pearson residuals between price and stars

	1 $	2 $	3 $	4 $	5 $	Total
1*	24.36	30.97	-0.24	-17.19	-12.96	24.94
2*	4.92	20.93	9.36	-14.27	-15.99	4.95
3*	-2.92	1.14	16.14	-6.37	-16.96	-8.97
4*	-6.96	-13.64	5.88	11.32	-10.99	-14.39
5*	-8.79	-21.12	-24.4	14.82	41.68	2.19
Total	**10.61**	**18.28**	**6.74**	**-11.69**	**-15.22**	**8.72**

Source: Compiled by authors based on data from Booking and TripAdvisor

Table 5. Proportional contingency table between ranking brackets and prices for Booking and TripAdvisor

Price	1 $		2 $		3 $		4 $		5 $		Total	
Rank	TA	Bk	TA	Bk	TA	Bk	TA	Bk	TA	Bk	TA	Bk
1-50	0.00	0.01	0.01	0.02	0.02	0.03	0.04	0.07	0.13	0.16	0.20	0.29
51-100	0.01	0.02	0.02	0.03	0.03	0.05	0.05	0.07	0.06	0.07	0.17	0.24
101-300	0.04	0.05	0.07	0.08	0.08	0.09	0.10	0.09	0.08	0.05	0.37	0.37
>300	0.05	0.03	0.07	0.03	0.06	0.02	0.05	0.02	0.03	0.01	0.26	0.11
Total	**0.10**	**0.11**	**0.17**	**0.16**	**0.19**	**0.19**	**0.24**	**0.25**	**0.30**	**0.30**	**1**	**1**

Source: Compiled by authors based on data from Booking and TripAdvisor

Table 6. Pearson residuals between ranking brackets and price ranking for Booking and TripAdvisor

Price	1 $		2 $		3 $		4 $		5 $		Total	
Rank	TA	Bk	TA	Bk	TA	Bk	TA	Bk	TA	Bk	TA	Bk
1-50	-13.05	-12.31	-13.85	-13.27	-11.35	-10.71	-5.31	-1.89	30.24	25.93	-13.32	-12.24
51-100	-7.17	-6.06	-6.15	-2.21	-2.89	1.82	4.54	4.26	6.45	-0.33	-5.22	-2.52
101-300	6.36	11.78	6.13	12.11	6.14	7.67	2.92	-1.13	-15.09	-19.81	6.46	10.62
>300	12.16	13.71	12.47	3.2	5.50	-0.37	-4.36	-2.53	-15.73	-7.22	10.04	6.79
Total	**-1.69**	**7,121**	**-1.40**	**-0.17**	**-2.60**	**-1.59**	**-2.21**	**-1.29**	**5.87**	**-14.24**	**-2.03**	**2.65**

Source: Compiled by authors based on data from Booking and TripAdvisor

Table 8 shows the results for each region analysed and confirms that there is a moderate correlation in all regions: the highest in MEA with 0.53 and 0.57 in TripAdvisor and Booking respectively, and with ASP being the weakest with 0.41 in both portals.

Table 7. Correlations between hotel category, rooms, price, scoring and number of reviews

	Mean	SD	1. [a]	2.	3. [a]	4. [b]	5. [b]	6. [b]	7.
1. Stars	3.45	0.97	1						
2. Rooms	137.96	172.29	0.4834	1					
3. Price	3.54	1.32	0.6757	0.2769 [a]	1				
4. Score TripAdvisor	3.84	0.60	0.4316	0.1000 [b]	0.5320	1			
5. Score Booking	7.86	0.86	0.4255	0.0587 [b]	0.5533	0.7582	1		
6. Reviews TripAdvisor	513.55	784.77	0.3778	0.5140 [b]	0.3436	0.2547	0.2694	1	
7. Reviews Booking	677.51	898.49	0.0961	0.3237 [b]	0.0048**	0.0239*	0.1316	0.4123	1

[a] *Spearman rank correlation* [b] *Pearson correlation*

*All p close to 0 except *p < .05; ** p > .05*

Also to test H1: The higher (lower) the category of hotel, the better (worse) position in the ranking, the ranking was divided into four brackets, from positions 1 to 50, from 51 to 100, 101 to 300, and from 301 to the end. As category of hotel is an ordinal qualitative variable, and the position in the ranking is also an ordinal qualitative variable, we conduct a chi-square test for independence.

From chi-square analysis we can see that the probability that in the sample there is the same number of hotels in the different brackets of the TripAdvisor ranking is extremely low (x^2 = 2.188.17 df=12, p < .001) the same as in Booking (x^2 = 1.730.75, df = 12, p < .001). This leads us to reject the null hypothesis and conclude that there is a relationship of dependency between hotel category and position in the ranking, which is statistically significant.

The construction of the contingency table between hotel category and position in the ranking of both portals is useful to display the results of the chi-square test. The proportional contingency table shows the observed relative values and the Pearson residuals are the difference between the observed and the expected values. We note that depending on hotel category, the hotels do not have the same likelihood of being in the same bracket of the ranking. The 5-star category occupies most positions of the first bracket (between positions 1 and 50), followed by the 4-star category in both Booking and Trip Advisor. However, the

hotels that occupy the worst positions (from 300 onwards) are 2-star establishments followed by 1-star ones on Booking.com, and on TripAdvisor 2-star followed by 3-star hotels. In the case of those occupying positions 101-500 of Booking they are 3-star followed by 2-star hotels, however on TripAdvisor they are occupied by 3-star followed by 1-star hotels (see Table 2 and 3).

It is shown that the establishments belonging to 5-star categories are at the top of the rankings, followed by 4-star hotels. Conversely, lower category hotels, with two stars, are located in positions higher than 300 in both rankings, followed by those with one star on Booking and those with three and one stars on TripAdvisor.

To confirm the second hypothesis, H2a: The higher (lower) category of hotel, the higher (lower) the price of the room, Pearson's Chi-squared test was performed between the stars variable and the price variable, as in the previous hypothesis both are ordinal qualitative variables.

The test indicates that the probability that in our sample hotels of any category are in the same brackets of price ranking is extremely low ($x^2 = 7216.6$, df = 16 $p < .001$). This tells us that we must reject the null hypothesis and conclude that there is an association between price and hotel category and that it is statistically significant.

The Pearson residuals between price and stars indicate that 1- and 2-star hotels have a lower price and that 4- and 5-star hotels are those that are clearly in the highest price ranking (see Table 4).

In addition, to confirm this aspect a Spearman's rank correlation test was performed, as both are ordinal variables, and a high Spearman's coefficient of correlation is obtained in the set of data of 0.67, with the MEA and ASP regions presenting a higher correlation with coefficients of 0.77 and 0.72, respectively.

To test H2b: The higher (lower) the price of the room, the better (worse) the score, again a Spearman's rank correlation test was performed between price of the room and score on both platforms because the price is an ordinal qualitative variable (from 1 to 5), and the hypothesis is accepted as there is a relationship between the two variables, as can be seen in Table 7 with the complete dataset. With data by regions we note that EUR has the highest correlation both on TripAdvisor and on Booking (0.58 and 0.62, respectively), followed by AME (0.58 and 0.60) and the weakest is in ASP (0.45 in TripAdvisor and 0.50 Booking), as can be seen in Table 8.

Table 8. Correlations between hotel category, rooms, price, scoring and number of reviews, by regions

	Region	**Mean**	**SD**	**1.** [a]	**2.**	**3.** [a]	**4.** [b]	**5.** [b]	**6.** [b]	**7.**
1. Stars	AME	3.45	0.89	1						
	ASP	3.48	1.00							
	EUR	3.38	0.92							
	MEA	3.85	1.00							
2. Rooms	AME	184.10	228.92	0.3593	1					
	ASP	172.16	196.24	0.5523						
	EUR	93.60	110.06	0.4969						
	MEA	189.18	193.31	0.4746						
3. Price	AME	3.39	1.32	0.6693	0.2284 [a]	1				
	ASP	3.66	1.23	0.7217	0.3786 [a]					
	EUR	3.51	1.37	0.6549	0.2576 [a]					
	MEA	3.31	1.44	0.7738	0.3126 [a]					
4. Score	AME	3.87	0.56	0.4787	0.1006 [b]	0.5772	1			

TripAdvisor	ASP	3.84	0.58	0.4185	0.1295 [b]	0.4549				
	EUR	3.85	0.61	0.4320	0.0787 [b]	0.5789				
	MEA	3.87	0.56	0.5338	0.1850 [b]	0.5554				
5. Score Booking	AME	7.98	0.75	0.5035	0.0864 [b]	0.6024	0.8163			
	ASP	7.66	0.93	0.4160	0.1280 [b]	0.5089	0.6905			
	EUR	8.02	0.76	0.4566	0.0817 [b]	0.6256	0.8438	1		
	MEA	7.47	0.98	0.5721	0.1334 [b] (0.00139)	0.5826	0.7946			
6. Reviews TripAdvisor	AME	900.75	1341.74	0.3223	0.6527 [b]	0.3228	0.2147	0.1566		
	ASP	391.55	691.65	0.4353	0.5035 [b]	0.4304	0.2838	0.3239	1	
	EUR	613.47	515.56	0.3910	0.5433 [b]	0.3440	0.2826	0.2692		
	MEA	362.86	504.21	0.4643	0.3824 [b]	0.3894	0.4118	0.4112		
7. Reviews Booking	AME	628.87	855.76	0.0156** (0,547)	0.3623 [b]	-0.1348	-0.0512* (0.048)	-0.0299** (0.248)	0.3858	
	ASP	388.06	651.67	0.2145	0.4297 [b]	0.1812* (0.02)	0.0698	0.2056	0.6045	1
	EUR	889.78	955.66	0.0484	0.4332 [b]	-0.0318	-0.0008** (0.953)	0.0451	0.4269	
	MEA	890.24	1298.94	0.2109	0.6336 [b]	-0.0289** (0.49)	0.1579	0.1918	0.3515	

[a] *Spearman rank correlation*
[b] *Pearson correlation*
*All p close to 0 except *p < .05; ** p > .05*

Table 9. Summary of the Hypothesis, methodology and results

Hypothesis	Method	Results
H1 Better hotel category, better score	Spearman's correlation	Confirmed
H1 Better hotel category, better ranking position	Chi square	Confirmed
H2a Better hotel category, more expensive	Chi square Spearman's correlation	Confirmed
H2b More expensive, better score	Spearman's correlation	Confirmed
H2b More expensive, better ranking position	Chi square	Confirmed
H3a Better hotel category, more rooms	Spearman's correlation	Partially confirmed
H3b More rooms, better score	Pearson's correlation	Not confirmed

Also, to test H1: The higher (lower) the price, the better (worse) the position in the ranking, the ranking was divided into four brackets, from position 1 to 50, from 51 to 100, 101 to 300 and 301 to the end.

Based on chi-square analysis we see that the probability that in the sample hotels of any price are in the same brackets of the ranking is extremely low ($x^2 = 2943.2$, df = 12, $p < .001$) on TripAdvisor, and ($x^2 = 2422$, df = 12, $p < .001$) on Booking. This tells us that we must reject the null hypothesis and conclude that there is an association between price and position in the ranking and that it is statistically significant (see Table 5 and 6).

Depending on price, hotels do not have the same likelihood of being in the same bracket of the ranking. Higher-priced hotels appear in the best positions of the ranking and lower-priced hotels occupy the worst positions, both on Booking and on TripAdvisor.

To test H3a: The higher (lower) the category of the hotel, the higher (lower) the number of rooms, Spearman's rank correlation test was performed between hotel category and number of rooms and the hypothesis is accepted as there is a moderate relationship (0.48) between the two variables. In EUR the correlation is highest (0.55) and in AME the lowest (0.35).

Analysing the results by cities, we see that half of the sample shows correlations higher than 0.50 while the other half does not, and so this hypothesis is partially confirmed.

Conversely, the number of rooms is unrelated to the score in either of the two portals, with very low correlations (between 0.06 and 0.1) and so H3b is rejected: The higher (lower) the number of rooms, the better (worse) the score. In this hypothesis we have used the Pearson correlation test because both, number of rooms and score, are quantitative variable.

It is also observed that the highest correlations are those made between the scores of both portals, especially in AME and EUR with correlations of 0.82 and 0.84, respectively. The summary of the Hypothesis, methodology and results, can be seen in Table 9.

5. Discussion

These results confirm the relationship between user satisfaction, measured from the point of view of the score of customer electronic word-of-mouth on TripAdvisor and Booking and hotel classification, confirming the theory of studies that indicates that the overall quality of hotels can be inferred from their stars (Fang et al., 2016) and that the star-rating classification mechanism is the most common customer segmentation pattern in the hotel industry (Dioko et al., 2013) or that an ascending order of accommodation needs is observed when we go from economy to luxury hotels (Zhang, Ye, & Law, 2011) .

The relationship between number of stars and position in the ranking is clear and statistically significant and so the loss of credibility of the star system as a quality standard (Núñez-Serrano et al., 2014) does not correspond to the results obtained with this study where it is possible to relate user satisfaction with the number of stars and manage to reduce the possible adverse effects of information asymmetry (Nicolau & Sellers, 2010).

On the other hand, the price variable analysed in this study confirms that there is a relationship with the score obtained and with hotel category, and so we conclude that higher category hotels have higher prices and that the higher the price, the higher the score awarded by users and hence customers do not evaluate quality independently of price (Fernández-Barcala et al., 2010), thus confirming the theory that the star-rating system is still a stable and consistent predictor of room prices (Israeli, 2002) and, it is traditionally used to rate hotels' quality. It should be stressed that hotels with a better ratio between price and category correspond to the regions ASP and MEA.

Our study confirms the well-established knowledge in services marketing of the positive correlation between price and service expectations (Racherla, Connolly, & Christodoulidou, 2013).

In the light of the results there does not seem to be relationship between price and number of rooms and so, with the present study we cannot conclude that larger hotels requested higher prices, unlike the findings in the study by Israeli, (2002).

As pointed out by Claver-Cortés et al., (2007), size and category are strategic variables together with type of hotel management to increase hotel performance. In our case we can assert that the strategic variables that have a better user score and a better position in the ranking of Booking and TripAdvisor hotels are hotel category and room price.

Finally, the number of rooms is moderately related with hotel category, and it behaves differently depending on the region, being weaker in AME and stronger in EUR, and hence we cannot conclude that this is a common pattern throughout the world.

Conversely, the number of rooms does not confirm a better user score, and hence hotel size does not affect user satisfaction. Where there is a high and statistically significant correlation is between the number of rooms and the number of reviews on TripAdvisor and Booking, which leads us to assert that the logic that one could expect of the greater the number of rooms, the more customers and therefore the more reviews, is confirmed in this study.

However, this behaviour is not observed in the same way in all regions: in AME there is a greater relationship between number of reviews on TripAdvisor and number of rooms and in MEA for the Booking portal.

However, the highest correlations are seen to be those which take place between the scores of both portals, this being indicative that the users of both platforms have very similar opinions about the same hotels.

6. Conclusions

The differences in criteria in the allocation of hotel category in each country and even within the same country, in each administrative region, do not seem to prevent the existence of a relationship between stars and the satisfaction of hotel guests measured from the point of view of the score awarded with the opinions of previous customers on the TripAdvisor and Booking portals since a higher hotel category presents a better score by customers who give their opinion on one of the two portals studied and, therefore, the hotels obtain a better position in the ranking of each website.

The eWOM of consumers from the demand side corroborates the validity of the classification system offered by a third party and each additional star corresponding to the hotel category presents a higher level of user satisfaction, measured by the assessment awarded in each one on both portals, placing the establishment in a better position in each ranking.

On the other hand, this study confirms the theory that the higher the hotel category the higher the price set by the hotel, and it contributes to the existing literature on hotel prices analysing them not from the point of view of monetary units, but in the form of a ranking (from 1 to 5) provided by Booking and concluding that the hotels with higher prices achieve a better score from customers and therefore a better position in the ranking of each portal.

In a market characterized by asymmetric information, attributes established by different actors are seen to have joined, such as hotel category which is determined by a third party, price, which is fixed by the supply side, and score, awarded by past guests, i.e. by the demand side, and all of these items, from different perspectives, contribute to reduce the adverse effects of asymmetric information in the hotel industry. So, the results show that hotel classification system fulfils its purpose, as both prices and customers' scores increase with each additional star.

This finding has implications for private managers, who should be aware of how the stars of their establishments are announced not only in information that they themselves control from their establishment (websites, blogs, their profiles on social networks, advertising, etc.) but also the star-rating system assigned by the different third-party electronic distribution channels that in some cases provide differences with the reality (Denizci Guillet & Law, 2010; Leung et al., 2011).

Moreover, as has been shown, the overall quality of hotels can be inferred from their stars (Fang et al., 2016), customers can use the stars as a tool in the choice of hotel establishment and the price they are willing to pay, both coinciding with the feedback provided by previous customers.

Finally, the main contribution of this work is that the conclusions are obtained through the analysis of a large amount of data, more than 14,000 hotels in 100 cities throughout the world, providing a global vision whereas to date similar studies had only been conducted in certain cities or at most in an entire country. In addition, the effort of comparing two of the major portals of opinion in the hospitality industry as are TripAdvisor and Booking is noteworthy and that the data offer certain similarities of behaviour.

The limitations of this study lie in the inconsistency between the star-rating system assigned by the different third-party electronic distribution channels and the one actually assigned, as confirmed by Denizci Guillet & Law, 2010; Leung et al., (2011). In our study we take into consideration the star-rating system of Booking which is a very well-known OTA in the hospitality industry, but the results could be slightly different if we took into account the star-rating system assigned by other channels. Empirical replications using other channels to get the star rating may provide more insights to this discussion.

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