A hedonic analysis of the determinants of hotel room rates in the Greater Gaborone Region (Botswana) using quantile regression

Delly Mahachi Chatibura

Faculty of Botswana, University of Botswana, Gaborone, Botswana

Abstract

Purpose – The purpose of this study is to examine the influence of key hotel attributes on the room rates of selected hotels in the Greater Gaborone Region, Botswana.

Design/methodology/approach – Using hedonic pricing analysis, the effect of eight attributes collected from 80 standard double rooms on Booking.com in the area was analysed using quantile regression.

Findings – The estimated results from quantile regression suggested the importance of the 10th quantile as the best predictor of hotel room price distribution. Overall, the presence of a fitness centre and the availability of meeting and conference facilities were positively significant for the lowest- and premium-priced hotels, respectively.

Research limitations/implications – The study advanced the literature in hedonic pricing models by confirming the applicability of hotel room rate attribute research in unexplored environments.

Practical implications – Hotel managers should be aware of the influence of key attributes, such as meeting and conference space availability and locational factors, on the pricing decisions of room rates in the Greater Gaborone Region. The study also presented opportunities for business-to-business marketing between hotel and tour operators in the region.

Originality/value – The study is one of the few that uses quantile regression in the hedonic pricing analysis of hotel room rates.

Keywords Hotel room price, Hotel room rate attributes, Hedonic pricing models, Quantile regression, Botswana, Greater Gaborone Region

Paper type Research paper

Introduction

In the hospitality industry, hotel attribute research has attracted much attention amongst scholars (Dolnicar & Otter, 2003). From standard or international hotel star ratings, such as the Forbes Travel Guide Star Rating system, to free Wi-Fi and location, multiple attributes have been identified as critical determinants of hotel room pricing. The relationship between hotel room prices and room attributes has been best explained by hedonic pricing models (HPM), which are perceived to provide better results than any other techniques (Schamel, 2012). Using the HPM, investors know which attributes to emphasise when planning and designing hotel rooms. Hotel managers will also know which prices to charge for certain hotel

rooms, what characteristics they should have and what amenities or services to provide for those prices. HPM also allows managers to know which attributes require an "extra" or additional charge and those that are discountable. Furthermore, the HPM helps managers identify the hotel attributes and amenities that guests are willing to pay for (Wong & Kim, 2012). Overall, hedonic pricing models assist managers in avoiding erroneous decisions in product offerings and differentiation strategies (Nadia, Beatrice, & Atour, 2021).

Despite the significance of hedonic pricing models for the hotel industry, Karunarathne and Silva (2021) suggest that their theoretical and empirical application in developing nations is very limited. As such, this study attempted to evaluate the applicability of the model to hotel rates in Botswana, a developing nation in Southern Africa. The model has never been applied to the country's hotel sector. The decision to explore the model in Botswana also supported the suggestion by Soler, Gemar, Correia, and Serra (2019), who recommended the importance of conducting similar research in unexplored regions.

Botswana is a country in Southern Africa with a steadily growing tourism market (Grant Thornton Botswana, 2020). The country receives visitors mostly from other African countries like South Africa, Zimbabwe and Zambia and from international source markets like the United States of America, Germany and the United Kingdom (Statistics Botswana, 2020). Botswana promotes itself as a luxury safari destination, attracting visitors primarily travelling for holiday (22.5% of tourist arrivals for 2018), visiting friends and relatives (27%) and business (23.3%) (Statistics Botswana, 2020).

The area under focus is the Greater Gaborone Region (GGR). The GGR refers to the city of Gaborone and its surrounding villages, including Tlokweng, Mogoditshane, Mmopane, etc. The region has a total land mass of 102 000 ha, which is divided into 65 000 ha (64%) of tribal land, 21 000 ha (21%) of state land and 15 500 ha (15%) of freehold land (Kalabamu & Lyamuya, 2021). The region accounts for 17% of the national population and a significantly higher share of the national economic output (Kalabamu & Lyamuya, 2021). The GGR was selected for this study as it is one of the country's fastest-growing regions in commercial, retail and real estate development. For example, the capital city, Gaborone, attracts mainly travellers on business and those attending meetings, exhibitions, or trade shows (Hospitality and Tourism Association of Botswana [HATAB], 2020; Botswana Tourism Organization, 2021). Gaborone has the largest concentration of hotels in Botswana, ranging from unrated to 5 stars based on Botswana's Star Grading System (Department of Tourism, 2022). Gaborone has also witnessed considerable investment growth from key international hotel chains like Hilton and Avani. The inventory of hotel rooms has increased over the last decade, with the introduction of medium-to large sized luxurious hotels which include Indaba Lodge Gaborone, Protea Hotel by Marriott Gaborone Masa Square, Aquarian Tide Hotel and Town Lodge, to name a few. The city, including the region, is poised for growth in leisure and business travel (Botswana Botswana |Tourism Organization, 2021; Africa Outlook, 2019). The Government of Botswana is keenly promoting Botswana as a business destination (Africa Outlook, 2019). Therefore, studies that investigate the attributes that could lead to optimum revenue generation potential for the sector are required.

Research on revenue management in the hospitality industry, specifically in the hotel sector, is anecdotal (Murimi, Wadongo, & Olielo, 2021). It has also been established in the extant literature that hotel attributes, such as the star rating (e.g. the Forbes Travel Guide) and central location, have positive significant association with revenue per available room (RevPAR) (Altin, Schwartz, & Uysal, 2017). Hotel size also affects decision-making on revenue management functions and practices (Murimi *et al.*, 2021). Overall, pricing represents one of the key determinants of accommodation revenue generation (Gibbs, Guttentag, Gretzel, Morton, & Goodwill, 2018). It is therefore envisaged that results from this study are timely and desirable, as they will assist advance decision-making in GGR's hotel revenue management literature.

After the introduction, the study reviews related literature and presents the methods used. Later, the findings are presented and discussed and at the same time, the implications of the study are highlighted. Finally, conclusions and recommendations for future studies are suggested.

Literature review

Tourism and the hotel sector in Botswana

Tourism was almost non-existent at the time of Botswana's independence in 1966 (Stone, Stone, & Mbaiwa, 2017). However, the introduction of the Wildlife Conversation and National Parks Act in 1992 saw a new dawn in tourism development, where wildlife was acknowledged as a resource of economic value (Mulale & Hambira, 2007). To this end, 17% of the country was designated as national parks and game reserves and another 20% as wildlife management areas (WMAs) (Republic of Botswana, 2000). During this time, a thriving tourism industry mainly reliant on prolific wildlife and nature resources prevalent in the northern part of the country, particularly in the Okavango Delta (the largest inland wetland of its kind in the world), the Chobe National Park and the Moremi Game Reserve emerged. Though there is slow recognition of cultural and heritage resources such as national monuments and cultural activities, including cattle post accommodation and recreational activities, tourism is now acknowledged as an engine for diversifying the economy away from mining, agriculture and manufacturing (Pansiri & Chatibura, 2022). To date, the tourism industry is a thriving sector, accounting for at least USD 1,412.8 million, or 8% of the country's Gross Domestic Product in 2021 (WTTC, 2022). Tourism is also perceived as contributing to employment creation and generating foreign exchange earnings, amongst other benefits (Stone et al., 2017).

The tourism industry has stimulated growth in the accommodation or hotel sector. In the 1970s, there was a marked growth of private safari lodges to accommodate international tourists in the protected areas (Mbaiwa, Toteng, & Moswete, 2007), and by 1984 there were about 960 beds in the country (Mbaiwa, 2002). The number of rooms increased to approximately 1700 in 1994 (Gumbo, 2014). By 1998, the number had risen to an estimate of 2375, spread over 132 establishments, in the form of hotels, lodges, camp sites or fixed safari camps (Republic of Botswana, 2000). In general, the number of accommodation service facilities continues to grow in response to growth of the tourism industry.

Despite this growth, research in the accommodation sector in Botswana is limited. Most importantly, studies on revenue management in the hotel sector are anecdotal. Extant research is currently centred around investment and ownership in the sector and its positive and negative impacts in selected areas (e.g. Mbaiwa, 2002; Mbaiwa, 2011; Moswete, Mpotokwane, Nkape, & Maera, 2019), sector performance in terms of overall room occupancy rates and length of stay (e.g. Department of Tourism, 2010), adoption of sustainable practices (Mahachi, Mokgalo, & Pansiri, 2015; Mbaiwa, Motsholapheko, Kgathi, & Monnamorwa, 2018; Motsaathebe & Hambira, 2022), to name a few. Hedonic pricing analysis has not yet been explored in the sector.

Hedonic pricing analysis

There are varying opinions on the theoretical foundations of hedonic pricing analysis (HPA). Some authors (e.g. Papatheodorou, Lei, & Apostolakis, 2012) ascribed its origins to Lancaster's (1971) theory of consumer demand, while others like Agmapisarn (2014) traced its origins to Waugh in 1928. However, Rosen (1974) is widely credited for formulating a formal model of hedonic pricing. The model is premised on the laws of supply and demand, which assume that in a competitive market, manufacturers or producers alter the composite product

to match buyers' preferences and expectations (Nadia *et al.*, 2021). When applied to the hotel sector, the theory accepts that a hotel room is a composite commodity made up of room properties, hotel amenities and attributes and location-specific characteristics and that hotel prices are a linear function of these features. Because hotel rooms and services are heterogeneous, with clearly distinguishable forms and features (Arzaghi, Genc, & Naik, 2022), managers can differentiate the prices of rooms based on these differences.

HPA is the most widely used approach for studying hotel room pricing (Papatheodorou *et al.*, 2012). Despite its limitations - that it requires databases with very detailed information about property characteristics for instance, the model has proven useful to the hospitality industry, particularly, to the lodging sector for evaluating the determinants of room pricing.

Determinants of hotel room prices

Several studies have been undertaken on hedonic pricing in the hotel market (e.g. Andersson, 2010; Portolan, 2013). The factors that determined hotel room prices identified in these studies are numerous and varied, owing in part to the peculiarities of hotels and their differentiation strategies. Arzaghi *et al.* (2022) however, grouped them into three; room properties, hotel attributes and amenities (including quality) and location-specific variables.

Room properties are room-specific characteristics, such as the size of the room, Wi-Fi, TV, complimentary breakfast. In a study of hotels in New York, Zhang, Ye, and Law (2011) noted that room size was one of most important attributes that affected customers' willingness to pay for economy hotels, whereas Chen and Rothschild (2010) found a significant effect in room size, in a sample of 73 hotels in Taipei. In this study, the first null hypothesis ($H1_0$) was proposed:

$H1_0$. "Room size" has no statistically significant effect on hotel room rates.

Other studies included the bathroom as an important room-specific attribute. The bathroom has varied interpretations in literature that need acknowledgement. Monty and Skidmore (2003) and Andersson (2013) referred to a bathroom as a private bathroom (within a guest room), while Kefela and Blomskog (2014) considered a bathroom with both a bathtub and shower. On the other hand, Conroy, Toma, and Gibson (2020) used a separate bath and shower for hedonic analysis in Las Vegas. The variations in interpretation imply that hedonic results, such as the inclusion of a bathroom, may differ across the different contexts. In the current study, the word bathroom refers the presence of a bathtub (with or without a shower) in the room. The second null hypothesis ($H2_0$) was proposed as follows;

$H2_0$. The "presence of a bathtub" has no statistically significant effect on hotel room rates.

Hotel attributes and amenities, on the other hand, are the general features, facilities and services of the hotel. Extant literature suggests the following facilities and services as some of the main determinants of hotel room rates; hotel age (Kim, Jang, & Kang, 2020), parking options (Coenders, Espinet, & Saez, 2003); hotel size in terms of number of rooms (Bilici & Karaahmetoğlu, 2022), leisure facilities like fitness centres and swimming pools (Tung, Pi-Ying, & Huang, 2011)), food and beverage operations (Roubi & Litteljohn, 2004), meeting and business facilities (Chen & Chiu, 2014) and baby-sitting services (Silva, 2015). The results from some of the studies were inconsistent. For instance, while Espinet, Saez, Coenders, and Fluvia (2003), reported that the availability of parking space alone, increased the price of a room by 8.5%, Kefela and Blomskog (2014) found no significant relationship between free parking and room rate decisions, implying that differences may exist institutionally (Karunarathne & Silva, 2021) and are worth studying.

Customer demands on the physical attributes of hotels are also constantly evolving (Soifer, Choi, & Lee, 2021). The presence of leisure facilities such as golf courses, saunas, swimming pools and spa facilities, for example, is now considered an essential attribute (Tung *et al.*, 2011), for hotels that seek to provide unique experiences to customers. Furthermore, quality features in the form of hotel star rating (Abrate, Capriello, & Fraquelli, 2011; Soler *et al.*, 2019), chain affiliation (Roubi & Litteljohn, 2004) and environmental sustainability measures (García-Pozo, Sánchez-Ollero, & Marchante-Mera, 2013), were included in the list of attributes that influenced prices.

Due to the ubiquitous nature of hotel attributes in the extant literature, the current study was restricted to key attributes:

$H3_0$. "Hotel age" has no statistically significant effect on hotel room rates.

$H4_0$. "Room size" has no statistically significant influence on room rates.

$H5_0$. The "presence of meeting and conference facilities" has no statistically significant influence on a hotel's room rate.

$H6_0$. The "presence of a fitness centre" leads to no statistically significant changes to room rates.

Location-specific variables such as the distance to a beach, distance to the city centre, the airport, subway, or metro stations and distance to tourist attractions were also studied in literature (e.g. Coenders *et al.*, 2003; Conroy *et al.*, 2020; Tung *et al.*, 2011). For example, Thrane (2007) reviewed the effect of distance to the city centre on hotel rates in Oslo. The study established that the more distant the hotel was from the city centre, the less expensive the rooms were. However, Chen and Rothschild (2010) found a contradictory relationship, between the distances of the hotels from the city centre to the rates in Taipei. In the case of Botswana, a land locked developing country that relies on natural flora and fauna as its major tourism attractions, where sea view or access to a private beach, are irrelevant variables, a context-specific variable such as the distance to and from the Gaborone Game Reserve was deemed more relevant for hotels in the GGR. The Game Reserve is 5km^2 in size and is the third busiest reserve in the country (ProdAfrica, 2022). It teems with game animals, such as wildebeest, eland, gemsbok, kudu, ostriches and warthogs and birdlife. The Reserve is also a popular picnic spot. Therefore, the following null hypothesis was proposed:

$H7_0$. The distance of a hotel to/from the Game Reserve has no statistically significant influence on a hotel's room rate.

The distance to and from the Sir Seretse Khama (SSK) International Airport was also considered relevant:

$H8_0$. The distance of a hotel to/from the SSK International Airport has no statistically significant influence on a hotel's room rate.

Overall, the list of variables used in this study was derived from existing literature but was adjusted to suit the context of the GGR. Further information on the variables selected for analysis was provided in the methods section.

Methods
Quantile regression modelling
Although the ordinary least squares (OLS) regression model is the most popular technique used to estimate hedonic pricing (Masiero, Nicolau, & Law, 2015), the method could not be used in the current study, because of specific violations of assumption testing. An

examination of Loess' line to determine homoscedasticity, in the data presented, resulted in a violation that could not allow OLS to proceed. Along with previous studies (e.g. Papastathopoulos, Koritos, & Beneki, 2023) that have questioned the appropriateness of linear regression analysis for data involving hotel prices, because of the heavy-tailed distribution of such data, and the limitation in assumption testing as indicated, the current study favoured the use of quantile regression analysis. Quantile regression is a method that assesses the effects of covariates at different quantiles of the dependent variable (Assaf & Tsionas, 2018) instead of the mean, as in standard regression. It is a useful technique in situations where there are violations in the assumption tests required for standard regression and because of its robustness against outliers (Waldmann, 2018) and small sample sizes (Howard, 2018). Though considered superior to traditional regression analysis, quantile regression remains largely unused in hospitality research. The use of hedonic pricing modelling and the specific use of quantile regression on hotel pricing, are therefore novel to hotels in Botswana.

The population – the hotel database in GGR

On the official Botswana Tourism Organization (BTO) (the national tourism organisation) web page, hotels are listed under ten districts. Full-service and select-service hotels, listed under the Southeast District where GGR lies, were analysed. In total, a population of 27 hotels was considered. Hotels located outside the GGR were excluded (Table 1).

Hotel-related information, including the room rate, was obtained from the official page of each hotel on Booking.com. Booking.com is one of the largest online travel agents (OTA) in terms of market share. In 2019, the company topped the list of OTAs at US$15.07 billion (Prieto, 2020). Booking.com offered a detailed description of the accommodation facilities in Botswana, including amenities and other hotel attributes. Díaz and Rodríguez (2018) also considered Booking.com more reliable than Holiday Check, as the site could differentiate goods and services in a destination, thus helping customers make better decisions. Booking.com has also been used in similar hedonic pricing studies (e.g. Santos, Fernández-Gámez, Solano-Sánchez, Rey-Carmona, & López delRio, 2021). Where information about a specific hotel was not available on Booking.com (e.g. the year of establishment), a telephone call to the facility was made. Where information could not be retrieved through telephone enquiries, as in the size of some of the hotel rooms, a missing value was assigned.

For consistency, the study was limited to double rooms. A double room was defined, in this study, as a room that occupied two people and had either a queen-sized bed or a king-sized bed. To reduce the effect of heterogeneity introduced by variations in room characteristics within a given hotel and because many hotels offered more than one type of double room, all double rooms were considered for analysis. All rooms assuming varying names, such as "standard double room", "superior double room", "executive double room" or "deluxe double room", offered at each hotel, were classified as double rooms.

The dependent variable and sample

The hotel room rate was measured using the Pula (BWP), Botswana's local currency. Castro and Ferreira (2015), amongst others, advise the use of a semi-log specification instead of a linear one, where a dependent variable adjusts in percentage terms, to unit changes in the independent variables, like room size, as in this study. Using logged variables also increased the explanatory power of the regression model (Schamel, 2012). As such, the dependent variable lnROOMRATE was a logged single night's rate, calculated from sample observations of the after-tax standard or undiscounted double room prices, inclusive of breakfast. lnROOMRATE was obtained by transforming the natural logarithm, of the room price of all double rooms queried for availability on Booking.com for the night of Tuesday 6

Hotels included in sample			Hotels excluded from sample (no rooms available on the nights of study)			
Name of hotel			Name of hotel			
1	Aquarian Tide Hotel	15	Peermont Mondior Hotel	1	Maison Calme	13	Cumberland Hotel
2	Avani Gaborone Resort and Casino	16	Peermont Walmont at the Grand Palm, Gaborone	2	Staywell Hotel	14	Rock Inn Suites
3	Cresta Lodge	17	Protea Hotel by Marriott Gaborone Masa Square	3	Cactus Inn	15	Emerald Hotel
4	Gaborone Hotel	18	Room50Two	4	Oasis Motel	16	Luxury Inn
5	Hilton Garden Inn	19	South Court Inn	5	Brackendene Lodge	17	Mphatlalatsane Hotel
6	Indaba Lodge Gaborone	20	Town Lodge Gaborone	6	Woodlane Hotel	18	Rasesa Lodge
7	Big Five Lodge	21	Travelodge	7	Regent Select Kgale	19	Motel Hillview
8	Cresta President Hotel	22	Havilla	8	Batho-Pele Lodge	20	Rock Inn Suites
9	Adansonia Hotel (Gaborone)	23	Hotel Crystal Palace	9	City View Hotel	21	Emerald Hotel
10	Hotel Labama	24	Planet Lodge	10	Kagisong Conference	22	Luxury Inn
11	Regent Select Hotel	25	African Home	11	MSA Hotel	23	Royal Apartments
12	Tlotlo Hotel and Conference Centre	26	Metcourt Inn	12	Phomolong Hotel	24	Sunbeam Lodge
13	Desert Inn	27	Batho-Pele Lodge	*Hotels Excluded from Sample (Outside GGR)*			
14	Warm Hands Hotel			*Name of Hotel*			
				1	Cresta Jwaneng		
				2	Mokala Lodge		

Source(s): Table by author

Table 1.
Hotels in GGR (BTO database)

December 2022 in September of that year. This period was considered for analysis because it falls in the low season period of Botswana's tourism sector (Siyabonga Africa, 2019). The period corresponds to a stretch of time, where prices are relatively stable, since hedonic analysis is sensitive to price changes (Palmquist, 2005). Hotels with no available double rooms on the specified date were excluded from further analysis (Table 1). To also avoid the seasonality effect brought about by variable pricing during different days of the week, only one price was used (Papastathopoulos *et al.*, 2023).

In all, 80 standard double rooms were available, as some hotels had multiple rooms of varying sizes and rates. The sample was collected exclusively from hotels in the GGR, and not from any other regions, to avoid the risk of heterogeneity introduced by regional effects.

Independent variables
Hotel attributes used as independent variables were selected from previous studies (e.g. Castro & Ferreira, 2015; Tung *et al.*, 2011; Espinet *et al.*, 2003; Nadia *et al.*, 2021; Thrane, 2007; Yalcin & Mert, 2018). Eight unlogged variables were selected: five quantitative and three qualitative variables.

The quantitative attributes included in the analysis were ROOMSIZE, HOTELAGE, NUMBROOMS, DISTANCEAIRPORT and DISTANCEGGRS (see Table 2). The qualitative attributes (BATH, MEETCONF and FITNESSCENTRE) were dummy variables measured on a binary scale, where 1 indicated presence of the attribute and 0 indicated absence (Table 2).

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Variable name	Variable description	Mean	SD	Min	Max	n
Dependent variable						
ROOMRATE	Room rate for a double room (BWP)	1576.01	853.00	370.00	4607.00	80
lnROOMRATE	Room rate for a double room, logged	3.14	.218	2.57	3.66	80
Independent variable (Quantitative)						
ROOMSIZE	Size of hotel room (m^2)	31.42	15.283	10	84	60
HOTELAGE	Number of years of hotel operation (years)	23.3731	17.659	3.00	56.00	67
NUMBROOMS	The number of rooms at the hotel	93.6625	62.779	6.00	199.00	80
DISTANCEAIRPORT	Total distance from hotel to Sir Seretse Khama International Airport (km)	12.8860	13.682	5.80	96.30	80
DISTANCEGGRS	Total distance from the hotel to Gaborone Game Reserve (km)	9.4575	14.295	3.20	96.60	80
Independent variable (Qualitative/Dummy)						
BATH	Bathroom with a bathtub is present in hotel room (Yes = 1, otherwise = 0)					59
MEETCONF	Meeting/conference facilities are present at the hotel (Yes = 1, otherwise = 0)					62
FITNESSCENTRE	A fitness centre is present at the hotel (Yes = 1, otherwise = 0)					47

Source(s): Table by author

Table 2.
Hotel descriptive statistics and variable definitions (N = 80)

Quantile regression model
The quantile regression model proposed for the study was expressed as follows:

$$lnROOMRATE = \beta_0 + \beta_1 ROOMSIZE + \beta_2 BATH + \beta_3 HOTELAGE$$
$$+ \beta_4 NUMBROOMS + \beta_5 MEETCONF + \beta_6 FITNESSCENTRE$$
$$+ \beta_7 DISTANCEAIRPORT + \beta_8 DISTANCEGGRS + \varepsilon$$

In the model, lnROOMRATE is the natural logarithm of the average room rate. β_0 is the intercept and β_1 to β_8 are the parameters measuring the change in the room rate for the respective covariates.

Conceptual regression framework
The proposed framework for the study with the key hotel attributes is summarised in Figure 1.

Data analysis
The logged one-night room rate, which is a continuous variable, was selected as the dependent variable based on the extant literature. The independent variables were also selected based on related literature on hedonic pricing in the hotel sector and on literature on the GGR. Statistical Package for the Social Sciences (SPSS) version 28 was used for data entry and analysis. The results of the regression models were presented following the APA format,
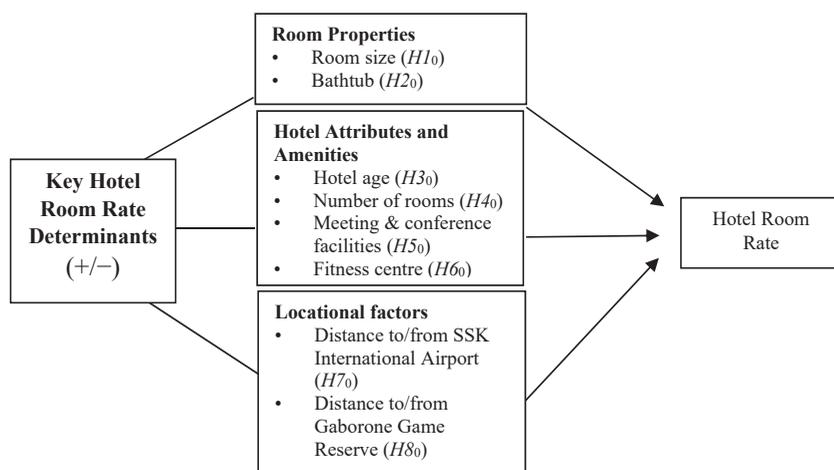
Source(s): Figure by author

using both descriptive and statistical reporting. The analogy of R in quantile regression, Pseudo R^2, was used to access the goodness of fit. The qualitative variables (incorporated as dummy variables) were interpreted further, to derive economically useful results in percentage terms by transforming the estimated coefficient using the formula, $100 \cdot (e^{\beta} - 1)$, where β is the coefficient of the dummy variable and e is the base of the natural logarithm (Halvorsen & Palmquist, 1980). To obtain the effect in monetary terms, the formula, $(e^{\beta} - 1) *$ average room rate (Kefela & Blomskog, 2014) was used, where applicable. Furthermore, the hypotheses formulated for the study were reviewed. An interpretation of the results and a discussion of the key findings are presented in the following sections.

Presentation of results
Descriptive statistics
Descriptive statistics and other statistical analyses were presented in this section. Table 2 shows key descriptive statistics for all variables used. Table 3 illustrates the quantile regression results.

In terms of the number of rooms at the hotels (Table 2), the minimum was 6 and the maximum was 199, with a mean of 93 rooms. The hotel room sizes ranged from 10 m² to 84 m², with an average of 31 m². The mean number of years of operation is 23 years, with a minimum of 3 years and a maximum of 56 years. Table 2 also shows that the mean distance from SSK International Airport was 12.9 km. The hotel closest to the airport was 5.8 km away and the furthest was 96.3 km away. Furthermore, the mean distance of hotels to and from the Gaborone Game Reserve was 9.5 km, with a minimum distance of 3.2 km and a maximum distance of 96.6 km. The mean room rate for the hotels was BWP1576.01. The minimum rate was BWP370.00, and the maximum was BWP4607.00.

Hotel room rate analysis
Quantile regression was run to predict the determinants of hotel room rates in GGR using eight variables (Table 3). The table shows the estimated coefficient of each independent variable at five quantile levels, 10th, 25th, 50th, 75th and 90th, as is common practice (Masiero *et al.*, 2015).

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Variable		0.10	0.25	0.5	0.75	0.90
Intercepts		3.235***	3.321***	3.055***	2.972***	2.866***
Room Properties	Room size	0.006*** (0.0011)	0.007*** (0.0008)	0.007*** (0.0008)	0.007*** (0.0019)	0.004*** (0.0010)
	Bathtub	0.199*** (0.0446)	0.058 (0.0328)	0.014 (0.0304)	0.096 (0.0740)	0.029 (0.0370)
Hotel Attributes and	Hotel age	0.002 (0.0012)	0.001 (0.0009)	0.002** (0.0008)	0.002 (0.0020)	0.004*** (0.0010)
Amenities	Number of Rooms	−0.001** (0.0004)	−0.001** (0.0003)	0.000 (0.0003)	0.000 (0.0007)	0.001*** (0.0004)
	Meeting and Conference Facilities	−0.283*** (0.0721)	−0.180*** (0.0530)	−0.310*** (0.0492)	0.055 (0.1195)	0.311*** (0.0599)
	Fitness Centre	0.588*** (0.0686)	0.480*** (0.0504)	0.468*** (0.0468)	0.191 (0.1137)	−0.116** (0.0569)
Locational Factors	Distance to/from SSK International Airport	−0.031*** (0.0096)	−0.026*** (0.0070)	−0.014** (0.0065)	−0.022 (0.0159)	−0.019** (0.0080)
	Distance to/from Gaborone Game Reserve	−0.047*** (0.0076)	−0.052*** (0.0056)	−0.021*** (0.0052)	−0.013 (0.0126)	0.020*** (0.0063)
Pseudo R^2		0.589	0.510	0.430	0.429	0.426

Note(s): ***$p < 0.01$, **$p < 0.05$, $p < 0.1$*
Source(s): Table by author

Table 3.
Quantile regression results: Parameter estimates by different quantiles

General findings
The results for Pseudo R^2 at each quantile were above 0.40, displaying good model quality (Hemmert, Schons, Wieseke, & Schimmelpfennig, 2018). A Pseudo R^2 of 0.589 at the lowest quantile suggested that about 60% of the variations in the hotel prices can be explained using the regression line of the 10th quantile. Independent variables at the 25th quantile account for 51% of the variation, while at the median (50th quantile), 75th and 90th quantiles, the independent variables account for about 43% of the variations. Overall, the 10th quantile (lowest-priced hotels) is the best predictor of hotel price distribution amongst the quantiles.

The highest predictor in the 10th quantile up to the 50th quantile was the presence of a fitness centre. All the results in the 75th quantile, except room size, were insignificant. Room size was the only variable with significant results at each quantile. In the 90th quantile (premium priced hotels), the presence of meeting and conference facilities predicted the most variance.

Hotel room rate determinants: room properties

    a) Room size

In terms of room properties, the impact of room size (ROOMSIZE), from Table 3 showed statistically significant results at all five quantiles. There was an increase in effect from the 10th quantile ($\beta = 0.006$, S.E $= 0.0011$), which remained stable at the 25th quantile ($\beta = 0.007$, S.E $= 0.008$), 50th quantile ($\beta = 0.007$, S.E $= 0.008$) and 75th quantile ($\beta = 0.007$, S.E $= 0.019$). Thereafter, there was a slight decline in effect at the 90th quantile ($\beta = 0.004$, S.E $= 0.0010$), creating an inverse U shape. The results suggest an overall positive effect, which was however more significant for lower- and mid-priced hotels compared to premium-priced hotels. In summary, lower and medium-priced hotels charged higher rates for bigger guest rooms. The results partly contradict findings by Sing and Awang (2021), who noticed using quantile regression, insignificant results of room size on hotel price in Malaysia for lower-priced hotels (at the 10th and 25th quantiles only) and significant results for higher-priced hotels (at the 50th, 75th and 90th quantiles). Thus, the null hypothesis $H1_0$ was rejected with the conclusion that there were statistically significant differences in the coefficients of ROOMSIZE.

    b) Presence of a bathtub

In general, the presence of a bathtub (BATH) had a positive and statistically significant effect at the 10th quantile only ($\beta = 0.199$, S.E $= 0.0446$) (Table 3). In other quantiles, the effect was not significant, displaying no pattern in the magnitude of changes. The results imply that a bathtub was an important feature in only the lowest-priced hotels, leading to a price increase of around 22%. Because of this result, the null hypothesis $H2_0$ was rejected.

Hotel room rate determinants: hotel attributes and amenities

    a) Hotel Age (number of operating years)

The estimated coefficients for hotel age (HOTELAGE) at the 50th ($\beta = 0.002$, S.E $= 0.0008$) and 90th quantiles ($\beta = 0.004$, S.E $= 0.0010$), were significantly positive, while those for the 10th, 20th and 75th quantiles were insignificant (Table 3), displaying a U-shaped pattern in the magnitude of changes. Overall, the results led to a rejection of the null hypothesis ($H3_0$), implying that there were statistically significant differences in the effect of HOTELAGE on room prices in GGR.

b) Number of Rooms

Regarding the value of the estimated coefficients on the size of the hotel (measured by the number of rooms [NUMBROOMS]), the results were mixed. There were statistically significant results for the rates at small and large hotels but not at medium-sized hotels. Statistically significant negative and constant effects were observed on the coefficients of NUMBROOMS, at the 10th ($\beta = -0.001$, S.E $= 0.004$) and 25th quantiles ($\beta = -0.001$, S. E $= 0.003$) (Table 3), signifying a scale effect, that was similarly observed by Vilchez (2013) in the 10th quantile. Furthermore, there was no significant effect at the 50th and 75th quantiles. However, the effect was significantly positive at the 90th quantile ($\beta = 0.001$, S.E $= 0.004$). In a similar study by Hung, Shang, and Wang (2010), though there was no significant influence at the 10th quantile, there was a positive influence at the 25th, 50th and 90th quantiles. In the current scenario, null hypothesis $H4_0$ was rejected.

c) *Presence of a meeting/conference facility.*

The estimated coefficients for the presence of meeting and conference facilities (MEETCONF), was negatively significant at the 10th ($\beta = -0.283$, S.E $= 0.0721$), 25th ($\beta = -0.180$, S.E $= 0.530$), 50th ($\beta = -0.310$, S.E $= 0.0492$) but positively significant at the 90th ($\beta = 0.311$, S.E $= 0.0599$) quantiles. The result was insignificant at the 75th quantile. These results suggested that the presence of meeting and conference facilities led to 36% higher pricing at premium-priced hotels. These results led to a rejection of $H5_0$ because there were statistically significant differences in the coefficients of MEETCONF across the quantiles.

d) Fitness Centre

Results from the model further suggested that the presence of a fitness centre (FITNESSCENTRE) had a larger positive effect on room prices for lower-than mid-priced hotels. The coefficients showed a decreasing effect until the 50th quantile. The availability of a fitness centre increased the room rate for lower priced hotels in the 10th quantile ($\beta = 0.588$, S.E $= 0.0686$) by 80%. Though the result was insignificant at the 75th quantile, it was negatively significant at the 90th quantile ($\beta = -0.116$, S.E $= 0.0569$). The results implied that the availability of a fitness centre was a major determinant of the room rate of budget or low-priced hotels. The findings from this study correspond with Mandić and Jurun (2018), who found (using standard regression models) that small and family-owned hotels with a wellness centre, in Croatia, can charge up to 42% higher prices. Because of these reasons, the null hypothesis $H6_0$ was rejected.

Hotel room rate determinants: locational factors

a) Distance to/from Sir Seretse Khama International Airport

The estimated coefficients for distance to and from the Sir Seretse Khama International Airport (DISTANCEAIRPORT) were not significant at the 75th quantile but were negatively significant at the other quantiles (Table 3). Generally, the results suggest that most hotels located closer to the Airport were more expensive than those located further away. A one-kilometre increase in distance of the hotel from the Airport, led to price decreases that were higher in the lowest-priced (3%) than the highest-priced (1.9%). Bilici and Karaahmetoğlu (2022), using OLS, also found a negative relationship between the distance of hotels to and from the airport, and hotel rates, in the East Black Sea Region in Turkey. They concluded that tourists were willing to pay more for accommodation facilities that were closer to the airport. Based on these findings, this study failed to accept $H7_0$.

b) Distance to/from Gaborone Game Reserve

In relation to the distance of hotels to and from the Gaborone Game Reserve
(DISTANCEGGRS), the effect of the estimated coefficients was significantly negative at
the 10th, ($\beta = -0.047$, S.E $= 0.0076$), 25th ($\beta = -0.052$, S.E $= 0.0056$), 50th ($\beta = -0.021$,
S.E $= 0.0052$) quantiles but positively significant at the 90th quantile ($\beta = 0.020$,
S.E $= 0.0063$) (Table 3). The effect at the 75th quantile was negative and insignificant. The
results, though mixed, suggest that generally, customers are willing to pay more for hotels
located closer to the Game Reserve. Furthermore, customers were willing to pay more for
premium-priced hotels located further from the Game Reserve. This led to a rejection of $H8_0$
since significant differences existed.

Discussion and managerial implications of the study
Using quantile regression, this study was able to detect the magnitude of changes in GGR's
hotel prices, from the lowest to the highest end of the price distribution structure. The only
variable (from eight) with a significant effect at all price levels was ROOMSIZE. The other
variables displayed mixed results.

ROOMSIZE, is an important attribute that predicted the price of all hotel rooms in the
GGR, regardless of the hotel's position in the pricing distribution structure. However, the
results suggested that lower and medium-priced hotels charged high rates for larger guest
rooms. Therefore, hotel operators at lower-priced hotels in the GGR can charge high prices for
larger rooms since most of their customers are willing to pay more for these rooms. Zhang
et al. (2011) and Monty and Skidmore (2003) also noticed that customers at budget hotels and
bed and breakfast facilities, respectively, are willing to pay more for a larger room than for
other attributes.

In the present study, the presence of a BATH was only significant at the 10th quantile. The
results imply that on any given day, the pricing structure at the lowest priced hotels in the
GGR is determined by the availability of a bathtub (with or without a shower). Managers
should therefore consider maximising the hotel's remuneration potential on rooms with
bathtubs and reserving those without, for "complementary" or discounted hotel packages.

HOTELAGE was statistically significant at all the quantiles, except the 10th quantile.
This meant that age was a key determinant of pricing in medium- and higher-priced hotels.
This further implied that the older hotels in GGR take advantage of their brand capital in the
market to influence room prices, since older firms are known to ride on their established
reputation to influence prices and hence achieve higher sales revenue (Hung et al., 2010). In
this case, older hotels in the region could use their brand capital to lead the market's pricing
distribution structure.

Regarding the number of rooms (NUMBROOMS), the study found statistically significant
negative effects on the rates at lower-priced hotels and positive effects on the rates of premium
priced hotels. This finding suggested that rates at premium-priced hotels in GGR were
influenced by the number of rooms. The larger the room capacity at these hotels, the higher the
prices, supporting the observation by Agmapisarn (2014) that large hotels often charge higher
prices. On the contrary, in the case of lower-priced hotels, the number of rooms had a negative
impact on the room rate. This suggested that lower-priced hotels with more capacity charged
less than their counterparts with fewer rooms, a strategy used to maximise room occupancy as
most of them rely on revenue generation from accommodation pricing only.

The effect of meeting and conference facilities (MEETCONF) was high at the upper end
(90th quantile) of the pricing distribution. This meant that these facilities were a critical
determinant in the pricing structure of premium priced hotels. A speculative reason that
could be advanced for this finding is the nature of the tourism product in GGR, which
leans towards business-oriented tourism (Spenceley, Rylance, & Lloyd, 2015). The city is

the economic and government capital of Botswana. Gaborone houses Botswana's Stock Exchange and the Headquarters for the Southern African Development Community (SADC). The meetings, incentives, conferences and events (MICE) market in Gaborone is burgeoning. In all, business travel contributed around BWP 3.1 million in 2014, to the country and the contribution is expected to rise to around BWP 5.3 million, in 2025 (WTTC, 2015). To some extent, this implies that hotels, especially the most priced ones, are competing for the availability of meeting or conference facilities. Managers in this range of hotels should provide key information about their meeting and conference facilities to prospective customers on their websites and social media pages. On the other hand, lower-priced hotels do not require such services but rather depend on external service providers to fulfil the needs of their customers (Shanga, Zhanga, Liub, Shangc, & Wu, 2020).

The presence of a FITNESSCENTRE had a greater effect on low- and medium-priced hotels than on high-priced hotels. Overall, the presence of a fitness centre at low-priced hotels (10th Quantile) in the GGR, offered the highest competitive advantage in pricing. A preliminary conjecture to explain this finding can be presented. Changes in lifestyle habits amongst travellers have meant an increasing number of travellers, globally, are concerned with maintaining good levels of physical exercise whilst travelling on business or pleasure. In fact, according to Smith (2017), research from Hotels.com reflects that 44% of travellers would sacrifice a cheap hotel room for a gym, at another hotel. As such, and to be competitive, lower-priced hotels should invest in a fitness centre. This finding supports Kobyak and Lvovna (2015) who stated that the presence of health and beauty services, including fitness studios and gyms at a hotel, offers good competitive positioning against rivals. The availability of a fitness centre at these hotels also had the potential to increase the room rate by more than BWP1261.41 (based on an average room rate of BWP1576.01). Managers of low-priced hotels could also use phrases, slogans, taglines, or relevant visual images of their fitness facilities (where these are available) in advertisements. It is also important for travel agents to advertise these features for budget hotels because on the contrary, hotels of high standards are anticipated to provide such basic facilities anyway (Mitsis, 2023). Other low-priced hotels, without a fitness centre, could therefore consider designing and installing one (after cost and benefit considerations), because of the potential of this feature in maximising room revenue.

Generally, the results also indicated that most hotels located closer to the International Airport were more expensive. However, the effect was higher in the lowest-priced hotels than the mid or premium-priced hotels. Furthermore, the findings also suggested that the lowest- and mid-priced hotels located closer to the Game Reserve were more expensive. In the premium-priced hotel category, though the distance to or from the Game Reserve was positively significant, the distance to and from the International Airport was negatively significant. This indicated that premium priced hotels used proximity to the Airport more than distance to and from the Game Reserve as a key determinant of their pricing structure. Though both locational variables were important, this finding indicates that new premium-priced hotel investors in GGR could locate their hotels closer to the Airport than the Game Reserve.

Generally, the Game Reserve is an important nature-based tourist attraction for the city and especially for mid- and lowest-priced hotels. Managers at these hotels should consider offering detailed travel routes to and from their hotels to these places in their social and online marketing activities. In addition, hotel managers of these hotels, who are not doing so, could offer shuttle transportation at an extra fee, to generate additional revenue, or engage with local transport operators for airport transfers. These specific attributes should then be included in their profiles on Booking.com.

Conclusions and recommendations for further study

By using hotel websites collected on a hotel booking website as the primary source of data, this study was vulnerable to selection bias. The study was also limited to hotels that had room availability during the night of analysis. Using a different search criterion could yield different results. However, the study was useful as it explored the distribution of hotel room rates in the GGR region. The data revealed that the structure of hotel room rates in the region was mainly influenced by the pricing strategies of the lowest-priced hotels and highest-priced hotels. For example, empirical evidence from the study suggested that the presence of a fitness centre had the highest (positive) influence on the lowest-priced hotels. This was followed by the presence of a bathtub and the room size. The study also gave evidence of a highly positive effect of meeting and conference facilities on the pricing structure of premium priced facilities. Amongst premium priced hotels, the bathtub was the only insignificant variable. High quality hotels would be expected to provide the bathtub, anyway.

Conclusively, it can be inferred from the results of the current study that pricing models are unique to each place because destinations are unique and have varying market forces. For hotel managers, the study, in general, suggests they can craft informed decisions regarding the inclusion or exclusion of certain attributes in the room rate and hence use room pricing as a valuable revenue management tool. It is at the hotel managers' discretion, where certain attributes are excluded from the room rate, to charge an additional fee for the provision of such attributes.

It would be worthwhile though in the future, for researchers to note how clusters of similar destinations, e.g. nature-based resorts, compare across several destinations in Botswana. This could be vital in deriving generalisable attributes about room pricing that are market-segment specific. Studies can compare the geographic and spatial variables of nature-based tourism accommodation in the northern part of the country. The area is home to the pristine Okavango Delta, a famed UNESCO World Heritage Site and the Moremi Game Reserve. Researchers could explore the quality attributes that include Botswana's star rating system and travel sustainability packages, including adherence to cultural and eco-sustainability principles by hotels in that area, in line with the principles of heritage preservation. Furthermore, the rates offered during the peak season could be compared with those offered during the low season to identify temporal differences in prices for hotels and lodges in the area.

Qualitative answers from customers should also be solicited to close the gaps identified in this study. For example, it is essential to justify why budget hotels with more rooms charge lower rates compared to their counterparts with fewer rooms. Future research could also be conducted to establish the key determinants of mid-priced hotels, since most of the variables were applicable to the lowest and highest-priced hotels.

Lastly, hedonic pricing analysis should be extended to other sections of Botswana's hospitality industry, including the restaurant sector. For example, research could be conducted to determine the effect of various factors, e.g. restaurant location, food quality and ambience, on menu prices. Useful information can be obtained to assist restaurant operators in generating effective menu pricing strategies.

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Corresponding author
Delly Mahachi Chatibura can be contacted at: dchatibura@gmail.com