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RESEARCH ARTICLE

The impact of the Web Summit on hotel performance, the case of Lisbon

Carla Bento[1] · Paulo Almeida[1] · José Luis Jiménez-Caballero[2]

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Abstract
This study aims to examine the impact of a mega business event—the Web Summit—on local hotels' key performance indicators. The Web Summit is an annual technology event held in November. Lisbon has been the chosen city for the past 3 years, 2019 making it the fourth. To understand this, daily data collected from STR allowed for a comparative study between hotel performance before and after the Web Summit. We compare the 3 years prior to the event and the last 3 years of the event taking place in Lisbon. The sample size is 63 hospitality companies that range from Economy to Luxury Class and ADR, RevPAR, and Occupancy data. Results show that on the first dates of the event ADR and RevPAR increase up to 115% and occupancy 21% when compared to the previous year. However, on the third year of the event, 2018, these numbers do not see the same increase and remain somewhat similar to the previous year, 2017. This shows that there is major impact on hotel performance justifying the interest governments and other tourism agencies have in attracting these types of events, although after the first impact prices tend to stabilize. The focus on one event only and not compared to other events and other type of event. This study will help Revenue Managers and other decision makers examine the real impact on hotel revenue of such events. They will also be able to preview growth associated to the implementation and support of mega events. This study shows that there are clear benefits in holding big business events, but hoteliers should make better forecasts to yield better results specially when concerning revenues. The before and after daily analysis of key performance indicators is of great value to help hoteliers and practitioners about revenue management pricing strategies regarding this type of events and their long-term impact.

Keywords Revenue management · Performance · Events · Web Summit · RevPAR

Introduction

Events are important demand drivers in tourism, whether they are cultural or sporting events, meetings, conventions, or exhibitions, and especially when considered mega-events. Müller (2015, pp. 627–628) refers that "[m]ega-events have different dimensions in which they can be 'mega' and not all mega-events are 'mega' in the same dimensions and to the same degree." Ritchie (1984, in Barreda et al. 2017) defined this type of events as "major one-time or recurring events of limited duration, developed primarily to enhance the awareness, appeal, and profitability of a tourism destination in the short and/or long term."

Event impacts have been studied in recent years, mostly focusing on the impact on host communities, total expenditures, motivation to attend, and the types of events studied are mostly related to leisure (Draper et al. 2018) and mega sporting events such as the Olympics (Scandizzo and Pierleoni 2018) or the FIFA World Cup (Barreda et al. 2017). Business events are an important component for driving revenue (Draper et al. 2018) in tourism and in hospitality firms, although Draper et al. (2018) mention that most research is leisure/consumer related and only 16.5% are focused on business events.

✉ Carla Bento
carla.s.bento@ipleiria.pt

Paulo Almeida
palmeida@ipleiria.pt

José Luis Jiménez-Caballero
jjimenez@us.es

[1] School of Tourism and Maritime Technology, Centre of Tourism Applied Research, Polytechnic Institute of Leiria, Leiria, Portugal

[2] Facultad de Turismo y Finanzas, Universidad de Sevilla, Sevilla, Spain

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The Web Summit is an annual technological event that "brings together the people and companies redefining the global tech industry" (websummit.com) with, according to their webpage, over 70,000 attendees (*Web Summit | Lisbon | Where the Tech World Meets*, n.d.), it lasts four days and it is held in November.

The Portuguese Government decided to support the coming of the Web Summit to Portugal and it will continue to do so by investing 11 million Euros per year in this event until 2028 (Amorim et al. 2018).

The support given to events considers the number of overnights produced. It is thus important to investigate the impact that this conference has had so far in the Lisbon hotels' Key Performance Indicators (KPIs). Although there may be evidence that the event generates a significant number of nights due to the announced number of participants, hotels measure their performance not only by the number of rooms nights sold, i.e., occupancy, but also Revenue per Available Room (RevPAR) and average daily rate (ADR).

Since most studies concerning economic impact assessment are more general and there is a lack of uniform measurements for all types of impacts (Getz 2018b), we have decided to use the indicators that are the reference Key Performance Indicators for the hospitality industry: Revenue per Available Room (RevPAR), Average Daily Rate (ADR) and Occupancy. The goal is to examine if the demand influences hotel pricing strategies during this event, and what is the effect on hospitality performance.

Our research contemplates daily occupancy, because the event has a governmental support based on the number of overnights generated and hotels need to occupy rooms. Dynamic pricing and Revenue management practices aim to increase revenue, profit, and customer value through the application of the best rates possible, so ADR must be analysed. RevPAR is the combination of occupancy and ADR and thus a more complete indicator of the policies developed by Revenue management strategies, so we need to fully understand the impact in this indicator.

Considering that tourism has been growing steadily since 2009, we wanted to confirm if there is a real impact due to this event or if the growth observed was already predictable. Major events are demand generators, so this study has tree objectives: to understand the real impact of the Web Summit in Lisbon's hotel (1) Occupancy, (2) Average Daily Rate (ADR) and (3) Revenue per Available Room (RevPAR). Data from STR (Smith Travel Research) was analysed, comparing the "before" and "after" this event. Conclusions may be drawn also from a broader impact, concerning days before and after the event. The study examines 6 years performance in Lisbon, it compares the 3 years prior to the event and the first 3 years of the event to analyse tangible impacts. The focus is on daily data and not just monthly results as to understand the full impact on the KPIs.

Portugal has seen an exponential growth in tourism in the past few years (INE and Turismo de Portugal 2019). Occupancy as well as Revenue have been growing steadily and Lisbon has seen an unprecedented growth in the number of hotels (INE and Turismo de Portugal 2019). The Portuguese government has developed several campaigns that led to the visibility of the destination in foreign markets. Major events have also contributed to this visibility and to bringing in more tourists. Since 2016, Portugal has had a program to support the recipiency and hold of corporate and associative congresses and events. Recently, the program "M&I Portugal 2019–2021" announced that it will continue to support events. The amount of support to be granted is directly related to the number of overnight stays generated by each event ("M&I Portugal 2019–2021 | Meetings In Portugal," 22 Jan 2019).

The Web Summit takes place in November, a month with lower occupancy and lower prices when compared to the annual numbers. This technology summit had its first edition in Dublin, Ireland, in 2009 and it had 200 participants. It has grown over the years and in 2014 its co-founder, Paddy Cosgrave, announced that event would move to Lisbon in 2016. After the second Portuguese edition of the event, in 2017, the *Associação da Hotelaria, Restauração e Similares de Portugal* (AHRESP) reported that there would have been less 30 to 40% guests in Lisbon hotels during that period if the Web Summit had not taken place (Monteiro 2017), showing the importance of this event and the risen interest in keeping it in Lisbon.

This paper is organised as follows: we review the literature concerning hospitality performance indicators and pricing dynamics, the methodology describes our objectives and the type of analysis we performed followed by the data analysis where we discuss whether there is an impact and how relevant it is. Finally, we present our conclusions and limitations.

Literature review

This section provides the readers with the fundamental concepts of this study, and it is divided as follows: the concept of Revenue management and the concept of Dynamic pricing. The most relevant Key Performance Indicators (KPIs) used in the hospitality industry, with a focus on the importance of RevPAR; also, the most relevant KPIs used in research; Business events in recent research and the event being analysed: The Web Summit.

Revenue management

Revenue management is the application of disciplined tactics that predict customer behaviour at micro-market level

and optimize product availability and price to maximize revenue growth (Cross 1997). To Schwartz et al. (2017) it can be defined as the optimisation of revenue, profit, and customer value. "It is the act of skilfully, carefully, and tactfully managing, controlling, and directing capacity and sources of income, given the constraints of supply and demand" (Tranter et al. 2009). According to Legohérel et al. (2013)"[y]ield/revenue management rests on the principle of strong price variation adapted to the market context (i.e. demand intensity, demand type, competitors' practices)", being "a sophisticated type of supply-and-demand management which acts simultaneously on prices and available capacity." (Legohérel et al. 2013). This view is particularly relevant in the context of our study since it focusses its concept on price, capacity and demand. Ivanov and Ayas (2017) refer that RM is a set "of tools and actions dedicated toward the achievement of an optimal level of the hotel's net revenues and gross operating profit by offering the right product to the right customers via the right distribution channel at the right time at the right price with the right communication." And continue referring tools such as price discrimination, rate parity, best available rate, early bird and last-minute offers, overbookings, and channel management (Ivanov and Ayas 2017).

A lot has been written about Revenue Management (RM), Pricing dynamics and Pricing strategies (Cross and Welch 2016; Ling et al. 2012; Nair 2019; Viglia et al. 2016) and this is because Price is the strongest driver of profit (Simon and Fassnacht 2019) and it is also the only marketing mix variable, within the four Ps, that is directly related to producing revenue (Steinhardt 2019). RM can be considered "a special case of price discrimination" (Rekettye and Liu 2018, p. 169) because it combines customers' willingness to pay and available supply (Rekettye and Liu 2018) in a given point in time. Dolgui and Proth (2010) refer that RM is "an adjustment of the prices to the state of the market". They also refer that "adjusting the prices is called pricing strategy. A pricing strategy has as goal to establish an optimum price with current profit maximization, maximization of the number of units sold (Dolgui and Proth 2010).

So, RM is a way of, considering several factors such as level of demand, type of guest (segments), time of the week, month or year, specific events, type of room or service, etc., setting prices as to improve revenues and profits.

Revenue Management has been growing as a discipline of interest for both practitioners and academics because of its importance and because it "can be profitably applied in airlines, hotels, restaurants, golf courses, shopping malls, telephone operators, conference centres and other companies" (Ivanov and Zhechev 2012).

Dynamic pricing

Dynamic pricing is one of the strategies used by revenue managers to maximize profit under the uncertainty of market conditions, such as fluctuating demand, competition and other factors (Viglia et al. 2016). There is a high interest in dynamic pricing in the hospitality field in literature, but not many definitions of what dynamic pricing really is, probably because there are many definitions for the same principle, and these can be *price customization*, *price segmentation* or *flexible pricing* all referring to price discrimination (Rekettye and Liu 2018). Essentially it means that sellers can set different prices on the same products or when the same products are sold under different conditions but at different prices (Rekettye and Liu 2018). In those different conditions demand is included. Demand is a function of price, and price can also be a determinant of demand (Tranter et al. 2009). Finding the ideal price is a challenge because managers do not want to lose money by under-pricing their services, nor do they want to lose guests by charging prices that the guests are not willing to pay. Studies in price perceptions focus on the willingness to pay and how guests perceive pricing strategies (Andres Martinez et al. 2011; Choi and Mattila 2005; Jeong and Kim 2014; Lichtenstein et al. 1993). There is also the question related to reference prices. Reference prices describe prices that consumers assume to be fair according to their past experiences and knowledge (Majid et al. 2014; Viglia et al. 2016).

Thus, when defining prices hoteliers should consider, among others, these factors: actual demand, demand generators that may affect future dates and which segments will be attracted (e.g., business or leisure). Rekettye and Liu (2018) mention that the current economy tends to favour price discrimination as the dominant attitude to prices.

Some studies have been conducted on the theory and practice of economic impact of events (Draper et al. 2018; Getz 2018a; Hodur and Leistritz 2006) that reveal the importance of events in overall tourism. There are also many studies that centre on the impact of sports events (Daniels et al. 2004; Ogino and Tanaka 2014; Perić 2018). However, only a short number of studies focus their attention on the direct impact in hospitality prices, such are the cases of Herrmann and Herrmann (2014), or Maier and Johanson (2013). These studies show that there are significant impacts on pricing strategies and dynamic pricing policies according to specific type of demand generators like big events and conventions.

This article contributes to the literature with an analysis of the real impact of a major event in the hospitality industry and it has also managerial implications since it can help managers take more reflected decisions based on these insights, namely develop a pricing strategy from the moment the event is scheduled and not only based on a response to the evolution of demand.

Key performance indicators

As we have seen, revenue management is a highly used practice in the hospitality industry and it uses RevPAR as the core benchmark key performance indicator, although GOPPAR (Gross Operating Profit per Available Room) (Schwartz et al. 2017) and TRevPAR (Total Revenue per Available Room) are also highly recommended indicators.

Occupancy used to be the primary indicator in the industry, but occupancy alone does not reveal the true performance of any hotel business, since rooms can be occupied at very low rates undermining financial success, so ADR and RevPAR should also be examined.

$$\text{The occupancy is calculated:}\ \frac{\text{number of rooms sold}}{\text{total number of rooms available to sell}} \times 100 = \text{occupancy rate.}$$

It must be also referred that ADR alone is not sufficient indicator as rooms can be sold at high rates but nor in sufficient quantity to contribute to the aimed financial goals.

$$\text{The average daily rate is calculated:}\ \frac{\text{room revenue}}{\text{total number of sold rooms}} = \text{ADR.}$$

Consequently, RevPAR is the most common indicator in the hospitality industry, used to measure hotel operations efficiency (McGuire 2015; Kimes 1989). It is obtained by multiplying the Average Daily Rate (ADR) by Occupancy within a certain period, so it is the result of the combination of two important performance ratios: ADR and Occupancy. Furthermore, ADR and RevPAR are the indicators that allow to explore the effects of dynamic pricing strategies.

$$\text{Revenue per available room is calculated:}\ \frac{\text{room revenue}}{\text{total number of rooms available to sell}} = \text{RevPAR.}$$

Or another way to compute:

$$\text{Revenue per available room: occupancy rate} \times \text{ADR} = \text{RevPAR.}$$

So, RevPAR is an indicator thar combines occupancy rates (sales volume) and average daily rate (rooms revenue). Although both these indicators are relevant and considered when analysing performance, RevPAR is the most common indicator used in the hospitality industry to measure performance, financial success and benchmark analysis (Harris 2013). Hospitality firms consider this indicator to be of paramount importance to measure real performance.

Business events' research

There are many factors influencing hotel occupancy and as a consequence hotel revenue, this happens because market dynamics are influenced by many factors, among which are demand generators (Tranter et al. 2009). A demand generator can be seasonality, weather, political circumstances or other entities or activities that produce demand (Tranter et al. 2009), among these activities are the events, either cultural, sports related or business such as meetings, congresses and exhibitions.

Events embody important demand generators and there has been a growing interest in the subject as decision makers on the regional level need factual information to support their decisions in order to sponsor those events (Herrmann and Herrmann 2014) and invest in the needed infrastructures. Müller (2015) proposed a definition for big events by dividing them in three types: Major events, Mega events, and Giga events, but excludes recurring events from all these three categories. Although his definitions exclude recurring events, we will consider the part of Müller's (2015) definition in which it considers major events as "of a fixed duration that (a) attract a large number of visitors, (b) have large, mediated reach, (c) come with large costs and (d) have large impacts on the built environment and the population", even though this event is a recurring one.

Methodology

Our methodology followed previous studies' methodologies, as we will see next.

Main variables

There are several studies that analyse RevPAR, ADR and/or Occupancy as Key Performance Indicators. Barreda et al. (2017) use them when they study the impact of a mega-sporting event, the "2014 FIFA World Cup", on hotel pricing strategies and performance. Kim et al.,(2019) debate the effect of hotels' price discounts on performance recovery

after a crisis and use RevPAR and Occupancy as performance indicators. When investigating convention hotel demand and group segmentation, Maier and Johanson (2013) also use ADR and RevPAR. Enz et al. (2016) explore the effects of competitor pricing levels on relative revenue on a sample of over 4000 hotels in Europe over a 10-year period (2004–2013) using ADR, RevPAR and Occupancy in their descriptive statistics. Moro and Rita (2019) identified common city characteristics influencing room occupancy and feature RevPAR in their model. Sainaghi (2011) tries to identify RevPAR determinants of individual firms located in a destination, the city of Milan, using independent variables in the "what" and "where" dimensions.

We wanted to understand the real impact of the Web Summit in Lisbon. It was thus necessary to investigate the results of Occupancy (overnight stays or room nights), ADR and RevPAR throughout the 6 years and during each date of the event. We compare the before and after with percentage changes. Then, and similarly to Enz et al. (2016) we searched for maximum and minimum values and tried to justify the maximum values by crossing them with events happening in Lisbon. Because maximum and minimum values, or range, do not provide a picture of the real variability and dispersion of the data analysed, we went further than the previous studies and used descriptive statistics to describe the data. We looked for measures of central tendency such as the median versus the mean to find out if the differences were significant. And the standard deviation to understand the spread of values and how far they are from the mean. Descriptive statistics refers to all techniques used to obtain information based on the description of data from a population and it aims to reveal data in a purposeful, summarized fashion and, in this way, to transform data into information (Cleff 2019).

The data were provided by STR, Smith Travel Research, which is an international company that provides data benchmarking, analytics, and marketplace insights for global hospitality sectors. Data provided by this company has been used in many other research papers (Barreda et al. 2017; Canina et al. 2006; Maier and Johanson 2013). The data was structured in a filled called "Daily data", in which daily RevPAR, ADR and Occupancy were provided.

The measured variables were RevPAR, Occupancy and ADR over 6 years. Daily data collected from STR allowed for a comparative study between hotel performance before and after the Web Summit in specific dates and not only monthly averages. We compare the 3 years prior to the event and the last 3 years of the event taking place in Lisbon. The sample size is 63 hospitality companies that represent 31.97% of a total of 197 properties in the STR census. These hotels provide STR with daily data and range from Economy to Luxury Class: 2 Economy Class, 11 Midscale Class, 16 Upscale Class, 15 Upper Upscale Class, 3 Luxury Class, 16 Upper Midscale Class. The KPIs are from these hotels' ADR, RevPAR, and Occupancy data. We analysed the years before the Web Summit, starting in 2013, so 3 years prior to the event, and then the last 3 years of the event, starting in 2016 up to 2018.

Daily data, which is not always used in events' impact research, allows for a more precise analysis namely if there are occupancy peaks during the event and total length of stay, if the occupancy of the nights before and after the event are influenced, that is, if attendees tend to arrive before the event or extend their stay, or if the occupancy is steady or fluctuates throughout the event's duration. This is important because hoteliers seek to maximize guest stays and make use of practices such as bookings with a minimum length of stay.

Events were retrieved from several sources since we could not find one single source where all the events are registered, and some entities would not provide data related to number of participants and nationalities due Data protection policies. Whenever a higher value in occupancy, ADR and RevPAR was found we tried to pinpoint any event that caused that value.

Data analysis

General KPIs were first analysed, and then descriptive statistics were used to understand the performance of hotels in Lisbon. We used Excel and its statistics module to analyse the data.

In 2013 the overall occupancy rate in Lisbon was 63.9%, with a small growth in the two following years: 2014, 71.2% and in 2015, 73.9%. In 2016, the first year of the event there is not much evidence of a major growth in the annual occupancy and probably no one expected an annual big impact on that year.

We observe that the occupancy rates in Lisbon have been growing steadily in the past 6 years, although 2017 and 2018 have almost the same occupancy, with, in fact, a slight decrease in 2018 (Fig. 1).

When analysing the Average Daily Rate (ADR) and the Revenue per Available Room (RevPAR) we can observe significant changes. We can see that between 2013 and

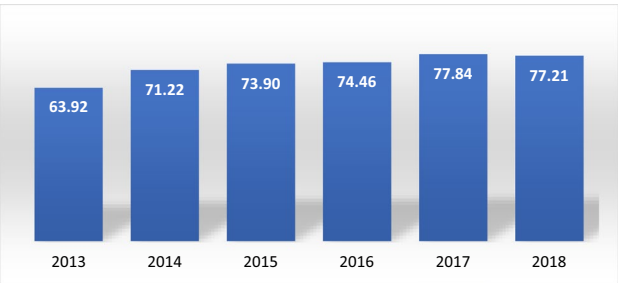

Fig. 1 Annual occupancy percentage, Lisbon: 2013–2018

2018 the ADR grew by 44.22% and the RevPAR grew by 74.19% which is significantly above the 20.78% observed in the Occupancy Rate growth. This growth cannot be attributed to the Web Summit event alone, but also to the major campaigns carried out by the Portuguese Tourism Bureau (Turismo de Portugal) (Fig. 2).

In fact, occupancy rates in Lisbon, as already seen, have been growing gradually. When observing monthly differences, we find that the year of 2014 saw the biggest growth with months, such as April, July, August, September, November, and December seeing the occupancy rate increased from 13.4% (in November) to 17.8% (in April). This pattern continues to the following year, in the first trimester. Similar growth was observed again in the first two months of 2017, again with the month of January gaining 19.0% in occupancy compared to the previous year. But after the general improvement of 2014, the occupancy rates have not seen major increases and in 2018 there was even a slight decline.

However, hotels analyse their revenue and not only occupancy, as revenue is the true indicator of a successful pricing strategy (fundamental of pricing). When analysing the evolution of ADR and RevPAR we can see that

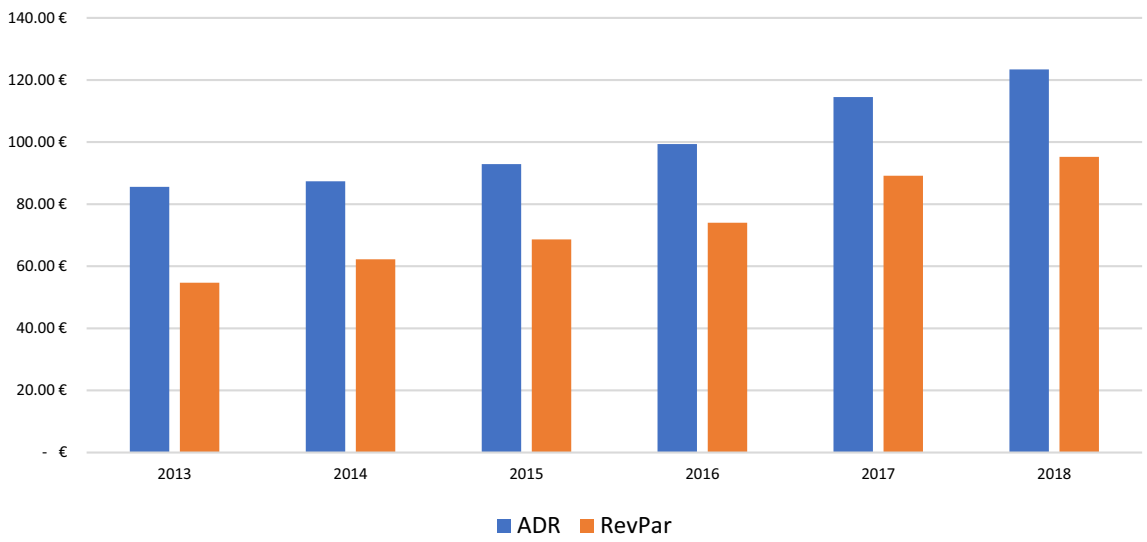

Fig. 2 ADR and RevPAR in Lisbon—2013 to 2018

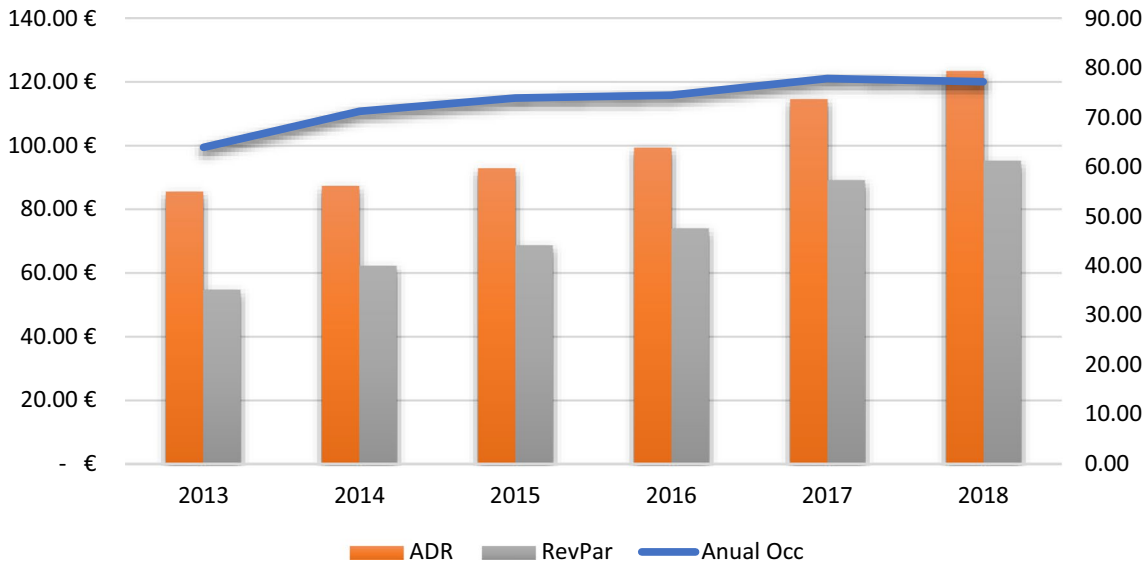

Fig. 3 Evolution of ADR, RevPAR, and Occupancy from 2013 to 2018

the occupancy rate has grown but the revenues have seen a better performance (Fig. 3).

When looking at occupancy rates over the year, the months with better performance in Lisbon are May, September, and October, but it can be considered that between April and October the performance is very regular (Fig. 4).

On the first year of the event the ADR on the month of November surpassed the annual ADR, growing 20.3% from the previous year. The RevPAR had an even more exponential growth of 29.3% (Figs. 5 and 6).

The previous years to the Web Summit had already seen an increase in occupation, especially after 2015. During the

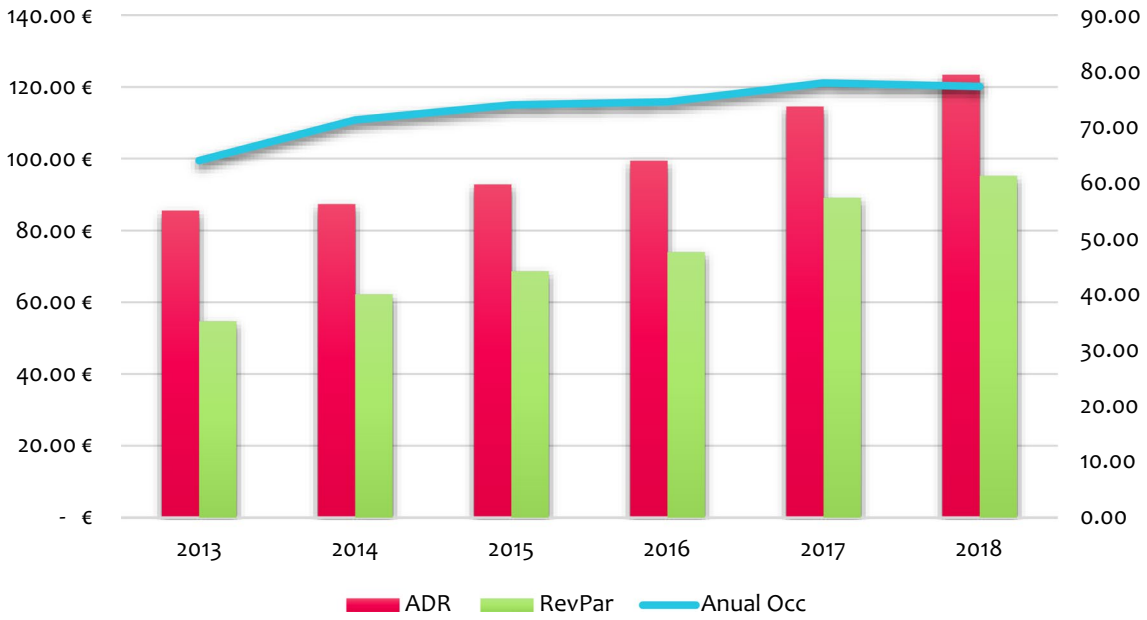

Fig. 4 Yearly ADR, RevPAR and Occupancy percentage, Lisbon, 2013–2018

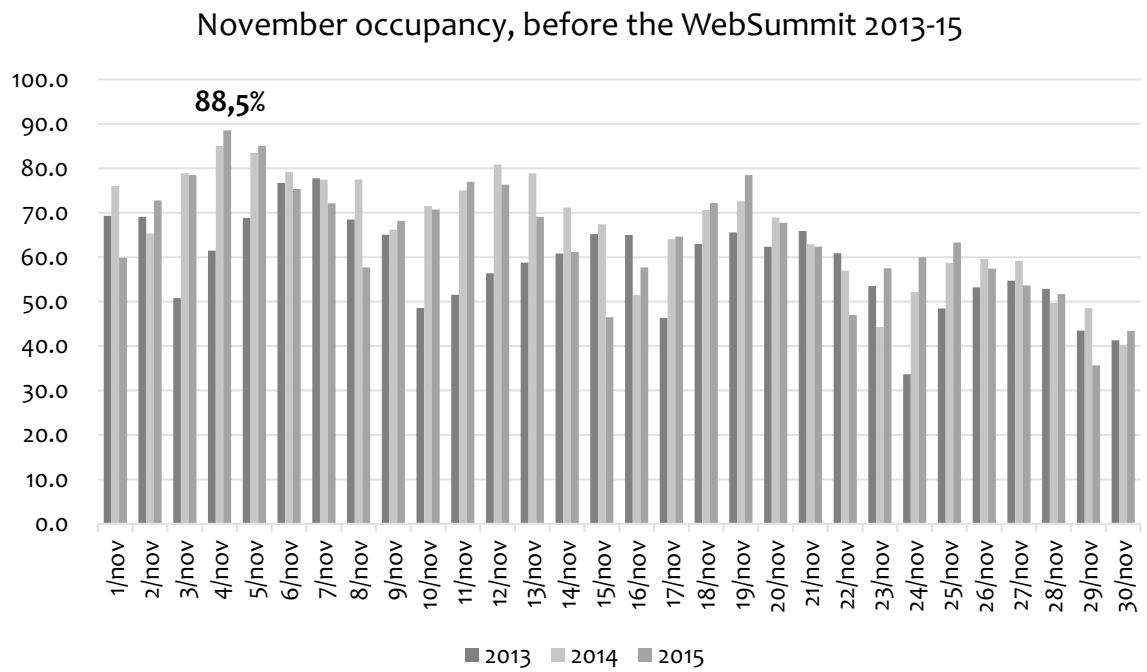

Fig. 5 November occupancy, before the Web Summit: 2013–2015

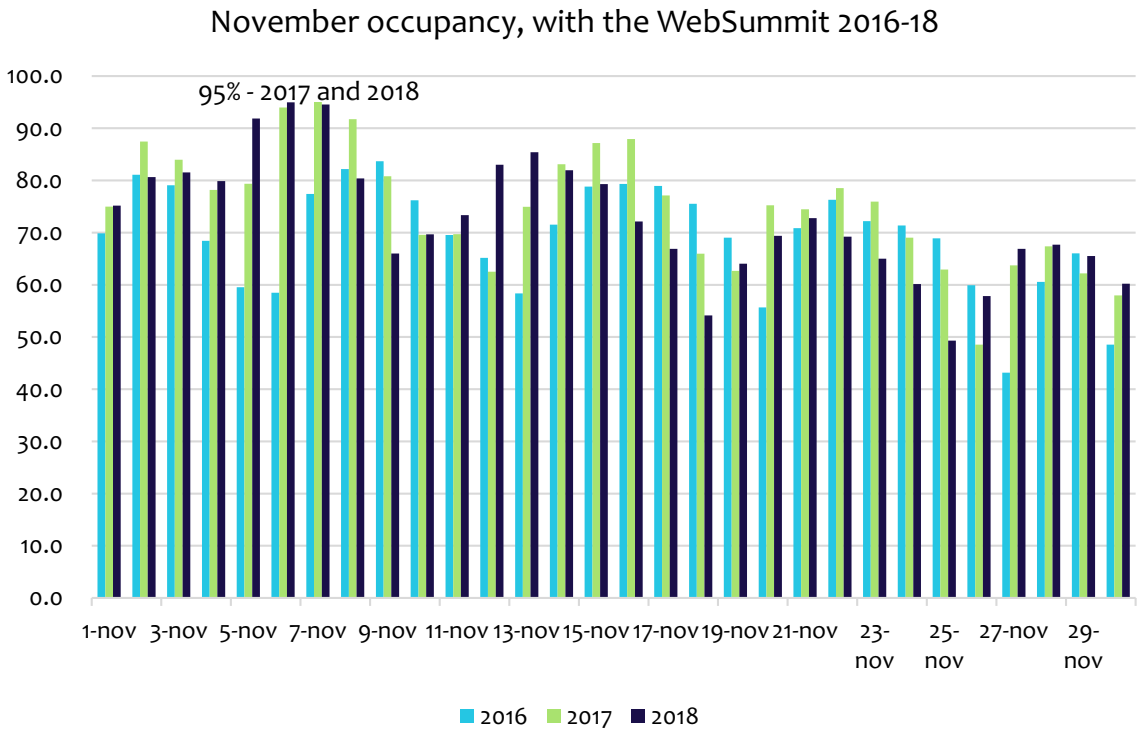

Fig. 6 November occupancy, with the Web Summit 2016–2018

week, the occupation is clearly higher during the weekdays when compared to the weekends, and the beginning of the month has a better performance.

As previously mentioned, the Web Summit started in 2016, and in that year and in the following (2017) the event started on a Monday through Thursday, three nights, four days of the week. On the first year (2016) the hotel occupancy in the three nights increases as the event continues and it is still significant in the last night of the event. However, in the two following years the occupancy of the first and second night of the event is superior, probably meaning that attendees do not stay the whole event. This is relevant when considering establishing a minimum Length of Stay (LOS) upon reservation. It is important to point out that in 2018 the event dates had an adjustment and, instead of starting on a Monday, the event started on a Sunday. This would probably be interesting for hotels since Sundays do not usually perform well on this day of the week. Nevertheless, the occupancy on the first night does not perform as good as in the previous year: in 2017, November 6th sees an occupancy of 94% and in 2018 the 4th of November sees an occupancy of 79.9%, so this is probably why the beginning of the Web Summit went back to a Monday. It is interesting to perceive these behaviours and one might conclude that business travellers travel during the week and not so much on Sundays.

The average occupancy during the three nights of the event was: 2016, 81.1%; 2017, 93%, and in 2018, 88.9%. It is also interesting to verify that, in the night of the last day of the event in 2018 (7th to the 8th of November) the occupancy was of 94.5%, contradicting the 2017 performance of 80.8%, and that of 2016 of 76.2%. This might mean that attendees do not leave on the last day and stay an extra night.

The average occupancy throughout the four nights, from the first night up to the night of the last day of the event (making it a five day stay in Lisbon) was in 2016 of 79.9%; 2017, 90.4% and in 2018, 90.3%. In 2019 the Web Summit will start on a Monday as on the first 2 years.

Our first objective was to understand if there is a significant impact on Occupancy, and we can see that there is in fact an impact.

Moving to Revenue, let us first analyse the Average Daily Rate (ADR). In 2018 the ADR for the three nights of the event was 146.26€, and if the fourth night is included the ADR was 142.69€. The average ADR in November was 100.24€. In 2017 the ADR of the three nights of the event was 159.01€, and on the fourth night (the last day of the event) it drops to 137.69€, making the ADR of the four nights fall to 153.68€. Even so it is a high value when compared to the annual average in Lisbon. In 2018, the year the event started on a Sunday, the ADR of the first three nights was 152.41€ and 155.30€ when considering also the fourth night. It represents an increase in value when compared to the previous year, but the best performing days were, in contrast to 2017, the last two nights with an ADR of 168.74€

and 163.99€. These are revealing numbers when considering in which day of the week these types of events should occur and when they should start and finish.

This data shows that there is also an impact on prices, answering our second question or objective, that was to understand if there is a significant impact on the Average Daily Rate, and we can see that there is in fact an impact on this KPI.

Monitoring the previous analysis done for occupancy and ADR, the average RevPAR in 2016 was, for the three nights of the event, 118.63€. The RevPAR for the second and third nights was 120.49€ and 122.88€ respectively. On the night of the last day of the event the RevPAR was 100.55€, still above the average monthly numbers: the RevPAR in November 2016 was 69.35€. The following year showed the same pattern but with an increase in RevPAR performance: on the three nights—Monday through Wednesday—the RevPAR was 148.83€ and on the night of the last day 111.26€. In 2018, when the event started on a Sunday the performance was better on the second and third night—Monday and Tuesday—and on Wednesday night, the last day of the event. Comparing patterns, the average RevPAR on the first three nights is 136.70€, although the remaining days, Monday and Tuesday, saw an average RevPAR of 145.54€, and on the night of last of the last day of the event it was 155.05€.

These differences can be justified with the beginning of the event on a Sunday, which might not be as appealing to the attendees, and maybe for this reason the event, in 2019, went back to the initial formula—Monday through Thursday. Another aspect to point out is that, in 2018, when the event ended on a Wednesday, the night of the 8th of November (Thursday) had a RevPAR of 110.22€, which is above the monthly average and probably meaning the participants are more willing to prolong their stays than to arrive early at events (Figs. 7 and 8).

Considering that RevPAR is the performance indicator that best describes the success of hotels, we can perceive a clear impact on this ratio, which was our third objective: yes, there is a significant impact on hotels' RevPAR during this event. The difference is obvious because we can observe an increase of 23.3% from the highest price in 2016 to the highest price in 2018. Before the Web Summit the highest price in November was 83.60€ and the highest price in the last edition of this Summit was 160.30€.

Descriptive statistics

Descriptive statistics explain the basic characteristics of the data (Sharda et al. 2018, p. 101) that help us reach the main goals of this research.

We searched for maximum and minimum values in the 6 years analysed, with a clear focus on the months of November. We also looked for a relationship between events and price levels, but our focus was this event.

We first looked for maximum and minimum values in occupancy, ADR and RevPAR throughout the 6 years. Occupancy had its lowest value at 25.19% and maximum at 99.40%. As far as Revenues are concerned, we

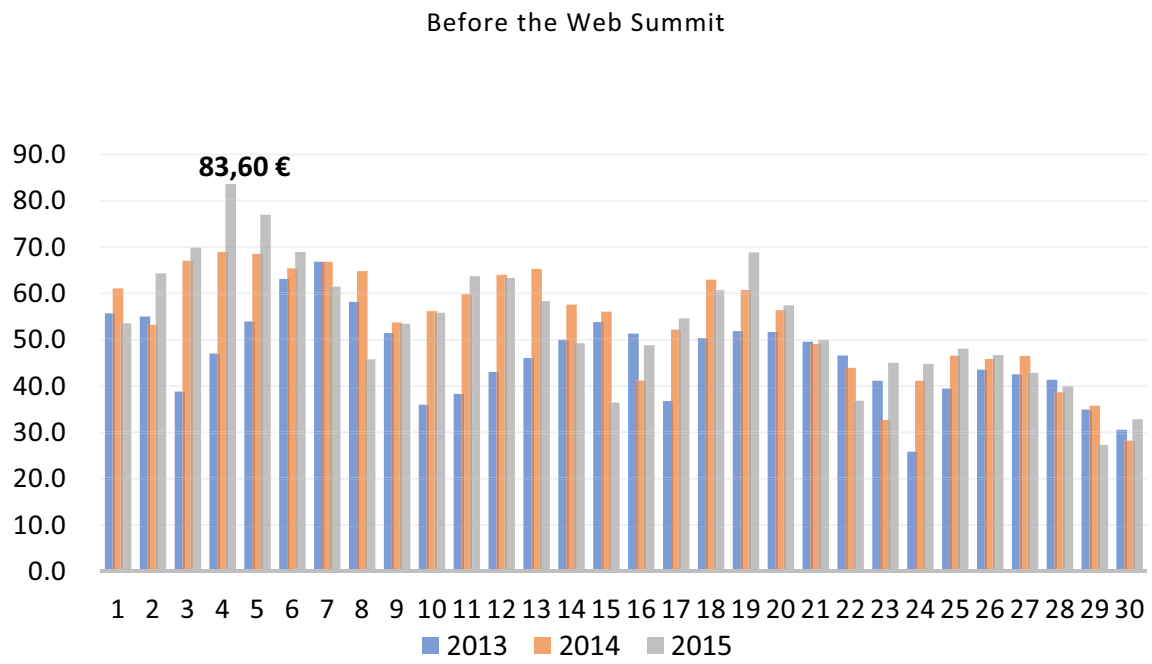

Fig. 7 Daily RevPAR—November 2013–2015

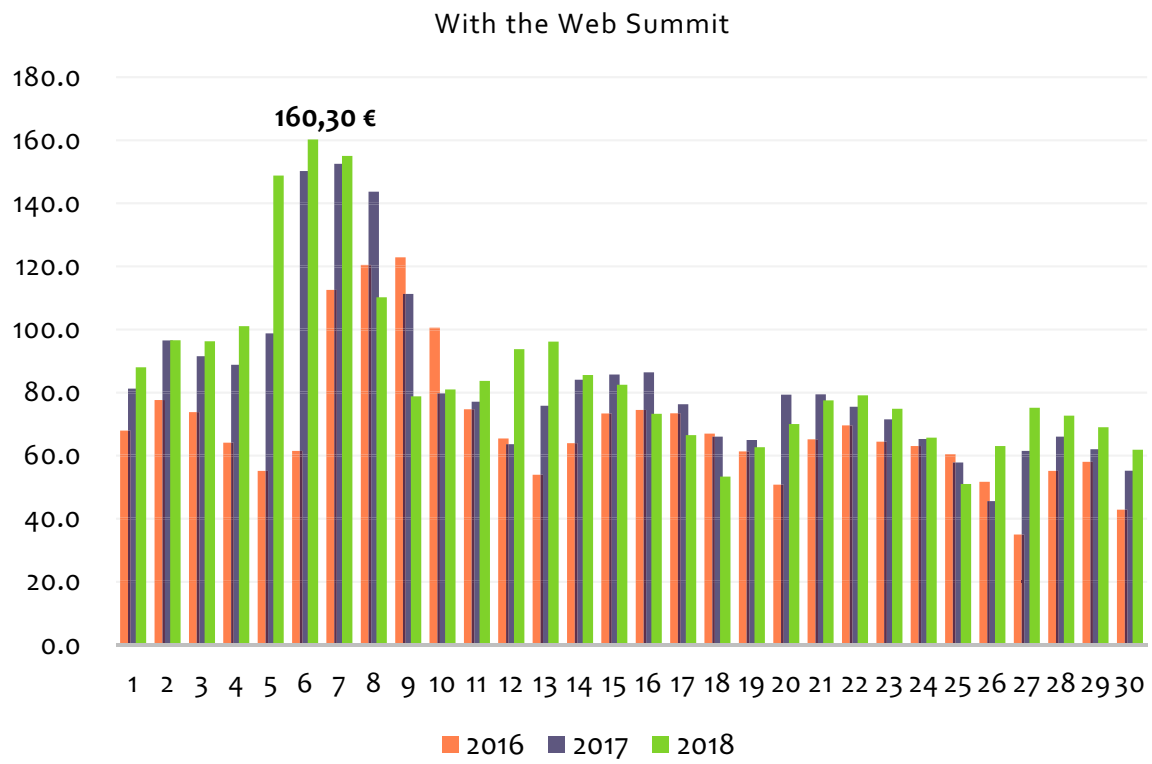

Fig. 8 Daily RevPAR—November 2016–2018

found the minimum ADR to be 67.82€ and the maximum 259.16€, and RevPAR had a minimum value of 19.17€ and a maximum of 256.66€. The mean (or average) values for occupancy, ADR and RevPAR were 73.07%, 98.18€ and 73.96€, respectively.

"Measures of dispersion are the mathematical methods used to estimate or describe the degree of variation in a given variable of interest" (Sharda et al. 2018, p. 103). Considering that measures of dispersion—or spread—of data values give a framework within we can judge and understand if the mean (or average) represents the data (Sharda et al. 2018) we wanted to verify the degree of variation in the three variables. These measures allow us to verify if the performance during the months of November and during the Web Summit are distinct from the mean values, thus having an impact on overall performance.

We examined the standard deviation in the 6 years and in the months of November before the Web Summit, and in more detail in the years of the event.

Measures of dispersion such as the standard deviation are sensitive to outliers (Bruce and Bruce 2017, p. 16) to avoid this we computed the Mean Absolute Deviation (MAD). The MAD is a simpler way to compute the overall deviation from the mean (Sharda et al. 2018) and it is not influenced by extreme values. This will help understand the pricing dynamics.

	Occupancy	*ADR*	*RevPAR*
Minimal	25,19	67,82	19,17
Maximum	99,40	259,16	256,66
Mean	73,07	98,18	73,96
Median	77,04	92,85	71,56
Standard Deviation	17,2416	21,02331	29,65256
Q1	60,89457	82,79821	51,34231
Q3	87,19044	108,9445	92,87511
IQR	26,29587	26,14629	41,53279

Fig. 9 Descriptive statistics for occupancy, ADR, and RevPAR—Years 2013–2018

Occupancy	ADR	RevPAR
MAD: 12,02	MAD: 15,80	MAD: 20,90

Fig. 10 Mean absolute deviation (MAD) or occupancy, ADR, and RevPAR—Years 2013–2018

Finally, we also computed the Interquartile Range (IQR). Like the MAD, the IQR does not take outliers into account only showing the distance between the middle 50 per cent of the data (Figs. 9 and 10).

Although the MAD is not a very high value, we can still observe that there is a spread in the KPIs, more accentuated in the RevPAR. When we look at the IQR, not as influenced by the extreme values we seem in the minimum and maximum observation, we can clearly see a dispersion indicating that prices are dynamic.

Focusing on the months on November.

Figure 11 statistics refer only to the months of November in the 6 years. Here we see a less spread of values and the Web Summit is included in this data (Fig. 12).

When analysing the months of November in the years when the Web Summit occurred, we verify that there is an increase in the minimum value, which seems to be justifiable because of the evolution in prices, but we also observe a very small difference in the Standard Deviation between the two periods, this showing that the pricing dynamics remained similar. It must be highlighted that the 3 KPIs saw an increase.

Figure 13 depicts the statistical data for the dates when the Web Summit occurred. We observe here very high values in both the ADR and RevPAR, showing that event made the prices go up. The standard deviation and the IQR are quite high in the days of the event, proving that there are differences in pricing throughout the event.

Results

Results show that ADR and RevPAR increased up to 85.6% and 115.8% when compared to the same period in the previous year (2016 compared to 2015) and Revenue per Available Room saw an increase of up to 117.5% (2015 vs. 2016).

Average RevPAR on the first three weekdays in November 2015 (Monday to Wednesday) was 57.66€. The average RevPAR on the first three weekdays in November 2016 (Monday to Wednesday) was 118.63€. Occupancy saw an increase of up to 21% on the second year of the event (the first day of the event in 2017 when compared to the first day in 2016—Monday) 0.2018 did not see the same increase,

	Years:	*Occupancy*	*ADR*	*RevPAR*
Minimum	2013-2018	33,6	70,1	25,8
Maximum	2013-2018	95,0	168,7	160,3
Mean	2013-2018	67,7	94,4	65,3
Median	2013-2018	68,7	88,5	62,4
Standard Deviation	2013-2018	12,35754	19,85403	24,31069
Q1	2013-2018	59,62872	79,99739	49,96864
Q3	2013-2018	77,06746	102,5319	74,83928
IQR	2013-2018	17,43874	22,53455	24,87064

Fig. 11 Descriptive statistics for occupancy, ADR, and RevPAR—November 2013–2018

	Years:	*Occupancy*	*ADR*	*RevPAR*
Minimum	2016-2018	43,2	81,1	35,0
Maximum	2016-2018	95,0	168,7	160,3
Mean	2016-2018	72,2	108,1	79,4
Median	2016-2018	71,8	102,3	74,1
Standard Deviation	2016-2018	11,00015	19,78413	25,4695
Q1	2016-2018	65,13463	93,90233	63,49924
Q3	2016-2018	79,48662	114,128	86,81615
IQR	2016-2018	14,35199	20,22564	23,31691

Fig. 12 Descriptive statistics for occupancy, ADR, and RevPAR—November 2016–2018

nonetheless numbers did not decrease, and RevPAR and ADR continued to perform very well.

Starting the event on a Sunday did not appear to be the best solution because occupancy performed below the two previous years (it went back to starting on a Monday in 2019). This also shows that probably business travellers choose weekdays and prefer to prolong their stay until the end of the week.

In the 6 years, the differences between the median and the mean show that the first is higher in Occupancy, but considering revenues, in both ADR and RevPAR the mean is higher. This shows that Occupancy is less variable and less affected by extreme values. On the other hand, in the ADR and RevPAR the means are higher than the median values, revealing a bigger spread of the data and this is corroborated by the standard deviation of 21.02 in the ADR and 29.65. The MAD confirms these results. The IQR also confirms the spread of Revenues—ADR and RevPAR—supporting that there is a strategy of dynamic pricing.

The month of November, chosen for this event, in the 6 years reveals that there has been a variability in the KPIs, similar throughout the whole period in study. When observing the month of November only when the Web Summit

	Occupancy	*ADR*	*RevPAR*
Minimal	76,2	126,47	100,55
Maximum	95,0	168,74	160,26
Mean	86,4	149,52	129,97
Median	83,7	146,82	122,88
Standard Deviation	7,07098442	12,9490508	21,299066
Q1	80,1408817	137,394852	110,74351
Q3	94,2689062	161,259486	151,3895
IQR	14,1280245	23,8646341	40,645986

Fig. 13 Descriptive statistics for occupancy, ADR, and RevPAR—Web Summit Days 2016–2018

occurred, we realize, not surprisingly, that the higher KPIs happened in the years of the event.

The Web Summit days show good results in all KPIs. Although the SD and IQR are not very high when regarding occupancy, the same is not observed in both ADR and RevPAR, where we have a SD of 21.29 and an IQR of 40.64. This proves that probably prices were not protected despite the dated being known with a year in advance and a possible forecast could have been done. When exposing the IQR of 40.64 only on the Web Summit days can reveal that possible minimum length of stay and premium prices protection did not yield the expected results or were not practiced by hoteliers.

Because the maximum values were in the 6 years analysed were not during the target event, we wanted to find out what had led to that performance, and we concluded that the best RevPAR performing dates were:

2014, May 23rd and 24th—the Champion's League Final between Real de Madrid and Atlético de Madrid—256.66€. Showing that big sporting events do have a major impact in Hotels' RevPAR like proved by Barreda et al. (2017).

2017, September 11th to 14th—with an average RevPAR of 198.42€ (on the 11th 201.51€)—53rd Annual Meeting of the European Association for the Study of Diabetes 11–15 September 2017 (nearly 18 000 delegates—nonofficial numbers).

2017, October 6th to 9th—with an average RevPAR of 191.11€ (on the 7th 201.64€)—XXXV Congress of the European Society of Cataract and Refractive Surgeons (ESCRS) 7–11 October 2017 (nearly 16 000 delegates—nonofficial numbers).

These two last events are medical events which poses the question of, despite being business events, the class or type of event is also relevant when it comes to pricing decisions. This also shows that the fact of the Web Summit being a very mediatic event it does not seem to generate the highest RevPAR.

Conclusions

Events do play a major role in occupancy and revenue performance. There is clearly a positive impact in the all the key performance indicators that were subject to analysis. There is also a positive indicator that attendees tend to extend their stay up until the following weekend. The first 2 years saw a price increase that tended to stabilise. Events held in the month of November can be an interesting way of ending the year since December is usually more for the leisure holidays and business activity only comes back strong usually after February.

This research focussed on the analysis of impact of the Web Summit on the key performance indicators. Responding to this we may support that Lisbon's hotels saw an evident increase in the occupancy that otherwise would not happen, and the financial indicators also show the impact of this event: ADR increased and RevPAR, the reference indicator, almost doubled from the highest value of the 3 years before the event—83.60€—to 160.30€ in 2018.

As far as pricing dynamics are concerned there is clearly a strategy of dynamizing the prices to increase revenues and profits. But it must be underlined that during the event the range of the ADR and RevPAR is still high, which probably shows that the approaches to the pricing where made based on demand and not so much on forecasts. Also, most probably the hotels did not apply minimum length of stay policies though the event. When the forecasted demand is high hotels should protect high rates to avoid the spread noted in the ADR and RevPAR range. Responding only to levels of demand may not grant the best results, so premium price protection and minimum length of stay strategies are advised.

In sum, events are in general important for hospitality firms, bringing profitable business independent of the type of event.

Theoretical and practical contributions

In terms of theoretical contributions, to our knowledge this is the first time that research has examined daily Occupancy, ADR and RevPAR and the Days of the Week for a specific event. Descriptive statistics, averages and maximum and minimum values were analysed, and the Standard Deviation, IQR and the MAD. In this sense, we agree with other authors who refer that it is necessary to deepen these studies regarding pricing strategies in specific dates with specific demand generators and make progress in research regarding the use of more sophisticated statistics in a sector characterized by simpler analysis that do not always evidence a "bigger picture", and the importance for tourism.

This study has other practical implications related to addressing the gap between academics and professionals in the hotel sector. One way to do this might be to focus on analysing the average variations in the KPIs and using more measures of central tendency such as the median and measures of dispersion when examining Occupancy, ADR and RevPAR. These measures are helpful in determining the range in values and thus developing strategies to reduce those ranges and develop a price optimization strategy.

This study also shows that, regardless of the type of event, the KPIs should be analysed daily, and not the full event's KPIs. This will enable to understand patterns, create stimulating packages for guests with more discretionary budgets, and minimum length of stays should also be applied. This can stimulate negotiations with specific operators, and last-minute offers in specific websites can be prepared in

advance and used in case of need. Another aspect involves dynamic packaging options, with specific length of stay to avoid the ranges observed in prices and occupancy, to attract most guests who wish to stay for the total duration of the event. And with this probably increasing ancillary revenues not analysed in this study. Detailed analysis of KIPs during events will also allow for the development of a more segmented analysis by crossing the KPIs with specific segments.

When choosing the days of the week for the events, and depending on the duration of the event, the proximity to the weekend should also be considered specially the end of the event and not so much the beginning of it, as we observed. Hoteliers can look at this as a tool for all sorts of events, from leisure to business or any other seasonal phenomena.

STR proves hotels with a comp set analysis so daily patterns should be compared to the comp set to verify where variations are happening.

The study of the range in prices within an event is also helpful to understand elasticity of demand, importance of the time of purchase so that discounts are nor offered prematurely.

One final aspect is related to the importance of participants in the event or speakers, and this applies so business events as well as sports or music festivals. Knowing the major speakers, players or performers may also help in the development of a more beneficial dynamic pricing strategy.

Limitations and future research

No research is without limitations and in this case, it is important to analyse other factors, such as nationalities and ancillary revenue. Another limitation is the focus on only one event. Several events should be analysed as to understand the impact by the type of event as to find out which events do produce the best revenues.

Other impact and questions should be considered: Have these tourists come back? How has the event projected our image internationally?

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