"Hotel – OTA" interaction and its influence on the optimization of urban hotels' distribution channels

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Abstract

Research background: The interaction between hotels and the online travel agencies (OTAs) influences the hotel sales, creating dependencies, which the hotel managers are reluctant to accept. The indicators that evaluate urban hotel sales in Bulgaria in the scope of partnership with OTA are examined. The influence of the modern digital tools to enhance business performance results is reviewed.
Purpose of the article: Focusing on Bulgarian urban hotels, the research measures the impact of diverse factors for shaping an adequate business model of an urban hotel. The effect of the share of the hotel sales via OTA platforms, the number of OTAs used, the occupancy rate, the RevPAR and the Booking.com rating score is considered. Finding an appropriate model for digital behavior of urban hotel enterprises is one of the aims of the survey.
Methods: A questionnaire distributed among urban hotels situated in industrial towns of Bulgaria is conducted. Linear regression and logistic regression methods are applied for the purpose of the study.
Findings & Value added: The importance of channel manager technology for business metrics in this sector is concerned. Three generalized hotel operating models are extracted. It is concluded that there is a necessity for constant management and review of the hotel - OTA relations.

Keywords: *hotel; OTA; channel manager; price; Booking.com*

JEL Classification: *D12; G41; Z30; Z33*

1 Introduction

Contemporary hotels have adjusted their business operations in accordance with the presence of online travel agencies. Although reluctant to adopt new technologies (Buhalis, 2003), hoteliers have to acknowledge and embrace the industry shift towards technology-driven management and promotion of their facilities (Inversini and Masiero, 2014). OTAs

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appeared as the most convenient and fastest option for entering the digital market. Embracing the idea of conquering new markets the majority of urban hotels in Bulgaria are exploiting extensively these sources of reservations.

According to many studies in the last decade an increasing share of sales via OTA distribution channels is observed and this process is constantly tracked by researchers such as Roland Shegg (2020), Stangl, Inversini and Schegg (2016), Mellinas (2019), Martin-Fuentes and Mellinas (2018) and many others. In this study, we aim to find statistically important correlations among a diverse amount of factors and variables including the share of sales via OTA, the number of OTA platforms used by urban hotels, the price of hotel room, the occupancy rate, the star category, the number of hotel rooms, RevPAR and the Booking.com rating score of the hotels. The logistic relations between the presence of a channel manager technology and the above mentioned variables of hotel operations are examined. The aim of the study is to outline the hotel enterprises that extract the most from their relations with OTA, as they are managing a stable and significant cooperation with the travel agents.

2 Literature review

The online travel agencies are playing a key role in the hotel service sector (Kim, Kim and Shin, 2009) and this fact has evolved in the formation of OTA, as a primary channel for online reservations according the research of Schegg (2020). There are many factors determining the valence and the direction of interactions between OTA and the hotels. A research of Inversini and Masiero (2014) is focusing on the successful management of distribution channels, while taking into account the marketing image of the chosen OTA platforms, the inclusion of human resources and hotel characteristics. Mellinas (2019) is exploring the dependence of the hotels on Booking.com regarding the star rating and the size of every hotel forming an RpR (Reviews per Room) index to measure the effectiveness. Previous studies of Öğüt and Taş (2012) and Viglia, Minazzi and Buhalis (2016) demonstrate the influence of customer reviews on the number of reservations, the price of the room, RevPAR and the occupancy rate of hotels.

A survey of Phillips et al. (2016) provides certain factors for the hotel customers' choice which include the physical aspects of hotel provision (premises, building, rooms and internet), the quality of the food and drinks and the aspects of the quality of services provided. Followed by the study of Raab et al. (2018), stating that the successful engagement and communication between the OTA and the hotel managers is a crucial element for full-fledged cooperation.

Regarding the perspective of the customers' choice there are many variables that can influence the hotel – OTA relationship. Pinto and Castro (2018) emphasize that customers prefer to book on OTA platforms mainly because it is easy and the prices are lower but also take into account the online customer reviews (the Booking.com hotel rating). According to Beritelli and Schegg (2016) hotels that use more online distribution channels obtain a greater number of reservations, while Anderson (2009) proves that cooperation with OTA increases the number of reservations from 7,5% to 26%.

3 Research methodology

The study is focused on the analysis and the evaluation of the dependencies that arise between urban hotels and OTAs in Bulgaria. Several dependency hypotheses are tested using linear regression and logistic regression analysis (Allison, 2013).

A comprehensive research, comprising of 46 questions is performed in the period April – July 2020. For the purpose of this study only 9 of these questions are used in order to fit the quantity limitations of the paper. The survey is distributed among the urban hotels situated in the towns of Sofia, Plovdiv, Varna, Burgas, Stara Zagora, Ruse, Veliko Tarnovo and Blagoevgrad using Google forms. All towns and the cities are regarded as well-developed economic zones in Bulgaria, according to a study of the Institute for market economy (2018). There are 104 questionnaires completed by managers or owners of urban hotels in the country. The quantitative data is analyzed with the assistance of statistical software Excel of Microsoft Office and JASP Team (2019) JASP (Version 0.11.1).

A linear regression method is used to reveal the dependency between the examined variables and factors. Before applying the linear regression a correlation matrix is formed to check for the importance and statistical strength of relations among the reviewed variables. The more important correlations found are listed as follows:

- Star category – number of rooms ($r=0.441$, $p<0.001$), Star category - price of room ($r=0.668$, $p<0.001$), Star category - RevPAR ($r=0.596$, $p<0.001$)
- Number of rooms– price of room ($r=0.\ 378$, $p<0.001$), number of rooms – RevPAR ($r=0.340$, $p<0.001$)
- OTA share – Booking.com rating score ($r=0.412$, $p<0.001$)
- Booking.com rating score – price of room ($r=0.373$, $p<0.001$), Booking.com rating score – RevPAR ($r=0.333$, $p<0.001$)
- Price of room – number of OTA ($r=0.292$, $p=0.003$)

Every combination of predictors and dependent variables is assumed, as well as multiple linear regression analysis for some combinations of factors - predictors. Considering correlations with a Pearson coefficient higher than 0.3, we focus on the indicators of the coefficient of determination R^2. According to Cohen (1988) regression models with adjusted R^2 values above 26% (> 0.26) suggest a strong dependency effect. Some of the pre-estimated models and especially the multiple regression ones showed high values of the adjusted R^2, but some showed present multicollinearity in certain factors.

Logistic linear regression is used when the dependent variable of the model has only two outcomes – a categorical dichotomous dependent variable. Allison (2013) proposes to use Tjur R^2 or McFadden R^2, being the most practical and correct coefficients for measuring the presence of statistically important relation between variables. The present study utilizes McFadden R^2 in order to determine whether the model is suitable. According to McFadden (1977, p. 35) values in the range of 0.2 - 0.4 are an excellent indicator.

4 Results

The hotels that took part in the survey showed mean values for star rating – 2.9, average number of rooms - 38, occupancy rate – 66.9%, number of OTA used – 2.79, share of OTA sales – 27.5%, average Boooking.com rating – 8.6, average room price – 69.22 BGN and RevPAR – 46.39 BGN. The variables reviewed are presented in table 1.

Table 1. Descriptive Statistics for the variables in the survey.

	Category	**Number of rooms**	**Occupancy %**	**number of OTA used**	**share of OTA %**	**Rating on Booking.com**	**Price of single room in BGN[2]**	**RevPAR in BGN**
Valid	104	104	104	104	104	95	104	104
Missing	0	0	0	0	0	9	0	0

[2] BGN – National Bulgarian currency

	Category	Number of rooms	Occupancy %	number of OTA used	share of OTA %	Rating on Booking.com	Price of single room in BGN²	RevPAR in BGN
Mean	2.904	37.673	66,9%	2.793	27,5%	8.588	69.22	46.69
Std. Deviation	0.971	43.154	0.148	1.808	0.179	0.680	31.508	23.143
Variance	0.942	1862.305	0.022	3.270	0.032	0.462	992.781	535.598

Source: authors' calculation

4.1 Linear regression models.

Considering the variable OTA share in sales and the possible factors that significantly affect its values, it was found that the only correct predictor is Booking.com rating score. For the purpose of the analysis following hypothesis was tested:

H_1 "the score of hotel rating on Booking.com is a statistically significant predictor of change in the share of hotel sales through OTA channels" and

H_0 "the Booking.com score rating is not statistically significant predictor of the share of sales via OTA". According to the extracted data in table 2, a significant level of dependence is found in this regression model.

Table 2. Linear regression model for Booking.com score as predictor of OTA sales.

Model Summary							
					Durbin-Watson		
Model	**R**	**R²**	**Adjusted R²**	**RMSE**	**Autocorrelation**	**Statistic**	**p**
1	0.412	0.170	0.161	0.159	-0.006	2.006	0.728

Coefficients						95% CI		Collinearity Statistics	
	Unstandardized	**Standard Error**	**Standardized**	**t**	**p**	**Lower**	**Upper**	**Tolerance**	**VIF**
(Intercept)	-0.615	0.207		-2.964	0.004	-1.027	-0.203		
Booking.com score	0.105	0.024	0.412	4.357	< .001	0.057	0.153	1.000	1.000

Source: authors' calculation

Analysis of the standard residuals shows that they are within the norms (std. residual min = -1.864, std. residual max = 2.769). The residual error independence was confirmed by the Durbin-Watson test (d = 2.006). The hotel rating on Booking.com predicts a statistically significant share of OTA, $F(1, 93) = 18.987$, $p < 0.01$ and corresponds to 17% of the deviation in the share of OTA with coefficient of determination Adjusted $R^2 = 0.161$. This value is moderately predictive of dependencies (Cohen, 1988). The correlation is statistically significant, $r(93) = 0.412$; $p < 0.001$. The regression equation for Booking.com score explains the changes in the share of OTA is $\hat{Y} = a + bx = -0.615 + 0.105.x$ (x = rating). Confidence interval is 95% CI (0.057, 0.153) with b = 0.105, meaning that an increase in the rating in Booking.com by one leads to an increase in the share of OTA in sales by approximately 0.057 to 0.153 units. The value of the angular coefficient b is statistically significant at a significance level $\alpha = 0.05$ ($t = 4.357$; P-value = <.001).

A multiple linear regression model addresses the share of OTA sales, the price of hotel room and the number of rooms as predictors of Booking.com score rating to test the hypothesis:

H_1 "hotel's rating score on Booking.com depends on three predictors, including the price of the room, the share of OTA in sales and the number of rooms that the hotel has" and Ho "the three factors are not significant predictors for the score of Booking.com rating of hotels". The results are presented in table set 3.

Table 3. Multiple linear regression "share of OTA sales", "price of room" and "number of rooms" as predictors of hotel`s Booking.com score.

Model Summary							
					Durbin-Watson		
Model	**R**	**R²**	**Adjusted R²**	**RMSE**	**Autocorrelation**	**Statistic**	**p**
1	0.605	0.366	0.345	0.550	0.080	1.832	0.411

Coefficients						**95% CI**		**Collinearity Statistics**	
	Unstandardized	**Standard Error**	**Standardized**	**t**	**p**	**Lower**	**Upper**	**Tolerance**	**VIF**
(Intercept)	7.716	0.173		44.701	< .001	7.373	8.058		
number of rooms	-0.005	0.002	-0.295	-3.157	0.002	-0.008	-0.002	0.797	1.255
share of OTA %	1.199	0.347	0.305	3.452	< .001	0.509	1.889	0.889	1.124
price of room	0.010	0.002	0.456	5.114	< .001	0.006	0.014	0.874	1.144

Source: authors` calculations

To evaluate the model, an analysis of standard residuals was performed showing that there are no values exceeding the norms (std. Residual min = -2.681, std. Residual max = 2.332), and the independence of the residual errors was confirmed by the Durbin-Watson test (d = 1.832). A collinearity diagnostics procedure is performed to show that no multicollinearity exists, with values respectively for each of the predictors - number of rooms, OTA share and price per single room - VIF = 1.255, 1.124, 1.144; Eigenvalue = 0.554, 0.141, 0.072 and Condition Index = 2.417, 4.788, 6.712. The results show that 36.6% of the room price variance is due to the collective action of the three factors, F (2, 91 = 17, 527), p <.001. Considering the factors separately, we find that for a = 7.716, the number of rooms (b = -0.005, β = -0.295, t = -3.157, p = .002), OTA share (b = 1.199, β = 0.305, t = 3,452, p <.001) and price of room (b = 0.010, β = 0.456, t = 5.114, p <.001) statistically positively influence the hotel's rating on Booking.com. The type of the regression equation in this case is $\hat{Y} = 7.716 + 0.005.x_1 + 1.199.x_2 + 0.010.x_3$. The conclusion drawn is that the factors number of rooms, share of sales through OTA and price of room have a strong influence ($R^2 = 0.366$, R = 0.605) on the score rating of the considered hotels on Booking.com.

4.2 Channel manager implementation

The channel manager technology is extremely useful for hotels that seek to utilize as many online distribution channels as possible, as it saves time and effort to monitor and update inventories on diverse number of platforms, but is used by only 16% of urban hotels in Bulgaria. This percentage is extremely low compared to the average percentage of hotels using channel manager in Europe - 56%, according to Schegg (2020). In table 4, two models of hotels are presented, segmented according to the utilization of channel manager.

Table 4. Comparative analysis of hotels utilizing and non-utilizing channel manager.

Criteria	Channel manager use	No channel manager
Star category	3.4	2.8
Number of rooms	77	31
Occupancy	67.80%	67.20%
Number of OTA	4.3	2.5
Share of OTA	36%	25.60%
Booking.com score	8.9	8.5
Room price	97.56 BGN	67.76 BGN

Source: authors` calculation

Reviewing the comparative table 4, it is visible that urban hotels utilizing the channel manager technology in Bulgaria are those with a higher star category and correspondingly more rooms. Both hotel types have similar occupancy rate, but these utilizing channel manager use a significantly larger number of OTA intermediaries, and accordingly the share of their sales through OTA is much higher - 36%. More reservations made through online intermediaries lead to a higher rating on the Booking.com site, a fact explained by the increasing number of reviews published on OTA sites according to studies of Melián-González et al. (2013) and Garrigos-Simon et al. (2017). A significant difference exists in the price, as the hotels that use "channel manager" maintain a higher price of their services.

Utilizing logistic regression analysis the following hypothesis is tested:

H1 "the presence of a channel manager depends significantly on the variables (covariates) share of sales through OTA channels, the number of rooms, the rating on Booking.com and the utilization of booking engine". The null hypothesis H0 rejects this statement.

Table 5. Linear logistic analysis channel manager as a result of share of OTA, number of rooms, Booking.com rating score and utilization of booking engine.

Model summary										
Model	**Deviance**	**AIC**	**BIC**	**df**	**X^2**	**p**	**McFadden R^2**	**Nagelkerke R^2**	**Tjur R^2**	**Cox & Snell R^2**
H_0	78.469	80.469	82.991	91						
H_1	43.860	53.860	66.469	87	34.609	< .001	0.441	0.546	0.137	0.314

Coefficients					Wald Test		
	Estimate	**Standard Error**	**Odds Ratio**	**z**	**Wald Statistic**	**df**	**p**
(Intercept)	-22.767	7.741	1.295e -10	-2.941	8.649	1	0.003
share of OTA %	8.558	3.246	5209.267	2.637	6.953	1	0.008
Number of rooms	0.042	0.014	1.042	2.972	8.834	1	0.003
Rating on Booking.com	1.683	0.760	5.381	2.215	4.908	1	0.027
Do you have booking engine	1.828	0.933	6.220	1.959	3.838	1	0.050

Source: authors` calculation

The formula of the multiple logistic regression model is $\text{logit}(p) = \log(p/(1-p)) = \beta_0 + \beta_1*(\text{OTA share}) + \beta_2*(\text{booking engine}) + \beta_3*(\text{number of rooms}) + \beta_4*(\text{Booking.com score})$. The results of the model show value for the McFadden R^2 coefficient - 0.441. In addition, the chances of the event "channel manager utilization" are indicative, as a unit increase in the values of the factors number of rooms, rating and utilization of "booking

engine"(z=1.959, p=0,050) lead to increase in the chance of this event up to 60%, compared to the reference group. Changes in the value of the sales share factor through OTA (z=2.637, p<0,008) significantly increase the chance of a positive result (presence of a channel manager), which is evident from the value of Odds ratio = 5209.267. The odds ratio coefficient for "number of rooms" as predictor value is 1.042 (z=2.972, p<0.003) and for "Booking.com score" 5.381 (z=2.215, p<0.027). All these indicators speak of a serious and clear relationship between the set variables and the initial result to confirm that the model is adequate.

5 Modeling and Discussion

The volume of sales generated through online travel agency channels is essential metrics for the analysis of the relationship between hotels and OTA. This study states an average OTA share in the sales volume of the urban hotels in Bulgaria 27.5%. In order to be able to establish the most appropriate model for cooperation with OTA from the point of view of the hotel manager, we segment the hotels according to their ICT utilization and share of OTA sales presented in table 6.

Table 6. Hotel business models based on ICT utilization and share of OTA sales.

ICT use model / Variables	**Model 1** Hotels that do not have website, channel manager or booking engine.	**Model 2** Hotels that utilize channel manager and booking engine.	**Model 3** Hotels with mixed use of channel manager and booking engine ICT.
Share of OTA	39%	37%	15-25%
Star category	1, 2 and 3 stars	3 and 4 stars	2, 3 and 4 stars
Number of rooms	19	29	50
Room price	56 BGN	97 BGN	61.33 BGN.
Booking.com score	8.8	over 9	8.5
RevPAR	39 BGN	65.60 BGN	40.36 BGN.
Occupancy rate	66.1%	67.3%	70%

Indicators on a monthly basis	**Model 1**	**Model 2**	**Model 3**
Room sales revenue	22 230.00 BGN	57 072.00 BGN	60 540.00 BGN
Operating costs	13 306.65 BGN	20 310.15 BGN	35 017.50 BGN
Net revenues (revenues – costs)	8 923.35 BGN	36 761.85 BGN	25 522.50 BGN
Commission payments to OTA	1 300.46 BGN	3 167.50 BGN	1 830.73 BGN
% of commission as part of revenues	5.85%	5.55%	3.02%
monthly Net RevPAR	401.21 BGN	1 158.43 BGN	473.84 BGN
monthly EBIT	7 622.90 BGN	33 594.35 BGN	23 691.77 BGN

Source: authors` calculation

The hotels from Model 1 (Table 6) are those that do not have a website and are therefore strongly engaged in sales through OTA channels. These accommodations are small hotels (average 19 rooms) and category 1 to 3 stars. Their digital presence is limited to the participation in the platforms of online travel agents. They are the model hotels that need assistance and professional advice on how to improve their financial performance and how to actively include ICT in their distribution policy. In order to gain a theoretical idea of the operating costs, the amount of the monthly commission to OTA and the monthly Net RevPAR the following formulas are used:

Operating costs (monthly) = 50%*Average RevPAR(46,69 BGN)*Number of rooms*30days
Monthly commission= Room sales Revenue*Share of OTA*Commission15%*30days

$$\text{Monthly Net RevPAR} = \frac{\text{Net revenues} - \text{Monthly commission}}{\text{Number of rooms}}$$

$$\text{Monthly EBIT} = \text{Net RevPAR} * \text{Number of rooms}$$

To calculate the hotel costs, related to overnight stays, assumed is that operational costs per room equal 50% of the average RevPAR in the sample (BGN 46.69). Commission fees to OTA platforms are not included in the operational costs. On this basis the monthly expenditures of each hotel are formed and thus according to the number of hotel rooms of each model are calculated theoretical values of operating costs, which are representing the real indicators in the business. It is clear that hotels, which do not have a website spend as much as 14.57% of their net income to cover commission costs to OTA, while their occupancy rate is lower than these of the other two models. The above indicators reveal model 1 as the most unprofitable from the point of view of hotel management.

Model 2 is typical for 3 or 4 star hotels, which have Booking.com rating score above 9. The hotels included in this model show exceptional profitability, despite the tremendous share of sales occurring on OTA platforms (37%). This model demonstrates much better performance of monthly Net RevPAR indicator, compared to the other two models and the highest operating profit. With the average of 29 rooms and prices out of the budget zone, this model is typical for boutique hotels or well-developed business hotels. The indicators we display for this model are based on the high price of accommodation and our assumption that the operating costs per room are equal to those of the other two models. This assumption may not be entirely adequate, given the presumption that the more expensive the accommodation is, the maintenance costs increase

The hotels that represent Model 3 have an average of 50 rooms, good occupancy rate (70%) and a low level of RevPAR (40,36 BGN). These hotels sell between 15% and 25% of their overnight stays on OTA platforms, which makes them less involved in OTA compared to the hotels in Models 1 and 2. The smaller OTA share can be explained by the size of these hotels or their lower online rating score, which averages 8.5 on Booking.com and do not attract as much attention as the hotels with rating score above 9. All these hotels have a website, but only some of them utilize a booking engine and a channel manager. The financial results of these hotels are underestimated when the savings from the scale is not taken into account. For example, if they manage to use the same number of operating staff as the hotels in Model 2 do, they will achieve serious savings that will impact the operating costs, and hence increase the profit of these hotels.

Based on their capacity and categorization, a large number of urban hotels could apply model 3. Trying to restrict sales via OTA channels should not be the target, their managers must seek a balance between the occupancy, price level and commission costs to OTA. This model is convenient in terms of the fact that it can be applied in less developed urban centers, where the level of average room price is lower. This is an advantage compared to the hotels , included in Model 2, which will find it more difficult to operate profitably in a market with low price levels and low consumer saturation.

In order to easily and seamlessly maintain more distribution channels, hotel managers must utilize the channel manager technology – the software that maintains inventory and prices in different channels through a single platform. The three models of urban hotel development reviewed in this study are highly dependent on the hotel size and to some extent on the star category. It is clear that small hotels and especially those that don`t utilize an own website are highly dependent on the OTA services. Usually these hotels are neglected in surveys regarding hotels and tourism sector but in reality hotels rated 1 and 2 stars constitute a 58% share of all Bulgarian hotels for 2019 (NSI, 2020).

Despite the statement of the study of Viglia et al. (2016) that e-word-of-mouth influences the hotel occupancy rates none of the variables in this study shows a significant influence on occupancy. The findings also oppose to Eurostat (2020) data for occupancy

rates in EU. Eurostat states a rate of 35% occupancy rate for hotels with less than 25 rooms and more than 50% occupancy rate for hotels with more than 100 rooms. These numbers could be a consequence of the fact that larger accommodations are made usually for seasonal resort hotels and they achieve high occupancy rate for a limited time frame in the summer or winter operation season. On the other hand, the hotels in this survey are only urban hotels, which operate all year round and need to accomplish a constant flow of incoming reservations. A significant dependency found was that of the share of OTA sales on the Booking.com rating score. This relation confirms the previously explored by Phillips et al. (2016) and Melinas (2019) correlations among the number of reviews, the valence of the reviews and the volume of reservations.

6 Conclusion

Exploring the aspects of OTA influence on hotels` strategy for the business development, various inter-correlated factors are found. A higher level of commitment to OTA does not lead to a higher level of hotel occupancy, but combined with higher room price it leads to higher RevPAR and higher profits. In the case of small urban hotels, which do not utilize ICT actively, high level of OTA engagement is observed. However, this fact does not contribute significantly to their financial performance due to the low price level of their rooms. The implementation of a hotel model that sells no more than 25% of the rooms via OTA platforms and generates a very good occupancy level and a decent RevPAR is proposed.

It can be concluded that hotels, engaged strongly with OTA sales are trying to develop ICT in order to redirect the inflow of bookings through direct distribution channels and enable diversification of sales. The competitiveness of hotels is increasingly dependent on their ability to use ICT strategically and tactically to improve their positioning, and attract more direct reservations.

Avoiding the OTA platforms in order to avoid commission payments is a self-destructive practice for any hotel business, while well balanced cooperation is a key for success. The only way for urban hotels to steer the balance in relations with OTA is to develop and implement ICTs like channel manager and booking engines. Small urban hotels which greatly depend on OTA sales should be more active in their communication with OTAs and try to establish price levels that can improve their financial results.

The influence of OTAs on urban hotels is very complex and the correlations found in this survey need to be examined by addressing a greater number of hoteliers for the purpose of establishing new strategic business solutions.

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