



TRevPAR as Hotels Performance Evaluation Indicator and Influencing Factors in Portugal

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Abstract

In a global competition current scenario, measuring the performance of hotels is increasingly important for managers who, to take decisions, need management indicators and tools. The most common operating indicators are occupancy rate and RevPAR (Revenue Per Available Room). The goal of any hotel is to be as profitable as possible, so they must work on increasing revenues and decreasing costs. To increase revenues the focus has been on revenue management practices, and there is already several software that help hoteliers to define the most appropriate price for each customer. Therefore, managers mostly seek to increase accommodation revenue, however from a total revenue management perspective revenue from other departments must also be considered. The TRevPAR (Total Revenue Per Available Room) appears as a more comprehensive indicator that takes into account all hotels revenue sources. The purpose of this research is to study and highlight TRevPAR influence factors, since this information have practical implications in the hotel managers' decision. This methodology was carried out through the analysis of 948 hotels from 2010 to 2017. The sample was obtained by crossing two databases: SABI platform and Portuguese National Tourism Registry (RNET). The tested determining factors were the hotel's location, size, number of stars and services. An original and exhaustive study in terms of services meets the purpose, thus, the influence on TRevPAR was tested on outdoor and indoor pools, tennis, golf, spa, meeting rooms and restaurants. The findings show a global increase over the years analysed (2010-2017) in TRevPAR. The location, size and number of stars influence TRevPAR, as do most services.

Keywords: TRevPAR, hotel, performance



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Introduction

Given the importance of the hotel sector on the countries' economy, it is essential to develop studies that can deepen the knowledge in the area of hotel management, since they allow the operational and management practices improvement, thus, contributing to the sustainable development of the sector and increasing profitability.

In general, the hospitality sector fits in a highly competitive environment, so it is essential to have accurate and credible information, to adapt the management of its activities (Santos, et al., 2016). In fact, the specificity of the hotel industry, explained by the set of characteristics that define it, namely "seasonality; volatility; perishability; diversity; intensive work; reduced time in providing the service; high investment in fixed assets; and high fixed costs." (Santos, et al., 2016: p. 34), poses great challenges to hotel company management.

There are few studies dedicated specifically to TRevPAR, an indicator of recognized utility, which considers total hotel revenue and not just accommodation revenue. It is a fact that accommodation revenue is traditionally the largest part of hotel revenue, however, the majority of hoteliers seek to diversify their revenue sources by betting on new services. Furthermore, TRevPAR is considered by hoteliers a KPI (key performance indicator) which provides a broad perspective of the hotel performance. This indicator is engaged with total revenue created from rooms and other facilities allowing the identification of success and failure areas.

These arguments support the main objective of this study, which is to identify the factors that have the greatest influence on TRevPAR to provide practical guidance to hotel managers in order to dedicate their efforts to improving the factors with the greatest impact on this operational indicator.

The choice of the research to focus on the case of Portugal is because the tourism sector, particularly the hotel industry, is crucial for the Portuguese economy. According to Turismo de Portugal (2019) tourism is the activity sector with the greatest expression in the country's exports, being, in 2018, responsible for 51.5% of services exports and for 18.6% of total exports, with sector revenues contributing 8.2% to national GDP. The same source refers that in 2018 tourism reached record values in Portugal, which were reflected in this sector employment (+6.7%), in tourist revenues (+9.6%), in global revenues (+7.3%), in the diversification of the markets and in obtaining recognition through several international awards.

According to INE (2019), 71.6% of overnight stays in the hospitality sector were spent in hotels, standing out units with three and four stars, with 22.6% and 49.1% overnight stays in hotels, respectively. In 2018, the average hotel stay was 2.77 nights and the occupancy rate stood at 51.9%. The total hotel income, in the same year, reached 3.6 billion euros, with accommodation reaching values of 2.6 billion euros, expressing a rise compared to the previous year of 7.4% and 8.1%, respectively. In terms of RevPAR the hotel sector presented an average value of 53.8 euros, which represents an increase of 4% compared to 2017. ADR (Average Daily Rate) was 88.9 euros, 1.5% more than 2017. In recent years Portugal increases the quality of tourism offer, the tourism promotion and the hotels diversity, allowing an increase in demand and prices. According to Deloitte (2019) in 2019, Lisbon's RevPAR is above of other cities' RevPAR such as Madrid, Berlin, Brussels or Frankfurt.

Operational management indicators are essential for decision making and as a way of benchmarking. The most internationally used indicators are the occupancy rate and RevPAR, however, there are many other ratios and indicators that can be useful for hotel managers to make decisions based on better information.

According to Santos, et al. (2016) and Gomes et al. (2018) the hotel industry uses specific operational indicators by department, the most important being:

- Accommodation department: room occupancy rate; average price (ADR, ARR); RevPAR; average occupancy per room; TRevPAR; GOPPAR (Gross Operating Profit Per Available Room).
- F&B department: Food inventory turnover; beverage inventory turnover; food cost percentage; beverage cost percentage; seat turnover ratio; RevPASH (Revenue Per Available Seat Hour).
- Operational departments in general: Efficiency ratio; percentage of personnel costs; percentage of wages.

Indeed, revenue management practices have allowed hoteliers to improve their performance in terms of setting the most appropriate prices for each market segment. Kimes (1989) refers that the application of yield management techniques implies a solid internal information system that provides data to support decision making and a deep commitment of management, influencing not only price decisions but also room inventory management. The same author argues that the yield management adapted to the hotel industry allows the increase of the hotels' income.

Yield/revenue management consists of sophisticated supply and demand management that acts simultaneously on prices and available capacity. It is the process by which the best service is allocated to the best customer at the best price at the best time (Smith et al., 1992, cited in Legohérel et al., 2013: 2-3). According to Legohérel et al. (2013) yield/revenue management represents a set of capacity management techniques that allow the maximization of revenue. The distinction between these two terms is not always clear; Legohérel et al. (2013) refer that the term yield implies a return on investment effort, and revenue management is linked to several areas such as marketing, information technology, finance or even sales. Kimes (2003) believes that yield management has evolved into revenue management, to keep up with the complexity of the business techniques.

Legohérel et al. (2013) also address the most recent evolution from revenue management to total revenue management, which seeks to optimize a company's total revenue aiming the best long-term commercial development. In this scenario, not only accommodation revenue will be considered, but all other hotel revenue sources, such as spa, golf and catering. The RevPAR should in this case be complemented by TRevPAR, which considers total revenue. In fact, Mašić (2013) considers TRevPAR to be a more adequate indicator to evaluate the hotel performance as it considers all income and not just income from accommodation.

TRevPAR is calculated by dividing the total income of the hotel by the number of rooms available (HANYC, 2014; Santos, et al., 2016; Santos et al., 2018). This is defined as a hotel key performance indicator which provides a view of total revenue for all departments and not just accommodation, like RevPAR (Santos et al., 2018). Taking advantage of this indicator this study aims to identify the determining factors of TRevPAR so that managers can dedicate their efforts and resources at improving the variables with the greatest influence. This is an innovative aspect given the scarcity of studies dedicated to the impact of hotel attributes on TRevPAR.

Several studies that deepen the impact of attributes on the hotel performance are known, but those use price or RevPAR, such as:

- Sainaghi (2011) developed a study to identify the determining factors of RevPAR, at independent 3 to 5 star hotels and analysed the impact of some factors on RevPAR, such as the dimension hotel (number of rooms and number of employees), category (stars), age of the hotel (date of foundation and last remodelling works), services (congress infrastructures) and market orientation and location (centrality). The results showed a significant negative relationship between RevPAR and the size of the hotel (number of rooms) and a positive effect of location on RevPAR. The remaining factors did not provide significant results.
- Menicucci (2018) studied several indicators (return on equity, return on asset, occupancy rate and gross operating profit per available room) and confirmed a significant positive relationship of dimension and location in the profitability of hotels.

- Beccera et al. (2013) developed a study using the impact on prices and concluded that the star rating and the fact that they belong to a hotel chain allowed hotels to charge higher prices and make fewer discounts, still confirming a stronger positive relationship between the number of stars and prices.
- Kim et al. (2020) using prices as a measure of performance, validated significant relationships between the attributes of hotels and their prices. They identified positive and negative relations, in fact, they verified that the size of the hotel, its rating (economy, midscale and upscale), the quality of service (TripAdvisor score), the distance to the airport, the distance to the highway had a significant positive effect on prices, while distance from tourist attractions and the age of the hotel had a significant negative effect on prices.

As already mentioned, there are few studies that focus specifically on TRevPAR, however, Lado-Sestayo et al. (2017) studied the influence of a hotel attributes set, management and location in TRevPAR and concluded that the attributes set are the most determining factors, with location being the second most important factor. Regarding the attributes set, the authors considered the size of the hotel as well as the space for holding events and used quality (number of stars) and market share as control variables. Regarding the attributes set, the effect of dimension and stars are highlighted as variables with greater influence, with emphasis on dimension. Bonfato et al. (2017) tested the relationship between TRevPAR and location (beach and countryside resorts) and services (all-inclusive and the others) and found that beach and all-inclusive resorts generate a higher TRevPAR.

Based on the literature review, the following hypotheses were outlined:

H1 – The hotel location influences TRevPAR

H2 – The size of the hotel positively influences TRevPAR.

H3 – The number of stars positively influences TRevPAR.

H4 – Services positively influences TRevPAR.

Methods

This study was applied in Portugal to hotels with restaurant and hotels without restaurant, from 2010 to 2017. This period was chosen as overnight stays in hotels have grown since 2010. The last year recording a decrease was 2009. As of 2010, there have been growth rates of overnight stays in hotels. Data in databases was only available until 2017.

The information needed for this study was collected between the 4th and 15th of July 2019 in two databases: Bureau Van Dijk's SABI (A Moody's Analytics Company) and RNET (National Register of Tourist Enterprises). For data treatment, Excel and SPSS version 26 were used.

The SABI platform obtained data from 2 161 hotels. To perform the TRevPAR calculation, the formula was applied, using the following values: sales and services; other revenues and gains; interests and similar gains; in order to obtain the total revenue for the period 2010-2017. Through RNET, information was obtained about the number of rooms of each hotel, the number of stars, the number of restaurants, the capacity of the meeting rooms and the availability of the following services: meeting rooms, spa, swimming pools (inside and outside), tennis, gym, golf.

These two databases were crossed, and were excluded companies that were not registered with RNET, those that did not have figures in any of the years of the period under analysis, as well as companies that did not have sales amount, that is, inactive companies, and those with a TRevPAR of less than € 1. Considering the statistical treatment two significant outliers were removed from

the sample so as not to prejudice the statistical tests results interpretation. This allowed the analysis and data treatment of 948 hotels.

The sample is characterized by having more hotels with a restaurant (83.1%) and the primacy of the sample is in 4-star hotels (37.1%) and 3-star hotels (32.9%). Most hotels are concentrated in Lisbon (22.4%), Porto (13.5%), Faro (8.4%), Funchal (6.9%), Leiria (5.45%), Santarém (5.4%) and Braga (5.3%).

It should be noted that the sample is different for each year, since hotels do not always show values in all years, this is due to the entry and exit of hotels in the market in this study period of time (Table 1).

Table 1. Descriptive statistics of TRevPAR

Years	No. of hotels	TRevPAR (mean)	TRevPAR (SD)	TRevPAR (minimum)	TRevPAR (maximum)
2010	717	€ 39.21	€ 36.02	€ 1.02	€ 394.38
2011	726	€ 39.91	€ 35.12	€ 1.08	€ 233.47
2012	745	€ 37.44	€ 35.28	€ 1.58	€ 293.57
2013	777	€ 38.90	€ 41.96	€ 1.10	€ 587.57
2014	805	€ 41.66	€ 40.07	€ 1.29	€ 301.44
2015	828	€ 46.37	€ 46.98	€ 1.31	€ 488.32
2016	873	€ 53.84	€ 61.17	€ 1.06	€ 1 046.39
2017	880	€ 63.68	€ 62.20	€ 1.15	€ 546.35

Several variables were used in this study to determine the factors that influence TRevPAR. The characterization of these variables in relation to the 948 hotels under study is in Table 2.

Table 2. Independent variables characterization

Variable	Definition	Mean	SD	minimum	maximum
STAR	Official classification through the number of stars	3.33	0.953	1	5
ROOMS	Number of rooms	96.29	146.34	10	2 301
DISTRICT	Location of the hotel				
RESTNUMB	No. of restaurants	1.66	1.742	0	20
MEETCAPACITY	Number of chairs in the meeting room	9.4	129.76	0	3 000
DUMMGOLF*	Hotel has golf **	0.03	0.157	0	1
DUMMSPA*	Hotel has spa **	0.23	0.424	0	1
DUMMPOOLO*	Hotel has outside pool **	0.38	0.485	0	1
DUMMPOOLI*	Hotel has inside pool **	0.23	0.42	0	1
DUMMMEET*	Hotel has meeting rooms **	0.61	0.488	0	1
DUMMTENNIS*	Hotel has tennis **	0.11	0.319	0	1
DUMMGYM*	Hotel has GYM **	0.28	0.448	0	1
DUMMREST*	Hotel has restaurant **	0.83	0.375	0	1

*Indicates a binary variable; the mean value refers to the proportion of the data where the attribute of interest is present.

** (yes=1; no=0).

Descriptive analyses were carried out to verify the evolution of TRevPAR between 2010 and 2017. Normality was tested on variables using the Kolmogorov-Smirnov test, and as this was not verified, measures of association between TRevPAR and several variables were calculated using Spearman's Rho. "Spearman's Rho coefficient measures the intensity of the connexion between ordinal variables, using instead of the value observed therein, only the order of observations." (Pestana and Gageiro, 2005: 176-177).

For the analysis of TRevPAR between hotels grouped by dummy variables, the Mann-Whitney non-parametric test was used, which is an alternative to the parametric t test for two independent samples. The Kruskal-Wallis test is a non-parametric test applied to variables of at least ordinal order and is also an alternative to the One-Way Anova (Pestana and Gageiro, 2005).

In order to determine which independent variables have the greatest impact on TRevPAR, the multiple linear regression model was chosen, which allows the analysis of TRevPAR with a set of independent variables. First, it was analyzed whether the variables were linear, as it was not verified, it was decided to transform the variable TRevPAR into \ln TRevPAR, and a log-linear model was applied. This was estimated using the multiple linear regression model technique using the stepwise method (Pestana and Gageiro, 2005). Subsequently, a diagnosis of the estimated model was performed.

About the interpretation of the coefficients for a continuous variable, the coefficient multiplied by 100 is equal to the percentage effect on the dependent variable. For a dummy variable, the relative effect on the dependent variable Y is $g = \exp(\text{coefficient}) - 1$, and for a percentage it is necessary to multiply by 100. This will be adopted for the variables: DUMMGOLF, DUMMSPA, DUMMPOOLO, DUMMPOOLI, DUMMMEET, DUMMTENNIS, DUMMGYM and DUMMREST.

Results

In terms of overall results, an increase in TRevPAR was confirmed during the period under review (2010-2017), with only a drop in 2012 (Table 1). It is also possible to observe the maximum and minimum values. These data have some volatility since the standard deviation is sometimes higher or similar to the average.

In the Table 3, the TRevPAR averages and medians are presented by district, showing a growth trend in the period under analysis. For all districts, TRevPAR for the year 2017 is higher than for the year 2010, except in the case of Angra do Heroísmo. The two districts with the highest TRevPAR are Funchal and Lisbon, on the other hand the district with the lowest value in 2017 is Bragança. It is worth noting some fluctuations in the evolution of TRevPAR in some districts. It can also be pointed out that Faro is the third district that is above the sector average in 2017 after Funchal and Lisbon.

Table 3. Average and median of TRevPAR of the sector by districts and by year

	TRevPAR 2010	TRevPAR 2011	TRevPAR 2012	TRevPAR 2013	TRevPAR 2014	TRevPAR 2015	TRevPAR 2016	TRevPAR 2017
A. Heroísmo	30,19/30.19	27,21/27.21	23,84/23.84	25,73/25.73	36,80/36.80	29,98/29.98	41,40/41.40	34,86/35.21
Aveiro	32,33/29.76	31,12/29.23	27,59/26.37	27,80/27.1	30,22/28.61	33,83/29.43	36,96/35.07	40,51/34.86
Beja	19,96/17.56	20,51/18.74	44,67/16.94	39,84/16.5	45,32/17.00	48,27/18.73	51,03/22.09	59,68/28.31
Braga	34,46/26.02	33,57/22.92	30,95/28.92	29,36/27.79	30,11/27.75	32,53/29.01	36,20/33.91	40,82/39.17
Bragança	29,06/10.72	26,87/9.96	20,91/8.11	21,42/5.96	19,49/6.99	22,44/7.92	16,43/6.45	23,85/7.97
C. Branco	30,21/25.84	27,17/28.5	24,15/25.56	23,13/25.24	23,96/26.34	26,49/27.69	29,59/33.02	34,08/36.94
Coimbra	30,33/27.07	29,84/26.01	26,66/22.37	28,08/21.1	30,35/22.85	35,29/27.76	37,82/27.61	42,53/28.76
Évora	51,80/44.22	49,12/43.98	42,20/28.62	41,94/30.12	42,97/30.14	46,96/49.73	50,56/53.13	57,55/67.82
Faro	43,42/35.59	44,17/35.73	43,39/35.79	44,50/39.79	46,97/40.35	58,03/44.74	61,74/55.18	68,12/60.60
Funchal	54,53/45.50	59,44/49.84	58,51/50.06	62,34/54.86	65,21/52.79	69,64/57.39	83,19/69.40	94,23/75.94
Guarda	33,01/34.73	28,09/27.23	24,06/24.35	23,29/24.53	24,94/26.07	26,38/27.31	29,66/30.88	30,21/28.74
Horta	33,45/33.45	28,91/28.91	28,54/28.54	29,01/29.01	27,11/27.11	28,43/28.43	32,48/32.48	34,63/34.64
Leiria	31,22/30.50	30,56/22.81	27,08/21.96	27,90/24.47	28,80/22.28	32,02/31.20	35,97/23.08	40,24/28.98
Lisboa	55,74/45.69	60,62/49.43	58,26/47.86	60,40/48.76	66,76/55.40	70,50/56.10	77,35/63.06	91,24/73.63
P. Delgada	36,28/31.47	35,50/34.26	31,08/30.24	33,73/34.12	35,41/31.01	42,92/38.74	55,44/42.72	68,14/52.19
Portalegre	43,46/36.27	45,45/37.03	35,48/24.49	53,49/25.09	41,57/30.28	45,60/30.23	50,16/30.92	52,01/33.54
Porto	32,49/22.37	35,63/26.22	33,54/24.86	39,90/26.05	40,41/28.53	47,05/33.61	53,36/35.08	61,70/41.70
Santarém	29,52/21.77	26,82/23.62	23,26/20.51	23,16/21.06	24,33/24.67	25,91/26.20	29,96/28.49	41,90/38.83
Setúbal	32,83/23.00	34,29/23.27	31,36/19.89	30,86/22.59	30,65/21.29	31,46/23.70	43,86/28.70	42,89/40.26
V. Castelo	30,19/19.99	24,72/20.31	20,16/17.64	20,58/15.84	23,17/18.40	25,64/22.97	28,89/24.31	32,69/30.95
Vila Real	46,70/33.54	44,98/33.21	37,46/34.86	33,96/32.76	35,67/31.27	42,15/37.10	48,95/36.91	59,75/52.26
Viseu	32,22/21.99	28,95/20.88	26,25/16.94	43,26/14.69	23,79/15.27	26,03/15.23	39,99/17.80	45,97/23.02

Subsequently, the hypotheses formulated were analysed:

H1 – the hotel location influences TRevPAR; considering that the location variable (DISTRICT) is measured through the districts where hotels are located, being a categorical variable and that TRevPAR is a quantitative variable, the Kruskal-Wallis nonparametric test of independent samples was chosen. Through this test, in the eight years under study, the distribution of TRevPAR is different in each district (Sig. 0.000), the median differs according to the districts (Table 3). For example, Bragança has a median of 7.97 and, on the other hand, Funchal has a median of 75.9.

The conclusion was that the location influences TRevPAR not rejecting H1

Regarding H2 – The size of the hotel (ROOMS) positively influences TRevPAR. It was found that there is a positive and significant association through Spearman's Rho. There is a moderate association in relation to the dimension. Thereby H2 is not rejected (Table 4).

The variables number of restaurants and capacity of meeting rooms were also analyzed, confirming that all these variables positively influence TRevPAR. It was found that there is a positive and significant association through Spearman's Rho. The more restaurants and the greater the capacity of the meeting rooms, the higher the hotel's TRevPAR (Table 4).

Table 4. Results of the non-parametric Rho de Spearman test to verify the relationship between the size of the hotels, number of restaurants, capacity of meeting rooms and TRevPAR.

Spearman´s Rho			
Correlation coefficient			
Sig. (2-tailed) = 0.000	No. of rooms	No. of restaurants	No. of chairs in the meeting room
TRevPAR 2010	0.267	0.315	0.294
TRevPAR 2011	0.309	0.333	0.305
TRevPAR 2012	0.304	0.320	0.288
TRevPAR 2013	0.305	0.346	0.260
TRevPAR 2014	0.326	0.317	0.262
TRevPAR 2015	0.323	0.319	0.238
TRevPAR 2016	0.309	0.305	0.208
TRevPAR 2017	0.303	0.311	0.185

Regarding H3 – The number of stars positively influences TRevPAR, the Kruskal-Wallis non-parametric test of independent samples was applied, which allowed us to conclude that the distribution of TRevPAR is diverse considering the stars (Sig. 0.000). It is interesting to analyse in which official star rating TRevPAR is superior. Through the median it is the 5-star hotels that have superior TRevPAR. The hotels with a lower median are those with 1 or 2 stars.

In other words, the median of TRevPAR differs depending on the official star rating, so H3 is not rejected.

Regarding H4 – Services positively influence TRevPAR, several services were analysed, characterized by the variables: DUMMGOLF, DUMMSPA, DUMMPOOL, DUMMPOOLI, DUMMMEET, DUMMTENNIS, DUMMGYM, DUMMREST. The Mann-Whitney non-parametric test of independent samples was applied, which allowed us to reject the null hypothesis in the eight years under study in relation to the 8 variables under study. All variables influence TRevPAR with a significance level of 0.000. Through the medians there is a superior TRevPAR for a hotel that has a restaurant, meeting rooms, golf, spa, gym, tennis, indoor pool and outdoor pool. (Table 5 and 6).

Table 5. TRevPAR median by group of services (values in euros)

	Tennis	Golf	Gymn	SPA
	Yes/No	Yes/No	Yes/No	Yes/No
TRevPAR 2010	42.06/28.92	52.47/30.32	48.93/25.55	46.15/26.97
TRevPAR 2011	40.98/28.83	56.65/30.57	52.64/25.79	49.06/27.23
TRevPAR 2012	36.75/26.25	48.61/27.44	50.03/24.03	46.49/24.77
TRevPAR 2013	36.45/27.08	53.07/28.20	51.01/24.00	47.80/25.10
TRevPAR 2014	40.20/29.76	52.15/30.55	52.25/26.52	49.05/27.74
TRevPAR 2015	46.79/32.85	63.05/33.83	57.98/29.00	55.39/29.90
TRevPAR 2016	50.83/37.59	70.32/37.90	62.93/32.87	62.09/34.14
TRevPAR 2017	63.73/43.55	84.82/45.54	73.54/38.86	71.38/39.50

Table 6. TRevPAR median by group of services (values in euros)

	Meeting room	Pool outside	Pool inside	Restaurant
	Yes/No	Yes/No	Yes/No	Yes/No
TRevPAR 2010	36.57/22.80	38.28/25.32	44.46/26.32	34.99/21.22
TRevPAR 2011	36.50/22.84	40.43/26.22	46.89/27.33	35.25/20.44
TRevPAR 2012	34.24/21.22	35.70/24.59	45.72/25.03	31.88/18.21
TRevPAR 2013	33.89/22.02	35.62/24.48	45.31/25.24	32.49/18.35
TRevPAR 2014	36.83/23.24	39.23/26.66	47.85/27.93	35.16/19.62
TRevPAR 2015	39.85/26.13	42.93/29.22	53.98/30.45	38.21/22.83
TRevPAR 2016	46.03/29.10	49.29/33.24	58.90/34.49	42.78/26.04
TRevPAR 2017	52.84/35.57	57.71/39.76	69.88/39.81	51.31/30.04

Considering all the influence of these factors, it would be interesting to determine which factors have the greatest impact on TRevPAR. What factors will be an interesting investment for the hotel, anticipating a good return. A model that allows the determination of the most significant variables.

To promote linearity in the model, it was decided to use the linear log model. Thus, the TRevPAR variable was transformed into LogTRevPAR. Eight models were developed, one for each year to analyse whether the variables behave in the same way. The 8 log-linear regressions were estimated under an ordinary least square (OLS), as it can be seen in Table 7. The estimation method used was stepwise, the first variable to enter the model was STAR, the variable that has the highest correlation coefficient. Regarding 2017, in the model summary the variable STAR explains 21% of TRevPAR. It should be noted that the district variable was transformed into 22 dummy variables, one for each district. To get a not too extensive solution, a model was created with only these variables to select the most significant ones for the LogTREVPAR model. Lisbon, Funchal and Bragança were the districts considered to have the greatest impact on TRevPAR.

With this estimation method, in the linear log model, significant variables are immediately selected, taking into account a significance level of 0.05, with all others excluded. Observing the results (Table 7), the most significant predictors of TRevPAR are: STAR, DUMMLisboa, DUMMFunchal, RESTNUMB and DUMMBragança.

Through the F test (table) the model is validated, as it appears that in total the coefficients are different from zero in relation to the variables belonging to the model. Through the T test all variables included in the model are significant.

Table 7. Log-linear regression of TRevPAR

	2010	2011	2012	2013	2014	2015	2016	2017
Constant	2.455***	2.275***	2.098***	2.111***	2.170***	2.001***	2.181***	2.455***
STAR	0.143***	0.209***	0.235***	0.260***	0.277***	0.36***	0.345***	0.338***
DUMMLisboa	0.289***	0.41***	0.43***	0.436***	0.471***	0.527***	0.498***	0.496***
DUMMFunchal		0.382***	0.413***	0.361***	0.364***	0.447***	0.510***	0.37***
RESTNUMB	0.071***		0.220***	0.063***	0.048***	0.047***	0.055***	0.05***
DUMMBragança	-0.482*		-0.523**	-0.641***	-0.692***	-0.642***	-0.943***	-1.088***
DUMMGYM	0.204**	0.249***	0.265***	0.180**	0.178**			0.21***
DUMMGOLF		0.469***	0.413**	0.480**	0.353**	0.414**	0.434**	
DUMMMEET	0.192**	0.225***						-0.148**
R²		0.230	0.275	0.276	0.288	0.303	0.299	0.31
F(ANOVA)		35.861***	39.872***	41.818***	46.145***	59.382***	61.571***	55.906***
Durbin-Watson		1.879	1.936	1.974	1.992	2.003	1.885	1.959

Notes: *p<0.1 **p<0.05 ***p<0.01

According to TRevPAR, between 2010 and 2017 an additional star implies an increase within a range of 14.3% to 36%. An increase in the restaurant number implies an increase in price of 4.7% to 22%. If the hotel belongs to Lisbon, the TRevPAR will increase within a range of 33.5% to 69.38%. If the hotel belongs to Funchal, the TRevPAR will increase within a range of 43.48% to 66.53%. If the hotel belongs to Bragança, the TRevPAR will decrease within a range of 61.93% to 194.5%. If the services are referred, it was verified that the existence of a gym increases the rate inside a range of 19.48% to 30.34%, moreover the existence of a golf increases the rate inside a range of 42.33% to 61.61%.

After the estimation of the regression, it is necessary to diagnose all misspecification problems (Pestana and Gageiro, 2005):

- The independence among predictor variables and linearity were analysed before the estimation of the model.
- Heteroscedasticity occurs when the error variance differs transversely between the cases, which implies a miss of efficiency. Then graphs were used to analyse the variance regression studentized residual versus regression standardized predicted value and standardized residual versus unstandardized predicted value. Through these graphs was verified that the residuals maintain a constant approach amplitude with respect to the zero-horizontal axis, without trends, then homoscedasticity hypothesis is not rejected.
- The autocorrelation was checked through a Durbin-Watson test (Table 7), where the values are close to 2 in all these models. This means that they are not autocorrelated.
- According to the central limit theorem, as each model has got more than 700 cases, the shape sampling distribution is normal. The same was applied in Agmapisarn (2014), which has 141 units.
- Multicollinearity can be tested through VIF (variance inflation factor) and Tolerance statistic. The closer the VIF is to zero, the smaller is the level of multicollinearity, and the

value limit is 10; (Agmapisarn, 2014; Pestana and Gageiro, 2005). Observing all the models the VIF varies between one and two. Considering the Tolerance statistic there are no values smaller than 0.5. Therefore, as they are closer to 1, the multicollinearity is scanty.

Summing up, all the model's assumptions were verified.

Discussion and conclusions

The hotel business operates in an extreme competitive environment on a global scale and, hotel managers, make decisions in markets with peculiar characteristics. In this context, having management support tools is essential, so there are several ratios and operational indicators used by the hotel industry, with emphasis to the RevPAR (accommodation).

The revenue management, manage the supply and demand variables to maximize yields, acting on prices and available capacity. In contrast to the RevPAR that considers only the income of the accommodation, TRevPAR focuses on the hotel overall income. In search of innovative solutions with practical implications for hotel managers, this study identified the factors with the greatest influence on TRevPAR in Portugal, according to what had been established as the aim of the study.

In the period under study, in general there was an increase in TRevPAR, standing out Faro, Funchal and Lisbon. Following the conclusions of the studies by Sainaghi (2011), Lado-Sestayo et al. (2017), Bonfato et al. (2017) and Menicucci (2018), this study concludes that the location has a significant influence on TRevPAR, that is, if a hotel is located in Lisbon, TRevPAR increases, on the other hand if it is in Bragança the TRevPAR will decrease.

Other conclusions show that the size of hotels in terms of number of rooms has a significant positive influence on TRevPAR, corroborating the research of Menicucci (2018), Lado-Sestayo et al. (2017) and Kim et al. (2020). However, it contradicts Sainaghi (2011) which states that there is a negative relationship between RevPAR and the size of the hotel.

In the same way, the largest number of stars has a significant influence on TRevPAR, confirming Beccera et al. (2013) and Lado-Sestayo et al. (2017). The offer of various services by the hotel positively influences TRevPAR, corroborating Lado-Sestayo et al. (2017) and Bonfato et al. (2017).

Regarding the variables that have the greatest impact on TRevPAR, it was found that those variables were stars and location. This aspect corroborates Beccera et al. (2013) regarding the stars and Lado-Sestayo et al. (2017) regarding the stars and location.

While studying the services offered by hotels it is noticed that all of them have some influence in the revenue, nevertheless the ones that stand out the most are the number of restaurants and the existence of a gym and a golf course.

The knowledge of these results presents practical potential, as their correct interpretation suggests that the location and size of the hotel and the planning of the services to be offered by hotels – such as the restaurant service, gym and golf course – will help to maximize total revenue. This study should be confirmed with case studies in different countries.

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