Quality certifications in the TripAdvisor era. Are they outdated?

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Abstract

Purpose – This study analyzes the effects of the consumer-generated media (CGM) boom on hotel managers' investment behavior concerning quality signals.

Design/methodology/approach – A survival analysis has been conducted, considering the permanence/dropout of the Spanish hotels in a quality certification system during the 1998-2020 period.

Findings - The number of hotels certified since 2010 has been progressively falling, pointing to a decreasing interest of the managers in these certifications. Nevertheless, this is not a generalized phenomenon: the hotel characteristics and the number and nature of reviews about them in CGM significantly affect their permanence decisions in certification systems.

Practical implications - The findings provide several keys to optimizing investment management in quality signals considering hotel characteristics and their positioning in CGM.

Originality/value – This is the first study that analyses the relationship between the presence of hotels in CGM and their investments in alternative quality signals. The results will allow future investment decisions based on previous real business experiences.

1. Introduction

The emergence of consumer-generated-media (CGM) platforms has revolutionized the way consumers seek information about the quality of tourism products (Nilashi et al., 2018). Social media and consumer feedback platforms such as *TripAdvisor* often provide consumers with up-to-date information about the experiences of other tourists, which greatly influences their decision-making (Filieri et al., 2020; Lee et al., 2021). In fact, online reputation in the form of reviews and ratings is sometimes considered by customers as more reliable or influential than information from in-store sources (Sutherland et al., 2021). This has implications for business management. Practitioners must now take their companies' CGM positioning very seriously, devoting significant resources to try to maintain or improve it (Anagnostopoulou et al., 2019).

This new scenario raises the question about the current usefulness of alternative quality signals that have been used by companies and consumers. Signals based on expert evaluations, such as hotel rating systems and quality certifications, may now have less relative influence on consumers' decisions and, thus, less importance for managers. In this regard, Torres et al. (2014) ask: "Are expert reviews outdated?".

This problem can be particularly relevant in the case of quality standards and certifications. Achieving this type of signal requires a significant investment for the company to adapt to the specific requirements of the system and to remain within it (Hernández-Perines et al., 2019). In the current scenario, managers may wonder whether these resources would be better invested in the management of the company's image in social networks and other CGM.

Nevertheless, not all hotel companies have the same characteristics and strategies. This means that the relative usefulness of customer feedback reviews vs. expert-based reviews is not always the same. On the one hand, the usefulness of quality standards and certifications may vary depending on these characteristics and strategies (Sutherland et al., 2021). On the other hand, the usefulness of CGM for a hotel and its potential customers will largely depend on the number of reviews the establishment has on the platform and their content (Raguseo et al., 2017).

The main objective of this research is to use signal theory as a basis to analyze the effect that the presence of CGM has had on the decision to enter, remain, or exit the quality certification systems. To reach this objective, we will try to answer the following research questions: In an environment in which CGM offer plentiful information to tourists, what types of hotels keep their investment in quality certifications? Why is it worth keeping those investments? To do so, we will carry out an analysis of the survival of Spanish hotels in Q-certification in the 1998-2020 period. We will consider different factors, including both internal characteristics of the hotel and its evaluation in a CGM of special relevance in this market: TripAdvisor.com.

2. Literature review

2.1. Quality signals in the hotel industry

The signaling theory (Spence, 1973) is one of the most widely used methodologies for dealing with information asymmetry. One of the parties to the transaction (e.g., the customer) does not have complete information about the attributes of what the other party (e.g., the hotel) is offering since many of the relevant characteristics are not observable prior to the purchase or booking of the service. This uncertainty can cause the perceived risk of the transaction to be high, and the transaction may not take place. To avoid this problem, the firms can issue signals that are interpretable by potential customers as relevant information to assess the quality level of the companies (Sergo and Damijanic, 2015).

Firms give signals about their own quality of service, e.g., through branding, advertising, or their pricing policy. However, these signals may be perceived by the consumer as less reliable than those given by third parties (Sparks et al, 2013). These external signals can be of two types: expert signals (issued by experts who analyze the quality levels of each company or establishment) or non-expert signals (mainly those issued by former customers) (Abrate et al., 2011).

As an example of an expert signal, the Hotel Star Rating system is used in the tourism sector as one of the main instruments for signaling the quality level (Belver-Delgado et al., 2020). Tourism administrations assign hotels a categorical classification (from 1- to 5-stars) according to a set of criteria of a fundamentally objective nature: the type of accommodation, room size, facilities and the number of services offered to their customers. The official star

3

category provides a relatively objective basis to measure quality (Abrate et al., 2011). However, within the same star category, there is great diversity in terms of the quality and level of service offered by hotels. As a result, potential customers usually want to complement this information with additional signals.

Other expert quality signals are those provided by organizations outside the hotel itself that independently certify the quality of the hotel according to different factors. Quality certifications have been used as a strategy for external and internal competition among hotels (Sparks et al., 2013; Sutherland et al., 2021). Internally motivated hotels seek to improve their operations and services, while those with external motivations tend to use these certifications as a signal to differentiate themselves from other establishments with the same star rating but lower service quality.

However, the development of digital technology and social media has revolutionized the quality signaling system in the tourism sector (Nilashi et al., 2018). Thus, review platforms such as TripAdvisor have emerged, where customers who have stayed at a hotel can share their experiences with other users and rate the hotel according to different criteria (location, cleanliness, service, and value for money). This creates a wide field for the dissemination of non-expert signals. With a visit to a website, a potential customer can observe the evaluations of multiple previous customers based on experiences in multiple service encounters, with comments about the most positive and/or the most negative of each experience as well as the possible existence, nature, and scope of service failures. It is integrated into a platform that usually provides an average overall evaluation per establishment, thus facilitating comparison with competing establishments. In this way, potential customers can review these non-expert quality signals and decide whether to choose this hotel or another, thus reducing the uncertainty associated with the multicriteria decision-making process (Ukpabi and Karjaluoto, 2018).

If consumers pay more attention now to these signals, the presence of these platforms may make hotels consider the maintenance of quality certificates less important and consider it a priority to allocate resources to social media management. There are examples of the importance that managers attach to TripAdvisor ratings: complaints when there is a change in the algorithm, use of these ratings in their communication campaigns, and resources applied in responding to reviews on the platform (Jeacle and Carter, 2011).

The quality of the information depends on a set of attributes: credibility, accuracy, usefulness, value, sufficiency, and relevance (Filieri et al., 2015). The diversity and disparity of non-expert opinions may cause the information coming from CGM to have certain limitations, but it has several advantages over expert opinions. The main limitation has to do with credibility and value. A client usually does not have the capacity of an auditor to observe the different aspects of the service, either systematically or in depth. Moreover, the neutrality of some opinions (e.g., positive reviews from people linked to the evaluated company) is sometimes under suspicion (Filieri et al., 2015). Although many platforms have implemented systems that allow users to assess the credibility of reviewers (Wu et al., 2020), these practices pose a problem related to information reliability.

However, CGM are useful for users (Filieri et al., 2020; Lee et al., 2021; Mariani and Borghio, 2021), and they have even certain advantages over expert opinions. Although each review displayed on the platform may have less credibility than the expert opinion, the aggregate of the reviews may provide a higher value to the user (Wu et al., 2020; Mariani and Borghio, 2021). Biased reviews may be diluted if the total number of reviews about the establishment is sufficiently large. In addition, the variety of service encounters and associated circumstances (including service failures) can be very high, which increases the scope of what is observed. Finally, the similarity between the sender and the receiver of a signal is also relevant (Heil and Robertson, 2010). The reviewer's approach may be perceived as closer to the user than an expert's approach.

2.2. Quality certifications and standards as quality signals

The literature widely studies the assessment of quality management certificates (Abrate et al., 2011; Sergo and Damijanic, 2015; Yang et al., 2016). Several studies try to establish the relationship between quality certification and performance (e.g., Nicolau and Sellers, 2010; Pereira-Moliner and Tarí, 2015). Practitioners occasionally look for outside advice and opinions to guide their quality practices and to improve their operational services (Torres et al., 2013). Other studies analyze the connection between quality certification and other factors, such as hotel size, location, hotel performance and competitiveness (Mellinas et al., 2019; Hernández-Perines et al., 2019).

Tourism quality certificates can reduce the information asymmetry inherent in the uncertainty associated with the selection process among the existing hotel supply (Yang et al., 2016; Lai et al., 2021). Nevertheless, the development of new technologies and the use of the Internet as a means for searching and purchasing have popularized other quality signal alternatives to these certifications. Thus, sales and opinion platforms such as Booking or TripAdvisor are emerging, where users share their experience with the rest of the world and search for information about destinations and hospitality organizations before, during and after their travel (Erdem and Cobanoglu, 2010). These are increasingly powerful tools in the decision to select one hotel or another (Jeacle and Carter, 2011; Chang et al., 2020). Therefore, in some cases, the need to allocate resources to other tourism quality certifications may not be as important as the need to maintain good customer ratings on these CGM.

Some authors have questioned the current value of signals based on expert audits in the face of competition from CGM (Torres et al., 2014). Moreover, empirical evidence shows that travelers increasingly use consumer-generated feedback as a source of information for choosing accommodation and tourist destinations (see Filieri et al., 2015). Besides, there are examples that point to managers' declining interest in expert-based systems (Jeacle and Carter, 2011). The rise of CGM and their use by consumers makes practitioners wonder whether it is worth the resources and effort to obtain an expert audit of their quality level (Weston et al., 2018). This may be especially true for expert-based systems that involve direct investments by the host to obtain and maintain a certificate. Thus, for example, the Quality Tourism Certification from the Spanish Institute for Quality in Tourism (ICTE) suffered a 25.13% dropout in the number of certified hotels in the period 2010-2019, calling into question the relevance of this type of certification (see Figure 1).
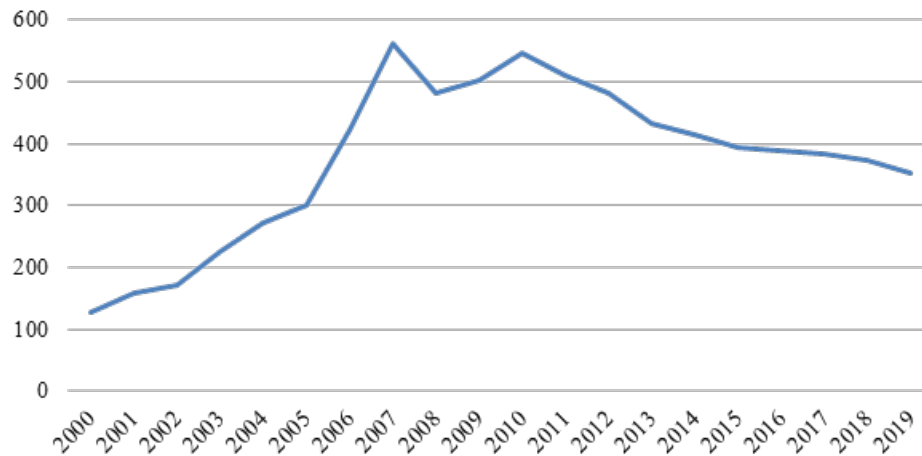
Figure 1. Evolution in the number of Q-certified hotels.

Source: Own work based on ICTE (2020).

This trend is not exclusive to the Q-system. In a report for the Committee on Transport and Tourism (European Parliament) that analyzed quality certifications and standards in Europe (e.g., ServiceQuality Germany, VisitScotland, TourCert, Q-for-quality, among others), Weston et al. (2018) concluded as follows: "The rise of user-generated ratings is challenging the need for quality certification schemes and resulting in some decline in the number of businesses that participate in them." (p. 78).

At this point, we wonder whether this dropout is generalized to all hotels or whether, depending on the characteristics of the hotel (e.g., its size, its category, and its strategic positioning), it could still be interesting to invest in these tourism quality certifications. The efficiency of certification may largely depend on the characteristics and strategies of hotels (Sutherland et al., 2021). In this way, even in the face of competition from powerful signals of a different nature, certification could maintain its efficiency for certain types of accommodation and certain situations (e.g., low presence in CGM).

3. Hypothesis

3.1. Hotel location

Hotel location is considered a key attribute and it has an impact on prices, market share and firm performance (Mellinas et al., 2019). The type of tourism that a hotel is

targeting will be the basis for defining its strategy in terms of hotel location and services offered.

Non-urban and urban hotels offer different services, as their clients have different needs. Non-urban (rural or coast) hotels are characterized by longer stays where users intend to enjoy all the facilities and services offered by the hotel (Pesonen, et al., 2019). In contrast, urban hotels tend to be related to business trips and short stays, seeking to offer a clean and well-located hotel (McCleary et al., 1993). In addition, due to the greater proportion of business travelers, urban hotel customers are more likely to be frequent guests (Liu et al., 2015). Therefore, quality signals are less necessary for customers where previous experiences in the hotel predominate. In addition, regarding business travelers (more frequent in urban hotels), the booking is usually made not by the user but by their company. In this case, the company will probably pay less attention to these quality signals (because it already has data from previous bookings) and more to other variables such as price and transport convenience (Yang et al., 2018).

Moreover, the selection of a leisure hotel is usually associated with a higher economic outlay and a high affective component since it is the time of year when users enjoy their free time with family or friends (Torres et al., 2014). Therefore, the customers try to avoid, to a greater extent, risks, or uncertainties (Ukpabi and Karjaluoto, 2018; Mellinas et al., 2019). In these cases, the distinction of quality seals can help to reduce information asymmetries and it is especially useful for potential customers. Thus:

H1: *The permanence of tourism quality certification will be lower in urban hotels than in non-urban hotels.*

3.2. Hotel category

In the tourism sector, the Hotel Star Rating system is used as one of the main instruments for signaling the quality level of companies. The official star category provides a relatively objective basis to measure quality (Abrate et al., 2011; Martin-Fuentes, 2016). However, within the same star category, there is great diversity in terms of the quality and level of service offered by hotels (Nunkoo et al., 2020), so it is common for potential customers to look for additional signals.

In that sense, the tourism quality certificate would be an additional signal that can help independent hotels or hotel chains reinforce existing signals (e.g., the star rating) with other signaling tools and thus be used as a means for differentiation from hotels that do not have this certificate (Silva, 2015). However, the effectiveness of the signals will depend on their consistency (Connelly et al., 2011). Therefore, it seems reasonable to expect that the effectiveness of a quality certificate will depend, to some extent, on the category of the hotel, so that hotels with a low star rating (1 or 2-stars) will have a lower return on investment in quality certifications and are therefore more likely to exit the system more quickly than hotels with a higher rating.

H2: *The category of the hotel (higher star rating) positively affects hotel permanence in a quality certification system.*

3.3. Percentages of national and international customers

For a quality signal to work, consumers need to recognize it and know how to interpret it (Oh et al., 2020). However, it may happen that the geographical area in which a signal operates and is known does not coincide with the geographical area linked to the company's potential customers. Not all certifications are internationally recognized (Li et al., 2020). Some of them have been created and are implemented at a national level. To achieve a successfully implemented certification strategy, there should be coherence between the geographic scope of the certification used by a hotel or hotel chain and the origin of its customers. (Iglesias et al., 2018). International tourists coming from countries where this certification is not implemented are rarely able to identify its meaning, which therefore lacks impact (Connelly et al., 2011). Consequently, hotels that primarily target domestic tourists would be the more interested in adopting and maintaining a nationwide tourism quality certification, as this is where it will be most effective.

H3: *The percentage of international customers negatively affects hotel permanence in a quality certification system (with national scope).*

3.4. Hotel chain geographic concentration

Hotel chains that are geographically highly concentrated—i.e., their hotels are located in specific geographic areas (e.g., Canary Islands)—may have lower brand awareness in

source markets than chains whose hotels are present in diverse destinations (Sánchez-Pérez et al., 2020). Tourists recognize them more easily because they may have already visited or seen their hotels in another destination or in their own region. This dispersion makes it less necessary for their hotels to use certifications, while in highly concentrated hotel chains, it may be interesting to use these certifications as a communication tool to make themselves known to other customers (Yang et al., 2016). Thus:

H4: *The degree of geographical concentration of the chain positively affects the permanence of the hotel in a quality certification system.*

3.5. Hotel presence in CGM

In the theoretical background section, we have seen that the rise of CGM means that tourism companies have new and powerful tools for quality signaling (Leung et al., 2017). In this scenario, practitioners may rethink the need to continue investing in other types of signals, such as quality certifications.

However, the usefulness of CGM platforms as quality signals for the consumer depends, to a large extent, on the number of different reviews that are published there (Martin-Fuentes, 2016). A low number of reviews of an accommodation makes the signal offered weak and unreliable (Filieri et al., 2020). Users know that a certain number of reviews may be generated by the hotel's owners or even by competitors (Filieri et al., 2015). In addition, there may be a tendency for consumers to publish reviews only when the experience has been extreme (either very positive or very negative) (Sparks and Browning, 2011; Filieri et al., 2021). This affects the reliability of reviews.

Nevertheless, as the number of reviews increases, the effect of self-interested reviews is diluted, and publication biases tend to compensate. Although each individual review may have low reliability in the eyes of the user, when the volume of reviews is high, the perceived reliability of the set of reviews will be high (Sparks and Browning, 2011; Filieri et al., 2020). In this regard, the literature has found a positive effect of the number of reviews on sales (Lai et al., 2021), booking intentions (Wu et al., 2020) and online search behavior (e.g., Ayeh et al., 2013). In sum, the power of the signal will be greater when the number of published reviews about a hotel is higher (Hernández-Maestro, 2020).

However, when the company's presence in CGM is small, practitioners will be more likely to want to continue to keep other quality signals such as certificates active. In this regard, the following hypothesis is proposed:

H5: *The number of reviews on TripAdvisor negatively affects hotel permanence in a quality certification system.*

A quality signal must not only be powerful (e.g., via number of reviews), but provide easily interpretable clues about the level of quality of the product or service too (Cheung et al., 2014). In this area, platforms such as TripAdvisor not only provide a set of customer reviews in text form but also show (along with other complementary signals) an overall evaluation on a scale of 1 to 5 and, from this, the hotel's position in the ranking of establishments in the region where it is located. These instruments provide the user with shortcuts that facilitate a quick interpretation of the level of quality (Sparks and Browning, 2011). Thus, the signals that reach the potential customer through CGM are related not only to the number of reviews but also to the content of the reviews and the associated evaluations (Lai et al., 2021).

These assessments may have a double effect on the permanence of hotels in quality certification systems. On the one hand, the hotels with the best positioning could be the most likely to decide to leave the system due to a *substitution effect*: the investment in certifications may be perceived by managers as no longer necessary since there are other signals that transmit a positive image of the hotel (Weston et al., 2018). On the other hand, hotels with a higher level of quality will be more likely to be able to obtain a certificate and may achieve better positions in CGM rankings. Moreover, the consistency between the two signals could make them mutually reinforcing, making investment in them more profitable (Connelly et al., 2011). There could be a *complementarity effect*.

We thus propose two alternative hypotheses to test which one of them receives more empirical support:

H6a: *The position of the hotel in the TripAdvisor ranking is negatively related to hotel permanence in a quality certification system.*

H6b: *The position of the hotel in the TripAdvisor ranking is positively related to hotel permanence in a quality certification system.*

4. Methodology

The main goal of this research is to analyze the hotels' permanence in a quality certification system considering the effects of the hotels' characteristics and their presence in CGM. To test the proposed hypotheses, we will focus on the case of a specific quality certification of tourism establishments: The Spanish Q-for-Quality in Tourism. This certification has a national scope and strong recognition in the sector and has already been used as an indicator variable for quality seal adoption (e.g., Rabadán-Martín et al., 2019). It corresponds to a type of expert signal that implies entry and maintenance investments by the hotel. Permanence in the system has a direct cost between 247 euros/year (< 20 rooms) and 909 euros/year (> 500 rooms) (ICTE, 2020). Although these figures are not elevated, they do imply the realization of a certain investment, and therefore, their maintenance suggests a real interest of the company in the expert signal's maintenance. This makes it more interesting for this type of analysis than other expert signals without direct costs that exist independently of the hotel managers' willingness (e.g., star ratings, hotel guides). In these signals, the hotel's permanence in the system can hardly be considered an indication of the managers' interest in maintaining them.

Thus, we will analyze the factors that affect the lifetime of hotels in the Q-certification system.

4.1. Data

We have used information from several databases. ICTE, the entity that has created the certification system associated with the Q label, has provided us with a database containing information on the hotels that have been associated with the system, with data on registrations and cancellations, with information from June 1998 to February 2020. We chose this month as the end date of the analysis to avoid the specific effect that the lockdown during the pandemic may have had on quality certification discharges and losses.

In addition, we have used data from the Official Spanish Hotel Guide from the Alimarket database (2020) to obtain more detailed information about the hotels: i.e., size of the hotel, location, chain to which it belongs (if any), and star rating.

Finally, the information on the number of reviews and the hotel position on TripAdvisor was obtained by searching the cumulative information for each hotel on this

website (May-June 2020). TripAdvisor was selected as the benchmark platform for the hypotheses and the empirical study for two reasons: (1) the outstanding importance of this platform in tourists' decisions (Filieri et al., 2020), and (2) the high correlation of the number of reviews and hotel scores with those shown in other relevant platforms such as Booking.com (Martin-Fuentes, 2016).

The goal of this research is to analyze hotels' permanence in a quality certification system. For this purpose, we used the database of hotels that have been in the Q-certification system at any time (554 hotels). However, not considering hotels that have never entered the system could lead to a selection bias in our analysis (Heckman, 1979). Therefore, we selected an additional sample of hotels to avoid this problem.

We used the Official Spanish Hotel Guide provided by the Alimarket database, which included 8745 hotels in 2020, of which 8191 had never been in the Q-for-Quality system. Then, we used a systematic random sampling procedure (selecting every 11th element in the alphabetical list, after a random start from the first 11 elements) on this database to obtain a final sample of 1294 hotels (740 from this procedure and 554 from the Q-system database). We use systematic sampling because, on the one hand, the probability that everyone will be included in the sample is the same and, on the other hand, the hotels belonging to the same brand are consecutively listed. Therefore, the systematic procedure automatically provides a stratified sample (Kinnear and Taylor 1996), thus avoiding the possible problem of over/under-representation of some brands that could occur in a completely random sampling procedure. From the hotels in the systematic random sample, we collected the same information as for the hotels within the Q-system using the Alimarket database and TripAdvisor. The sole exceptions are the dates of entry and exit, as they have never been in the system.

4.2. Measurement

The dependent variable is a duration variable. To measure it, we used the information provided by the ICTE with the date of entry into the system (i.e., the hotel obtained their quality certificate) for each accommodation and, in the case of cancellation, the exit date from the system. From this information, the procedure used in the survival analysis estimates

the duration of the stay (in days) in the certification system (_t) and the presence or absence of the relevant event (i.e., the exit from the certification system).

Information on the independent variables was obtained from the Official Spanish Hotel Guide provided by the Alimarket database and, in the case of the last two variables, from the TripAdvisor website (2020). *Hotel location* is a dummy variable that takes the value 1 when the hotel is an urban hotel (when located in provincial capitals) and 0 otherwise (rural or coast in tourist urbanizations).

Hotel category is the score obtained by the hotel in the star-rating system. In Spain the 5-star rating system is used, with a 1-star rating corresponding to the lowest category and a 5-star rating corresponding to the highest. There is an additional 5plus category, but given the small number of cases, we decided to integrate it into the 5-star category. 4 dummy variables have been created that take value 1 when the hotel has the corresponding category. The missing category (one-star) is the reference category.

Percentage of international customers. The exact percentage of foreign tourist in each hotel is not published. To obtain an estimation, we used hotel location data (from the Alimarket database) and the percentage of foreign vs. national tourist that corresponds to each region in Spain (INE data). As a proxy for this variable, we used the foreign tourist percentage that corresponds to the region in which the hotel is located.

Geographical concentration of the brand. Equation (1) shows the standard location coefficient formula (Hoover and Giatarrani, 1971). It is used to calculate the geographic concentration level of the hotel brand. It takes values between 0 (minimum concentration) and 1 (maximum concentration).

Location coefficient (L_c):

$0 \leq L_c \leq 1$

$$Lc = \Sigma \frac{1}{2} \left| \frac{X_{cr}}{X_c} - \frac{X_r}{X} \right| \tag{1}$$

Where:
X_{cr}: number of establishments of hotel chain (c) in Region (r)
X_c: number of establishments of hotel chain (c) in Spain
X_r: total number of establishments in Region (r)
X: total number of establishments in Spain

Number of reviews on TripAdvisor. These data were obtained directly from the TripAdvisor website and indicate the cumulative number of reviews that the hotel has received on this platform.

Hotel position in the TripAdvisor ranking. For each hotel, TripAdvisor provides the position of the accommodation (in terms of the average rating, on a scale of 1 to 5, given by its client reviewers) with respect to the total number of accommodations in the location. Based on this information, we calculated for each hotel the ratio position/number of hotels in the location. Low values indicate a better position in the ranking, while high values indicate that the hotel is among the worst rated at that destination. Practically all the hotels in the sample are on TripAdvisor. In the few cases where this is not the case (4 out of 1294), both the number of reviews variable and the ranking variable were given a value of 0.

Two control variables were included in the model: (1) *the number of rooms in the hotel* was data directly extracted from the hotel directory, indicating the number of available rooms for guest use; and (2) *the size of the hotel chain*, which was measured as the natural logarithm of the number of hotels in the chain to which the hotel belongs. In the case of an independent hotel, this variable takes the value 1. The descriptive statistics for all the variables are shown in Table I.

Table I

Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
_t	554	3751.88	2015.21	124	8076
Rooms	1294	105.13	122.22	1	1136
Log_Chain size	1294	1.34	1.71	0	4.95
Urban	1294	.31	.46	0	1
Cat2	1294	.16	.37	0	1
Cat3	1294	.28	.45	0	1
Cat4	1294	.44	.50	0	1
Cat5	1294	.06	.24	0	1
Foreign	1294	45.78	21.52	17.07	86.90
Concentration	1294	.79	.22	.22	.99
N_reviews	1294	777.55	1116.20	0	12207
Ranking	1294	.46	.30	0	1

5. Results

The goal of this research is to analyze the effects of the hotels' characteristics and their presence in CGM on their permanence in a quality certification system. Thus, in our model, the dependent variable is the time elapsed from the hotel's entry to the certification system until it leaves (in case of exit). Survival analysis (or time to event analysis) is the most appropriate methodology for this type of model (Leoni, 2020). These models are widely used in medical science, engineering, and biology and are also increasingly used in economics and business.

The Cox proportional hazards model (Cox, 1972) is one of the most used for survival analysis. As happens in other time-to event analysis models, the Cox model attempts to estimate a hazard function h(t). For this purpose, the probability of the event occurring at time t is calculated, considering that the individual has survived up to moment t.

$$h(t) = h_0(t)exp(\beta_1 x_1 + \cdots + \beta_k x_k) \qquad (2)$$

This function includes a baseline hazard function $h_0(t)$ that represents the risk evolution over time (keeping the value of other variables that may affect risk at zero: the explanatory variables of the model) and includes the effects of the explanatory variables (X_i). These effects are estimated through the corresponding parameters (β_i). In the Cox model, no assumptions are made about the baseline hazard. However, it is assumed that the hazard ratio ($exp(\beta_i X_i)$) is fixed over time. In survival analysis there is usually some kind of censoring in the data. This is because, in some cases, the event does not occur during the study period. Most often there is right-censoring. This means the existence of cases in the database that survive (have not yet experienced the event analyzed) at the end of the study period. Our database is right-censored by the fact that, even though we have the exact exit date for those who actually left the system, we do not know the exit date (if any) for those who were still in the system at the end of the analysis period.

Moreover, our data are not left-censored. This censoring occurs when some cases enter the system before the start period of the study and the dates are not available. The ICTE database provides the exact date of entry of all hotels that have been in the system. This allows us to obtain a more accurate calculation of the time spent in the certification system for each hotel.

Many factors that may affect the hotel's permanence in the certification system may have also been considered when deciding whether the hotel sought to enter the system. This

might generate selection bias, which causes the coefficients obtained in a conventional survival analysis (e.g., a Cox model) to be biased. To avoid this, we also carried out a selection-duration model. Specifically, a Weibull model with sample selection as was presented by Boehmke (2005).

It has two advantages: (1) unbiased and robust estimates for hypothesis testing can be obtained (Boehmke et al., 2006), and (2) it will allow us not only to see the effect of the independent variables on the hotels' permanence in certification but also their effects on entry or non-entry into the system.

However, the procedure has a disadvantage with reference to the Cox model: the second stage in the selection-duration model uses a parametric approach. An assumption has to be made about the form of the baseline survival function $h_0(t)$. The researcher must specify either an exponential, Weibull, or lognormal duration model (Boehmke, 2005). In contrast, Cox uses a semiparametric approach, and no assumptions need to be made for $h_0(t)$. In this way, the selection-duration approach has the advantage of avoiding selection bias, while the Cox approach avoids making assumptions about the baseline function. Since each procedure has certain advantages, we present the results obtained for each of them.

Table II shows the results obtained for the selection-duration model and for the Cox model. The effects of each explanatory variable on the probability of the hotel's entry into the certification system are shown in column 2. A Weibull model was specified for the baseline hazard function. Positive values imply that the corresponding variable increases the probability of entry. Third column shows the effects of these variables on the exit risk from the system for those hotels that have joined into the system. Hazard coefficients show positive values, indicating that increases in the variable led to a higher exit risk. These estimates are already corrected for possible selection bias, so, in principle, they will be the most appropriate for hypothesis testing.

Table II.

Survival analysis results.

| | Selection-duration model | | | | Cox model | |
| | 1st stage (Selection) | | 2nd stage (Duration) | | | |
	Coef.	P	Coef.	P	Coef.	P
Rooms	-.00101 (.00042)	.017	-.00284 (.00086)	.001	-.00250 (.00082)	.002
Log_Chain size	.2081 (.05425)	.000	-.23875 (.09979)	.017	.26179 (.09349)	.005
Urban	-.51828 (.08861)	.000	.72277 (.17280)	.000	.79602 (.1581)	.000
Cat2	0.2764 (.17603)	.116	-1.025 (.36220)	.005	-1.0268 (.35083)	.003
Cat3	.65002 (.16729)	.000	-1.222 (.34569)	.000	-1.2934 (.33739)	.000
Cat4	1.0097 (.17238)	.000	-1.048 (.35900)	.004	-1.2244 (.35371)	.001
Cat5	.58419 (.23297)	.012	-.55076 (.42211)	.192	-.67729 (.41119)	.100
Foreign	-.01595 (.00207)	.000	.01185 (.00418)	.005	.01414 (.0040)	.000
Concentration	1.6723 (.41565)	.000	1.0087 (.81752)	.217	.70880 (.78415)	.366
N_reviews	.00013 (.00006)	.021	.00019 (.00009)	.034	.00016 (.00008)	.057
Ranking	-.4837175 (.1407292)	.001	.9045365 (.2895772)	.002	.93286 (.27594)	.001
constant	-1.0020 (.4429022)	.024	-14.9507 (1.1009)	.000		
N	1294 (554 in Qsystem)				554	
Log Likelihood	-2808.18				-114.61	
Wald Chi2 (p)	181.32 (.000)				156.38 (.000)	

Note: Robust standard errors in parentheses.

Additionally, in the last column, we show the results (hazard coefficients) of a survival analysis using the Cox procedure. The coefficient interpretation would be the same as in the second stage of the selection-duration model (positive values indicate that higher levels in the explanatory variable imply higher risks of exit from the system), but in this case, the coefficients are not corrected for selection bias.

The results obtained are very similar (see Table 2) which is an indication that the assumption made for the baseline model in the selection-duration model (Weibull) has been correct (Cleves et al., 2016). The coefficients obtained appear to be consistent and they remain stable at changes in the estimation procedure. Nevertheless, the Rho indicator has

been estimated in the selection-duration model. This shows the degree to which selection bias has been detected. In our model, it reached a significant level (-.201, p. = .001). This suggests that the decision to add a sub-sample of hotels that have never been in the system was appropriate. This has allowed us to apply a procedure to obtain unbiased coefficients. It supports the decision to use the selection-duration model results instead of the Cox results for hypothesis testing.

Hypotheses 1 to 4 are linked to the objective of analyzing the relationship between the characteristics of hotels and their permanence in the quality system.

Hypothesis 1 proposed that urban hotels would have a higher exit risk (shorter length of permanence) than leisure hotels. The hazard coefficient (.723, p<.01) indicates that the exit risk is higher in urban hotels, supporting H1.

Hence, the coefficients show the degree to which the exit risk from the system is higher in hotels of the corresponding category compared to the reference category (one-star). All coefficients are negative, indicating that the category with the highest risk (lowest permanence) is precisely the one-star category. Nevertheless, the coefficient for the 5-star category is not significant (-.551, p>.10). The largest effects on survival are found in the intermediate positions (3- and 4-star hotels) of the star-score system (coefficients: -1.222, p<.01, and -1.048, p<.01). Hypothesis 2 receives limited support. To analyze this result in depth, we performed a Kaplan-Meier analysis showing the different paths per star category of hotel survival in the certification system (Figure 2). The estimator of Kaplan-Meier is a nonparametric estimate of the probability of survival (permanence in the system) past time t (Cleves et al., 2016).
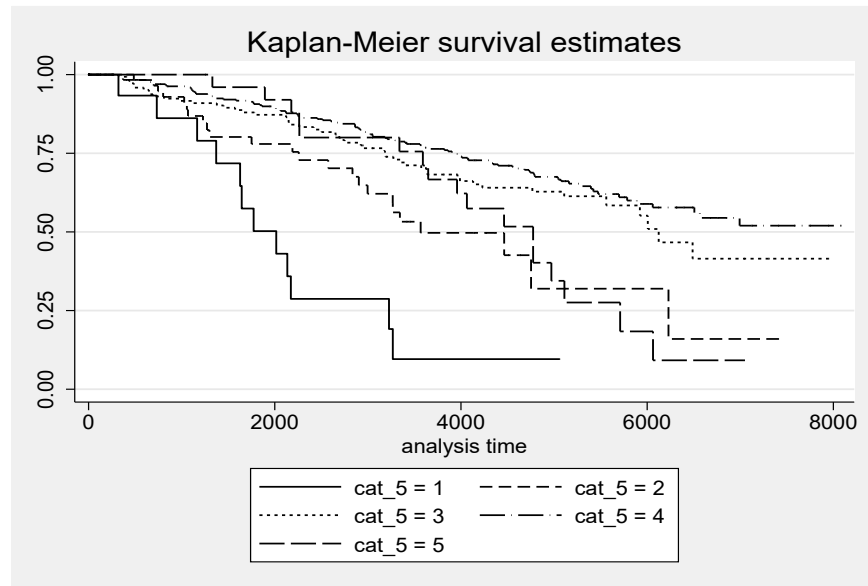
Figure 2. Survival estimates by star-categories.

Figure 2 shows the Kaplan-Meier estimates of survival in the certification system for each hotel category as a time function (number of days from the moment that the hotel entered the system). In fact, the 1-star category shows the most differentiated behavior. The permanence length in the system is the lowest. Approximately half of the hotels in this category that enter the system leave it in no more than 2000 days. This is in accordance with what was proposed in Hypothesis 2. For the other categories, 3- and 4-star hotels show the highest staying power in the system, while 2- and 5-star hotels show intermediate behavior between the two patterns described above. The star category influences the length of stay in the system, but the effect does not increase monotonically with increasing category.

Hypothesis 3 proposed a negative effect of the percentage of international customers in the hotel on its permanence in a quality certification system. The results support this hypothesis. The hazard coefficient reaches a positive and significant value (.0118, p<.01), indicating a shorter permanence length when the percentage of international tourists is higher in the hotel.

However, the effect of the geographical concentration of the chain to which a hotel belongs is not significant (1.0087, p>.10). Hypothesis 4 must be rejected.

The purpose of this research is to address the characteristics and policies of hotel firms on the permanence in a quality certification system, and to analyze the effect of CGMs

on this permanence. Therefore, the last two hypotheses are particularly relevant, because they refer to the relationship between the presence and position of the hotel in a leading CGM and the permanence in a quality system.

The two hazard coefficients corresponding to the variables related to TripAdvisor have positive and significant values. As proposed in Hypothesis 5, we observe a negative effect of the number of reviews of the hotel on this platform over hotel permanence in the quality system (.0002, p<.05).

Finally, the possible effect of the hotel position in the TripAdvisor ranking and the existence of arguments in both directions led us to propose two alternative hypotheses. The empirical evidence (.9045, p<.01) supports Hypothesis 6b. A higher value of the ranking variable (worse position) generates a higher risk of exit from the system and, thus, a lower average permanence length.

6. Discussion and conclusions
6.1. Conclusions

Literature has indicated the trend towards less weight of expert signals in the tourism sector (Torres et al., 2014). There is evidence of changes in the behavior of tourists, who now gather information mainly from non-expert sources to make their decisions (Nilashi et al., 2018). However, empirical evidence in the literature has focused on changes in consumer behavior (e.g., Li et al., 2020) and in firm responses to customers in online platforms (e.g., Belver-Delgado et al. 2020; Hernández-Maestro, 2020), but not on the consequences on the investment behavior of the firms. One of the contributions of this paper is to provide evidence on how this impacts investment decisions at the firm level. Since 2010, the number of certified hotels has been progressively falling. The economic crisis of 2008-2012 may have initially influenced this dropout, but we see that once the crisis is over, the number of certificates has continued to fall, which indicates that hotels are finding alternative systems for quality signaling (Weston et al., 2018).

Is this a generalized phenomenon, and does it affect all types of hotels equally? The survival analysis allowed us to perform a much more detailed approach to this phenomenon. The greater or lesser survival in the system by type of hotel may be an indicator of the degree

of interest in maintaining investments in this certification and, thus, of its efficiency (as perceived by practitioners) for each type of hotel.

The signaling theory indicates that the efficiency of signals depends on several characteristics, including consistency and reliability (Connelly et al., 2011). The results suggest that the consistency of the certificate with the hotel's target market is key to its effectiveness. On the one hand, the Q-label has a national scope, and therefore it is in national markets where the permanence in the system is higher. On the other hand, non-urban hotels tend to maintain their investment in the certificate for a longer term. This is probably related to the greater presence of leisure tourism in non-urban hotels and to the greater relevance of quality signals for this type of tourist (Torres et al., 2014). Repeated stays in business travelling make this role less important (Yang et al., 2018).

The literature about the star-rating as a quality signal has shown that there is a significant correlation between star-rating and other quality-related variables as price, scores in CGM, and objective quality indicators (Martin-Fuentes, 2016). It also evidences that this signal has important limitations that make it convenient for hotels to complement it with other indicators to achieve effective positioning in terms of quality (Nuñez-Serrano et al., 2016). With what levels of the star-rating is a quality certificate best complemented? Our results indicate that it is in the 3- and 4-star categories where the permanence in the system is longer. In these categories, the certificate more efficiently complements the quality positioning of these hotels. However, in case of lower category hotels, especially one-star hotels, the inconsistency of the signals and the difficulties in maintaining the certificate mean that investment in it is not as efficient. Curiously, the dropout probability is also relatively high in the case of 5-star hotels. In these establishments, the signal of having 5-stars may be sufficiently powerful, so it does not need to be accompanied by another quality signal, being unnecessary to invest in it. This result fits with the outstanding greatest effect found by O'Connor (2010) of the 5-stars category on customer expectations. The coherence between signals (star-rating and Q), which the literature proposes as necessary for signal efficiency (Connelly et al., 2011), seems to reach its maximum level at 3-4 stars.

Another contribution of the paper consists to link the individual situation of each hotel in CGM with its permanence in a quality certification system. As far as we know, this relationship had not been empirically studied in the literature. We have found that not only

the characteristics of the hotel but also its presence in CGM influences the effectiveness of certification as a quality signal. Hotels with a higher number of reviews on TripAdvisor tend to stay, *ceteris paribus*, in the Q-certification system for less time. The strength of the information signal offered by this CGM may make investment in certificates such as Q less necessary, which leads to a higher probability of abandoning the system. This result suggests a relationship between the number of revisions and the reliability of the signal as predicted by the literature (Filieri et al., 2015).

Nonetheless, the information provided by CGM is relevant in terms of not only the signal strength but also the direction in which it points (Wu et al., 2020; Filieri et al., 2021). Two alternative hypotheses had been proposed. Results show that the hotels with the best reviews are those that, *ceteris paribus*, have the longest stays in the quality system.

Hotels with many reviews in CGM tend to dropout more quickly from the certification system, but for equal levels in the number of reviews, a better positioning in the CGM ranking is associated with a higher permanence in the system. Hotels that achieve a higher level of quality have a greater ability to stay in the system, and consistency between signals can increase their effectiveness (Connelly et al., 2011). Lower relative marginal costs and greater information efficiency can together lead to greater efficiency of quality certification. When the certificate is aligned with the company's strategy and positioning, its use can complement the CGM signals.

Literature on signaling indicates that, to be effective, the signals must be consistent with each other and with the firm's characteristics and positioning (Connelly et al., 2011). However, the signals have a cost (monetary or in time and effort), so firms may even forego some signals if they see that there are equally effective alternatives that are less expensive. This paper contributes to the literature on signals by analyzing the complementarity and substitutability effects of quality certifications and CGM as signals in the hotel sector.

6.2. Theoretical implications

In the context of the CGM boom, are quality certifications outdated? If there is a replacement of these certifications with CGM as quality signals, for which type of hotels does this replacement occur more frequently? To answer these questions, we conducted a

survival analysis with objective data on the entry and departure of hotels in Q as a representative quality certification system.

Although the relative effectiveness of certificates as a sign of quality has been falling, we observe that there are very relevant differences concerning this phenomenon depending on the circumstances and characteristics of the hotel. Expert signals continue to play a role that –in cases of hotels with little presence on social media- can help to fill gaps in the firm's CGM signaling and, in other cases, can complement other expert and non-expert signals. There is not only a substitution effect of some signals for others, but also a complementarity effect which (depending on the characteristics, situation, and strategy of the firm) can be greater than the substitution effect, making it recommendable to enter or remain in the certification system.

When the company's strategy and other signals are not consistent with the certification signal, companies tend to abandon the certification more quickly. A high company presence in CGM has this effect too. In the next section we will discuss the implications of these results for practitioners.

6.3. Practical implications

In this study we have analyzed real business decisions regarding entry and permanence in a certification system. From the results obtained it is possible to draw indications for hotel or hotel chain managers, especially for those in charge of quality, positioning, or communication policies. The data obtained from the permanence of hotels in the system show that the rise of other quality signals has certainly reduced the need to use these certificates. However, there are very substantial differences depending on the characteristics of the hotel and the amount and nature of the hotel information that is published in the CGM.

In this sense, we see that larger hotels or hotels belonging to chains have less difficulty in maintaining the certificate. Moreover, if this certificate is aligned with the quality positioning of the company (3- or 4-star hotels) and with its target market, the effectiveness of the certificate is substantially higher.

The analysis of investments and disinvestments suggests that the certificate is particularly interesting for hotels with the above characteristics that do not yet have a high

number of reviews on CGM. Besides, hotels that do not have this profile should focus their investments on other quality signals such as CGM.

6.4. Limitations and future research

This study has some limitations. First, the analysis was performed using data from a single certification system: The Spanish Q for quality certification. This is a very relevant certification in the Spanish tourism sector and has been the subject of analysis in several studies (Rabadán-Martín et al., 2019). As advantage for research, it involves certain identifiable minimum costs for the participants, which implies that those who remain in the system demonstrate a substantial interest in the signal's maintenance. The permanence or non-permanence of quality signals that do not involve costs does not have this informative power. Nevertheless, it is worth asking whether the same thing is happening with other similar certificates in other countries.

Second, we used only TripAdvisor as a competing signal in the empirical analysis. Undoubtedly, it is one of the most relevant platforms worldwide (Filieri et al., 2020), but it is not the only relevant CGM. However, the strong correlations in the hotel data on different platforms lead us to believe that the differences in results using other platforms would be hardly relevant.

Finally, we focused only on generic quality certifications, but many hotels have adopted new standards since the COVID-19 outbreak (Chan et al., 2021). Several questions can be raised in this respect: Can CGM offer signals that compete with specific (health or environmental) certifications? Would this substitution effect be less than that detected with generic quality certifications such as Q? These issues raise new questions for future research.

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