African Journal of Hospitality, Tourism and Leisure, Volume 7 (4) - (2018) ISSN: 2223-814X

Drivers of efficiency in hotels in South Africa

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Abstract

The purpose of this study was to analyse the efficiency of hotels in South Africa. By using primary and secondary sources, data were collected from 42 different types of hotels in South Africa, for the 2016 period, on a variety of parameters. A stochastic cost frontier function with three functions (i.e. labour, food and beverage, and materials) and one output as the total revenue is specified and used to estimate hotel efficiency. From the study it is clear that one structural driver, namely, 'location' and two executional drivers, namely, 'hotel category' and 'occupancy', significantly impacted ($p < 0.05$) on hotel efficiency in South Africa. The classification of drivers allows hoteliers to first work on drivers that can be changed in the short-term (executional drivers), then focus on the ones that require long-term planning (structural drivers). The results have implications for hotel managers in that if they want to improve efficiency they must manage hotel capacity and customer demand in a way that maximises revenue. The results could enhance the service data and yield management with regards to South Africa hotel efficiency.

Keywords: Stochastic cost frontier, hotel efficiency, hotel capacity, customer demand, South Africa

Introduction

Generally, hotels face economic risks due to high overhead and capital costs, intense competition and the perishability of rooms. Hotels also suffer from a high degree of randomness of demand and customer arrivals as articulated by Assaf and Knežević (2010). This is further exacerbated by predictable, seasonal factors and unpredictable, individual customer demand which makes it difficult for hotels to attain efficiency (Sanjeev, 2007). Consequently, a combination of these factors produces thin profit margins that prompt hotels to identify drivers of efficiency to lower costs and optimise revenue (Chen, 2007).

However, hotels in South Africa have struggled to overcome the aforementioned risks resulting in a high failure rate. According to Mhlanga and Tichaawa (2016) the failure rate for hotels in South Africa is considered to be higher than the failure rate for small businesses. It is estimated that fifty-six percent of hotels fail during their first year of operation and eighty-one percent fail within five years (Statistics South Africa (SSA), 2016). This, according to Mhlanga and Tichaawa (2016) is indicative of the level of inefficiency prevalent in the hotel industry in South Africa. In the extant literature, some research endeavours (see works by Choi & Chu, 2001; Enemuo, Ejikeme & Edward, 2016; Forones, 2013) argue that identifying factors impacting hotel efficiency could improve hotel performances.

Although research has been conducted on efficiency drivers in various industries, research on hotel efficiency shows up relatively little in the literature in South Africa. Most of the studies on hotel efficiency is restricted to research papers in Europe, the United States and other countries in Asia (Mhlanga, Hattingh & Moolman, 2015). International studies on hotel efficiency might not be applicable to the South African hotel subsector, since Mhlanga and Tichaawa (2016) caution that a study on hotel efficiency should be interpreted in the light of its geographical context and should not be generalised to other countries. Due to the importance of hotels on tourism, research within this context was conceptualised (Mhlanga & Machingambi, 2016). The findings could enhance the service data and revenue management with regards to hotel efficiency in South Africa.

Theoretical background

Over the last couple of decades, tourism has been recognised as playing a significant role in global and national economies (Mhlanga, 2018). According to the World Travel and Tourism Council (WTTC, 2017), the travel and tourism industry generated 108 741 000 jobs directly in 2016 (3.6% of total employment) and supported 6 million net additional jobs. In total, travel and tourism generated US$7.6 trillion [10.2% of global gross domestic product (GDP)] and 292 million jobs in 2016, equivalent to 1 in 10 jobs in the global economy (Mhlanga & Tichaawa, 2017). Tourism is predicted as supporting over 380 million jobs by 2027 (WTTC, 2017).

According to Lombard (2016), data from Statistics South Africa reports that the tourism industry in South Africa recorded a growth of 6.6% between 2013 and 2014, exceeding the average global growth in the sector. The industry contributed 9% to South Africa's GDP in 2015, exceeding the global average growth in the sector, whereas in 2016, the tourism industry directly contributed ZAR 127 billion to South Africa's GDP, an increase of 7% from the previous year (Lombard, 2016). Furthermore, the Culture, Arts, Tourism, Hospitality and Sport Sector Education and Training Authority (CATHSSETA, 2017) asserts that tourism directly employs more people than do the mining, communication services, automotive manufacturing and chemicals manufacturing sectors. To illustrate the point, 4.5% of the total workforce was directly employed in the sector during 2014, being an increase from the 3.8% recorded for 2015 (Lombard, 2016).

Hotels are classified under the hospitality subsector, which is one of the six subsectors of the South African tourism industry (CATHSSETA, 2017). According to PricewaterhouseCoopers (PWC, 2017), hotels provided 45 000 jobs through direct employment and generated ZAR17.3 billion in 2013, accounting for 71% of total accommodation revenue in South Africa. PWC (2017) further estimates that by 2020 there will be about 63 700 hotel rooms available, an increase from 60 100 in 2015, with total room revenue expected to reach ZAR20.6 billion in 2020, an increase from ZAR14.2 billion in 2015. Hotels are therefore a critical cornerstone of the hospitality subsector, which is a pillar of the tourism industry (RSA NDT, 2011).

According to PWC (2017), the depreciation of the South African rand has had a positive impact on hotels by boosting both international and domestic demand. As such, South Africa has become a cheaper destination for foreign visitors, whilst more South African residents now travel domestically as international destinations have become less affordable (Mhlanga, Hattingh & Moolman, 2013). However, despite the increase in both international and domestic tourists, hotels have struggled to remain profitable with most hotels struggling to survive (Mhlanga, 2015). Mhlanga and Tichaawa (2016) attribute hoteliers' inability to identify factors impacting operational efficiency as the main reason for their failure. Therefore, a better understanding of the factors impacting hotel efficiency will provide important implications for hoteliers (Mhlanga, Hattingh & Moolman, 2014).

Literature review

According to Parsa, Gregory and Terry (2010), there are two types of drivers in the hotel industry, namely, 'executional cost drivers', which are short term in nature and determined by managerial ability and 'structural cost drivers', which involve choices with regard to the underlying economic structure of a hotel. 'Executional cost drivers' are more operational in

African Journal of Hospitality, Tourism and Leisure, Volume 7 (4) - (2018) ISSN: 2223-814X

nature and have a direct impact on operational costs. Unlike executional drivers, structural drivers once committed, are not easy to change in the short and medium term and hence can significantly constrain the performance of hotels if there is misalignment with the competitive environment. Figure 1 identifies the theoretical framework used in this study.

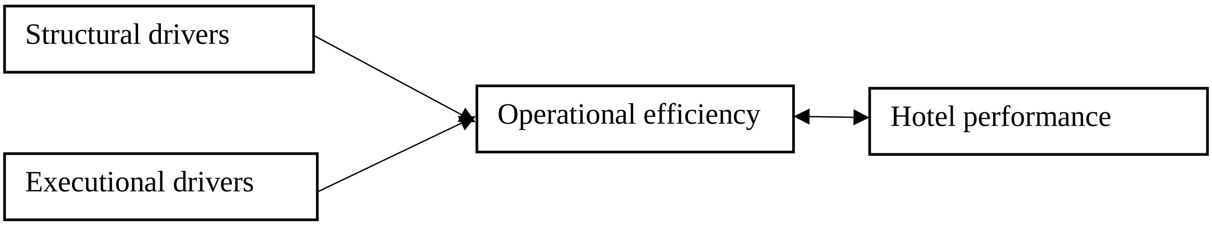

Figure 1: Theoretical framework

The framework identifies and connects structural and executional drivers that underlie hotel efficiencies. According to Sanjeev (2007) a hotel is said to be output oriented Pareto-efficient when it is impossible for a hotel to produce a larger output from the same inputs. In this study, the impacts of structural drivers, such as, 'location' and 'hotel size', along with executional drivers, such as, 'hotel category' and 'occupancy', on hotel efficiencies in South Africa are investigated.

The first structural driver, hotel location, refers to the location of a hotel in a metropolitan or non-metropolitan area. For instance, in 2005, Barros (2005) explored the relationship between the efficiency and location of hotels and found a statistically significant relationship between hotel location and efficiency with hotels located in or near cities being more efficient than those in remote locations. In another study, Chen (2007), it was found that location did not efficiency was not affected by location. Shang, Wang and Hung (2009) applied a stochastic DEA and a post-DEA regression to analyse the impact of location on the efficiency of 57 international tourist hotels in Taiwan. The authors concluded that location significantly impacted on hotel efficiency wherein resort hotels were more efficient than metropolitan hotels. In another study, Bernini and Guizzardi (2010) found that location of hotels had a positive correlation with efficiency, particularly for those in cities by the beach or in cities of recognised cultural importance. According to Wang, Tran and Nguyen (2014) the following factors epitomise a good location, namely, site accessibility, size, and population in the area and degree of competition which in turn significantly influence restaurant efficiency.

The second structural driver, hotel size (as measured by the number of rooms), has been found to be a significant determinant of hotel efficiencies. For instance, Sanjeev (2007) evaluated the impact of size on the efficiency of 68 Indian hotel and restaurants in 2004 and 2005. The findings did not reveal any significant link between size and efficiency. Pulina, Detotto and Pabba (2010) used a window DEA approach to investigate the relationship between hotel size and efficiency in Italy. Their findings revealed that size did not impact on efficiency. Assaf, Barros and Josiassen (2012) explored the relationship between the size of a hotel and its efficiency. They found that large hotels were more efficient due to the economies of scale. Assaf and Knežević (2010) also found a positive relationship between the size of a hotel and its efficiency. Poldrugovac, Tekavcic and Jankovic (2016) found a significant relationship between hotel size and efficiency with small hotels operating at an average efficiency level of 85%, while medium-sized hotels had an average efficiency level of 70%.

The first executional driver, hotel category (i.e. 5 star or 4 star or less) has been found to influence hotel efficiencies. In 2010, Hsieh and Lin (2010) found that 5-star hotels had higher efficiency scores than lower rated hotels in Taiwan while Honma and Hu (2012) found that 5-star hotels had higher efficiency scores than lower rated hotels in Japan. In Taipei, Chiang, Tsai and Wang (2004) found a statistically significant relationship between the hotel star/category and efficiency. Assaf and Agbola (2011) also found a positive relationship between the number of stars and hotel efficiency. However, in a study in Turkey, Davutyan (2007) found that 4-star hotels had higher efficiency scores than 5-star hotels.

The other executional driver, hotel occupancy (the accrued revenue in given time interval divided by the number of rooms available during that time) indicates the rate at which capacity utilisation generates revenue. Anecdotal evidence points to the fact that occupancy impacts on hotel efficiency, and empirical evidence from different parts of the world substantiates this conjecture through multiple methodologies. For instance, Hsieh and Lin (2010) found a positive relationship between hotel occupancy and hotel efficiency. Neves and Lourenco (2009) examined the impact of occupancy on efficiency using a sample of 83 hotels. Their findings revealed occupancy significantly impact on hotel efficiency due to capacity utilisation. Chiu and Huang (2011) evaluated the optimal occupancy rate, operational efficiency and profitability efficiency of Taiwan’s international tourist hotels and found no clear link. According to these authors increasing the occupancy rate does not always increase hotel efficiency. For some hotels, decreasing occupancy rates can simultaneously improve hotel efficiency because of less variable costs incurred such as linen costs and labour.

From the preceding points, Chiu and Huang (2011) caution that when assessing hotel occupancy the RevPAR of the hotel should also be considered because a hotel with an occupancy of 70% with a RevPAR of ZAR820 per night is less costly than a hotel with an occupancy of 80% with a RevPAR of ZAR800 per night. This is because both hotels are realising almost the same RevPAR yet a hotel with an occupancy of 70% at ZAR820 is utilising less rooms than a hotel with an occupancy of 80% at ZAR800.

Research Hypotheses

In view of this study’s purpose, the following hypotheses have been formulated:

H1: Location significantly impacts on hotel efficiency.

H2: Size significantly impacts on hotel efficiency.

H3: Hotel category significantly impacts on hotel efficiency.

H4: Occupancy significantly impacts on hotel efficiency.

Research methodology

A stochastic frontier function with three inputs (i.e. labour, food and beverage, and materials) and one input as the total revenue is specified and used to estimate hotel efficiency. This approach has been used by several authors in empirical studies of hotels (Anderson, Fish, Xia & Mixhello, 1999; Barros, 2005; Chen, 2007). Below, a briefly description of the stochastic frontier approach and the empirical model used in the current study is provided.

The stochastic frontier approach

The concept of frontier is the main focus of the methods for measuring efficiency that have been proposed over the last decade. Efficient units are those operating on the cost or production frontier, while inefficient ones operate either below the frontier (in the case of the production frontier) or above the frontier (in the case of the cost frontier).

In the empirical microeconomic literature, there are two groups of methods for estimating frontier functions and thereby measuring efficiency: deterministic methods, such as DEA and stochastic frontiers. DEA involves the use of linear programming first introduced by Charnes, Cooper and Rhodes (1978), whereas stochastic frontiers involve the use of econometric methods first taken up by Aigner, Lovell and Schmidt (1977) and Meeusen and van den Broeck (1977) simultaneously. The basic stochastic model of the frontier cost (or production) function assumes that any deviation of the observed cost (or production) from the theoretical microeconomic cost (or production) function is caused by purely random disturbances and inefficiency.

The deviation is represented as the composite error term in the stochastic frontier model. The purely random component captures the effect of variables that are beyond the control of the production unit being analysed that can negatively affect efficiency (such as the weather or season). Therefore, a main advantage of the stochastic frontier approach over DEA is that it isolates the influence of factors other than inefficient behaviour, thus correcting the possible bias of inefficiency from the deterministic methods.

The costs of a hotel depends on the output vector (y), the price of the input (w), the level of cost efficiency (u), and a set of random factors (v). Thus, the cost frontier function is expressed as:

$$C = C(y, w, u, v) = C(y, w)\exp(u + v) \tag{1}$$

The composite error term $(u+v)$ is composed of two parts. The first is u, is a one-sided term reflecting technical inefficiency, which in the case of the cost frontier is non-negative and in the case of production frontier is non-positive. The popular distributional forms for the technical inefficiency effects are the half-normal, the exponential, and the truncated-normal distributions (Kumbhakar & Lovell, 2003). The second is v, a two-sided component capturing random shocks and statistical noise, and it is assumed to be distributed as a two-sided normal with zero mean and variance. The frontier function can be estimated by the maximum likelihood method, as the inefficiency is estimated from the residuals of the regression. Following Battese and Coelli (1995), the variance terms are parameterised by replacing $\sigma_u^{\ 2}$ and $\sigma_v^{\ 2}$ with

$$\sigma = \left(\sigma_u^{\ 2} + \sigma_v^{\ 2}\right)^{1/2}, \qquad \lambda = \sigma_u / \sigma_v, \qquad \gamma = \sigma_u^{\ 2} / \sigma^2 \ . \tag{2}$$

The individual estimation of inefficiency can be obtained using the distribution of the inefficiency term conditioned to the estimation of the composite error term (Jondrow, Lovell, Materov & Schmidt, 1982). The cost efficiency (denoted as CE) can be defined as the ratio of the minimum feasible cost if the hotel is efficient and the observed costs are:

$$\text{CE} = \frac{C^{\min}}{C} = \frac{C(y, w)\exp(v)}{C(y, w)\exp(u + v)} = \exp(-u)$$

(3)

The measure of CE has a value between zero and one.

Data specification

A list of local registered hotels was obtained from Gauteng Province. Gauteng is the most populous province in South Africa. These hotels had to comply with the criteria set by Tourism Grading Council of South Africa (TGCSA, 2017) for classification as a hotel, namely an establishment that provides formal accommodation with full or limited service to the travelling public. A hotel must have a reception area and also offer a dining facility. It must also have a minimum of 6 rooms but more likely exceeds 20 rooms. (p. 3)

The hotels were selected in each of the nine provinces in South Africa and the sample size for the study was determined such that it achieved a 95% confidence level and was within a 5% sampling error as recommended by Leedy and Ormrod (2013). Consequently, a sample size of at least 40 hotels (Table 2) was deemed appropriate for this study.

Table 2: Hotel types and capacity.

No.	HOTEL	STAR CATEGORY	CAPACITY	No.	HOTEL	STAR CATEGORY	CAPACITY
1	Hemmingways hotel	4-star	132	22	Albany Hotel	3-star	86
2	Blue lagoon hotel	4-star	107	23	eMakhosini Boutique Hotel	3-star	93
3	Beacon Island	5-star	128	24	Coastlands Durban	3-star	135
4	Monte Casino	5-star	186	25	Garden Court Umthatha	3-star	101
5	The Thistle Hotel	3-star	83	26	Hotel Savoy	3-star	92
6	12 Apostles Hotel	5-star	66	27	The Russel Hotel	2-star	88
7	Courtyard Port Elizabeth	4-star	103	28	Point Village Hotel	3-star	75
8	Radisson Blu Hotel	4-star	155	29	The Plettenberg Hotel	5-star	96
9	Sheraton Protea Hotel	4-star	126	30	Kurland Hotel	4-star	84
10	The Boardwalk Hotel	5-star	109	31	Conrad Pezula	4-star	91
11	Road Lodge Hotel East London	2-star	95	32	Hilton Sandton	5-star	108
12	Town Lodge Port Elizabeth	3-star	102	33	The Winston Hotel	3-star	73
13	Road Lodge Port Elizabeth	2-star	91	34	Sandton Sun	5-star	81
14	The Commodore Hotel	3-star	68	35	Hobbit Boutique Hotel	3-star	79
15	The Table Bay Hotel	5-star	89	36	Emoya Hotel and Spa	3-star	130
16	Queen Victoria Hotel	3-star	59	37	President Hotel	3-star	74
17	The Portswood Hotel	2-star	62	38	Southern Sun Bloemfontein	4-star	148
18	Hotel Cube	3-star	74	39	Mpekweni Beach Resort	4-star	121
19	Hilton Durban	5-star	126	40	Southern Sun The Ridge	4-star	137
20	Pavilion Hotel	2-star	61	41	Sun City Resort	5-star	82
21	The Benjamin	2-star	69	42	Soho hotel	3-star	66

The manager from each participating hotel was approached for permission to conduct the study. To obtain data, the researcher requested financial statements for the 2016 financial year from each participating hotel. Certain information which was missing on the financial statements was obtained through interviews with key hotel personnel in respective hotels, as it was reported separately for each hotel during the study period. It was agreed that the names of the respondents be kept anonymous although it was agreed that the names of the hotels be disclosed. Efficiency scores for each of the hotels in the sample for the year 2016 were computed. Consequently, the study managed to create 42 observations over 12 months containing the efficiency score as the dependent variable and various other parameters as independent explanatory variables recorded over the said time period.

Empirical model

The study specifies a stochastic generalised Cobb-Douglas cost frontier function with three input prices, i.e. price of labour (wl), price of food and beverage (wc), and price of materials (wo), with one output as the total revenue for the hotel (TR) and two control variables, i.e. room occupancy rate (OR) and the production value of food and beverage space per square metre (VFR). Some research endeavours (Banker & Morey, 1986; Chen, 2007; Roh & Choi, 2010) identify these inputs (labour, food and beverage, and materials) and output (total revenue) as the most important variables that influence hotel efficiency, hence they were adopted for this study. The total operating costs (TC), including labour costs, fuel and energy, materials and external services, are taken as the dependant variable in Eq. 4. The variables are defined and characterised in Table 3.

Table 3: Main descriptive statistics of variables used in the study (year 2016)

VARIABLE	DESCRIPTION	MEAN	MAXIMUM	MIN	S.D
TC	Total cost (10^6 NT)	421.49	1679.04	9.56	398.05
wl	Price of labour (10^3 NT)	305.27	527.61	41.23	136.52
wc	Price of Food and Beverage (10^3 NT)	71.85	146.34	3.78	49.77
wo	Price of materials (10^6 NT)	4.53	7.385	0.209	0.652
TR	Total revenue (10^6 NT)	417.50	1268.68	11.03	425.15
OR	Occupancy rate (%)	0.271	0.705	0.186	0.153
VFB	Value produced per F&B space (10^3 NT)	176.412	668.105	3.407	126.401

Since a cost frontier must be linearly homogeneous in input costs (Kumbhakar & Lovell, 2003), the empirical model with the half-normal inefficiency assumption is as follows:

$$\ln(TC/wo) = \beta_0 + \beta_1 \ln(wl/wo) + \beta_2 \ln(wc/wo) + \beta_3 \ln TR + \beta_4 OR + \beta_5 \ln VFR + (u+v) \quad (4)$$

The distribution assumptions of error term are as follows:

(i) $v_i \sim iid\ N(0, \sigma^2{}_v)$

(ii) $u_i \sim iid\ N^+(0, \sigma^2{}_u)$

(iii) v_i and u_i are distributed independently of each other, and, of the regressors.

The likelihood ratio statistics are applied to test whether or not the estimate coefficients are significantly different from zero.

Results and discussion

The maximum likelihood techniques are employed to the estimates of the variable coefficients and the parameters of the two error components. Table 4 summarises the estimation results obtained for the stochastic frontier.

Table 4: Parameter estimates of the Cobb-Douglas cost frontier function (year 2016)

Variable label	Parameter estimate	*t*-ratio
Constant	-3.2267	-3.560***
$\ln(wl/wo)$	0.2579	3.418***
$\ln(wc/wo)$	0.4658	21.271***
$\ln TR$	0.8734	14.578***
OR	-0.4604	-0.459
$\ln VFB$	-0.3577	-6.784***
${\sigma_v}^2$	0.00251	
${\sigma_u}^2$	0.10256	
$\sigma^2 = \sigma^2{}_v + \sigma^2{}_u$	0.10276	
λ	6.2905	
$\gamma = \sigma^2{}_u / \sigma^2$	0.7646	
Log-likelihood	10.6220	
Observations	42	

***Significance at 1% level

Except for the occupancy rate (OR) variable, the coefficients of all variables have the expected signs and are very significant at 1%, respectively. The ratio of the variability for u and v can be used to measure a hotels' relative inefficiency, where $\lambda = \sigma_u / \sigma_v$ and $\gamma = \sigma^2{}_u / \sigma^2$, and is a measure of the amount of variation stemming from inefficiency relative to noise for the sample. The values of λ and γ (i.e. 6.2905 and 0.7646, respectively) reveal that inefficiency plays an important role in the composite error term and postulate the choice of the stochastic frontier approach in the present study. The cost elasticity with respect to total output is the estimated coefficient of β_3 , i.e. 0.8734.

The returns to scale of the South African hotel sector can be obtained from $1/\beta_3$, i.e. 0.10256. This reveals that the performance of hotels are slightly under the situation of slightly increasing returns to scale. The efficiency level of each hotel can be obtained from Eq. (3) with the estimated inefficiency u . Table 5 shows the results of hotel cost efficiency.

Table 5: Parameter estimates of the Cobb-Douglas cost frontier function and efficiency rankings of hotels (year 2016)

No.	HOTEL	EFFICIENCY	RANKING	No.	HOTEL	EFFICIENCY	RANKING
1	Hemmingways hotel	0.7129	19	22	Albany Hotel	0.4173	42
2	Blue lagoon Hotel	0.6604	22	23	eMakhosini Boutique Hotel	0.5931	32
3	Beacon Island	0.8633	4	24	Coastlands Durban	0.8160	10
4	Monte Casino	0.7951	12	25	Garden Court Umthatha	0.5872	34
5	The Thistle Hotel	0.8719	3	26	Hotel Savoy	0.4455	41
6	Garden Court Sandton Sun	0.8045	11	27	The Russel Hotel	0.6314	27
7	12 Apostles Hotel	0.8986	1	28	Point Village Hotel	0.4720	38
8	Courtyard Port Elizabeth	0.7091	20	29	The Plettenberg Hotel	0.7353	15
9	Radisson Blu Hotel	0.6032	31	30	Kurland Hotel	0.6348	25
10	The Boardwalk Hotel	0.6442	23	31	Conrad Pezula	0.5659	35
11	Sheraton Protea Hotel	0.6083	30	32	Hilton Sandton	0.8420	7
12	Protea Hotel Pretoria Hatfield	0.5897	33	33	The Winston Hotel	0.5202	36
13	Premier Hotel Pretoria	0.6109	28	34	Sandton Sun	0.7904	13
14	The Commodore Hotel	0.6390	24	35	Hobbit Boutique Hotel	0.4625	40
15	The Table Bay Hotel	0.8480	5	36	Emoya Hotel and Spa	0.5201	37
16	Queen Victoria Hotel	0.8318	8	37	President Hotel	0.7214	17
17	The Portswood Hotel	0.8769	2	38	Southern Sun Bloemfontein	0.6884	21
18	Hotel Cube	0.8453	6	39	Mpekweni Beach Resort	0.7647	14
19	Hilton Durban	0.8266	9	40	Southern Sun The Ridge	0.6336	26
20	Pavillion Hotel	0.7321	16	41	Sun City Resort	0.7199	18
21	The Benjamin	0.4670	39	42	Soho hotel	0.6105	29
Mean efficiency 0.6812							
Highest efficiency 0.8986							
Lowest efficiency 0.4670							
Standard deviation 0.1025							

In Table 5 hotels have been ranked in this study based on their efficiencies. As shown in Table 5, the average efficiency is 68.12% and indicates that almost 32% costs can be reduced without decreasing output if the hotel can operate efficiently. The maximum hotel efficiency score is 89.86% while the minimum efficiency score is 46.70%. Twenty-one out of 42, i.e. 50%, hotels are operating with an efficiency higher than the average efficiency.

Compared to the finding elsewhere in the same industry, these efficiency scores are lower than the 80.30% in Taiwan (Chen, 2007) and 90% in the United States (Anderson et al., 1999).

In order to test the theoretical framework and the corresponding hypotheses, and to determine whether there were any significant differences amongst the means of the 42 hotels, a one-way Analysis of Variance (ANOVA) was performed for the four efficiency drivers (Table 6).

Table 6: One-way ANOVA results for the drivers of operational efficiency in hotels

DRIVERS OF EFFICIENCY	Mean efficiency	β-value	*F*-value	Significance (p-value)
Location		0.409	3.507	0.0052*
Metropolitan (n=25)	0.8051			
Non-metropolitan (n=17)	0.4734			
Size		0.286	2.753	0.2306
Small: <100 rooms (n=14)	0.7855			
Big: >100 rooms (n=28)	0.7620			
Hotel category		0.129	0.814	0.0113*
5 star (n=25)	0.7269			
≤4 star (n=17)	0.7171			
Occupancy		0.113	0.102	0.0101*
Low: < 50% (n=24)	0.5132			
High: > 50% (n=18)	0.7586			

*Indicates a significant difference ($p < 0.05$)

The first structural driver, location, significantly impacted ($p < 0.05$) on hotel efficiencies. Furthermore, the efficiency of hotels located in the non-metropolitan area (mean=0.4734) are lower than in the metropolitan area (mean=0.8051). This finding supports some of the qualitative arguments in the previous literature (Shang et al., 2009; Bernini & Guizzardi, 2010) on the significant impact of location on hotel efficiency. The high efficiency in hotels located in metropolitan areas might be attributed to site accessibility, size and population in metropolitan areas which according to Wang et al. (2014) epitomise a good location.

The second structural driver, size, had a non-significant impact on hotel efficiency. Despite being insignificant, these results are still of interest. For instance, the efficiency of small hotels (mean = 0.7855) is higher than that of big hotels (mean = 0.7620), indicating that smaller hotels are more efficient than big hotels. The results deviate from previous literature scholars (Assaf et al., 2012; Assaf & Kneževič, 2010; Poldrugovac et al., 2016) who found a significant relationship between size and hotel efficiency. A possible argument for the efficiency of small hotels in this study could be that smaller hotels manage smaller levels of resources hence it is easier for them to maximise their capacity.

The first executional driver, hotel category, significantly impacted ($p < 0.05$) on hotel efficiencies. The results confirm the findings by previous scholars (Hsieh & Lin, 2010; Honma & Hu, 2012; Chiang et al., 2004; Assaf & Agbola, 2011) who also found that star category significantly influenced hotel efficiency. The results confirm the assertion by the Tourism Grading Council of South Africa (TGCSA, 2017) that the perceived service expectancy would be better at a 5-star hotel than at a 2-star hotel which significantly influences efficiency in different hotel categories.

The second executional driver, occupancy, significantly impacted ($p < 0.05$) on hotel efficiencies. This finding is consistent with the previous findings by Neves and Lourenco (2009) and Hsieh and Lin (2010) who also found that hotel occupancies significantly impacted on hotel efficiency. However, Chiu and Huang (2011) caution that when assessing occupancy the RevPAR of a hotel should also be considered.

Putting this into perspective, and taking a less prescriptive view regarding the assumptions of Chiu and Huang (2011), the results derived from this study suggest it is costly to operate a big hotel in South Africa because demand is not big enough to operate a big hotel efficiently in the South African hotel market. Therefore, the more cost efficient hotels would be hotels that are able to maximise revenue with limited available rooms. This is a very critical result, compelling hotels not just to focus on increasing occupancy, but to strive to increase Revenue per available room.

Conclusions and managerial implications

The paper indicates that hotels in South Africa are on average operating at 68% efficiency and the market is competitive in general. The ranking permits inefficient hotels not only to ponder about their positions in the ranking list but also to develop strategies for their efficiency improvement in the future. The best performing hotels are identified and constitute reference points for the inefficient hotels.

From the study it is clear that one structural driver, namely, 'location' and two executional drivers, namely, 'hotel category' and 'occupancy', significantly impacted (p < 0.05) on hotel efficiency in South Africa. However, no significant evidence can be found that hotel efficiency is affected by size.

The classification of drivers allows hoteliers to first work on drivers that can be changed in the short-term (executional drivers), then focus on the ones that require long-term planning (structural drivers). The results have implications for hotel managers in that if they want to improve efficiency they must manage hotel capacity and customer demand in a way that maximises revenue. To stimulate demand during periods of low demand, management could consider strategies that attract more customers such as discount allocation, whereas during periods of high demand they may consider increasing room rates or duration control.

Researchers have raised concerns about the appropriateness of stochastic frontier approach to measure hotel inefficiency because of the assumptions that must be made in the conduct of the analysis. Researchers have expressed reservations about the lack of a priori justification to guide decision making with respect to the assumptions as well as about the robustness of findings to the assumptions made. However, this article provides decision-making guidance to researchers who wish to use stochastic frontier approach to analyse hotel efficiency. The results indicate that the stochastic frontier approach can be applied as a useful management tool to identify drivers of hotel efficiency and could enhance the service data and revenue management with regards to hotel efficiency in South Africa.

References

Aigner, A., Lovell, C. A. K. & Schmidt, P. (1977). Formulation and estimation of stochastic frontier production function models. *Journal of Econometrics*, 86(2): 21-37.

Anderson, R. I., Fish, M., Xia, Y. & Mixhello, F. (1999). Measuring efficiency in the hotel industry: A stochastic approach. *International Journal of Hospitality Management*, 18(1): 45-47.

Assaf, A.G. & Agbola, F.W. (2011). Modelling the performance of Australian hotels: A DEA double bootstrap approach. *Tourism Economics*, 17(1): 73-89.

Assaf, A., Barros, C. P. & Josiassen, A. (2012). Hotel efficiency: a bootstrapped metafrontier approach. *International Journal of Hospitality Management,* 31(2): 621-629.

Assaf, A. & Knežević, C. L. (2010). The performance of the Slovenian hotel industry: evaluation post-privatisation. *International Journal of Tourism Research,* 12(4): 462-471.

Banker, R.D. & Morey, R.C. (1986). Efficiency analysis for exogenously fixed inputs and outputs. *Operations Research*, 34(4): 513-521.

Barros, C.P. (2005). Measuring efficiency in the hotel sector. *Annals of Tourism Research*, 32(2): 456-477.

Battese, G. E. & Coelli, T. J. (1995). A model of technical inefficiency effects in a stochastic frontier production function for panel data. *Empirical Economics*, 20: 325-332.

Bernini, C. & Guizzardi, A. (2010). Internal and locational factors affecting hotel industry efficiency: evidence from Italian business corporations. *Tourism Economics*, 16(4):883-913.

Charnes, A. C., Cooper, W. W. & Rhodes, E. (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research*, 2(6): 429-444.

Chen, C.F. (2007). Applying the stochastic frontier approach to measure hotel managerial efficiency in Taiwan. *Tourism Management*, 28(4): 696-702.

Chiang, W., Tsai, H. & Wang, L. (2004). A DEA Evaluation of Taipei Hotels. *Annals of Tourism Research*, 31(3): 712–715.

Chiu, Y. & Huang, C. (2011). Evaluating the optimal occupancy rate, operational efficiency and profitability efficiency of Taiwan's international tourist hotels. *The Service Industries Journal*, 31(3): 2145-2162.

Choi, T.Y. & Chu, R. (2001). Determinants of hotel guests' satisfaction and repeat patronage in the Hong Kong hotel industry. *International Journal of Hospitality Management*, 20(6): 277-297.

Culture, Arts, Tourism, Hospitality and Sports Sector Education and Training Authority (CATHSSETA). (2016). *Tourism and sport skills audit*, Sandton, Tourism, Hospitality and Sport Education and Training Authority, Johannesburg, South Africa.

Davutyan, N. (2007). Measuring the quality of hospitality at Antalya. *International Journal of Tourism Research,* 9(1): 51-57.

Enemuo, O.B., Ejikeme, J.N.U. & Edward, C. (2016). The role of customer satisfaction and maintenance culture in the sustainability of hospitality industries in Umuahia North and South Local Government Areas of Abia State. *Journal of Hospitality and Management Tourism*, 7(1): 1-10.

Forones, R.C. (2013). *Customer care and customer satisfaction in hotels*. Available from https://prezi.com/customer-care-and-customer-satisfaction-in-hotels. [Accessed 22 August 2018].

Honma, S. & Hu, J. L. (2012). Analysing Japanese hotel efficiency. *Tourism and Hospitality Research,* 12(3): 155-167.

Hsieh, L. F. & Lin, L. H. (2010). A performance evaluation model for international tourist hotels in Taiwan - an application of the relational network DEA. *International Journal of Hospitality Management,* 29(1): 14-24.

Jondrow, J., Lovell, C. A. K., Materov, I. S. & Schmidt, P. (1982). On the estimation of technical inefficiency in the stochastic frontier models. *Journal of Econometrics*, 19(3): 233-238.

Kumbhakar, S. C. & Lovell, C. A. K. (2003). *Stochastic Frontier Analysis*. Cambridge: Cambridge University Press.

Leedy, P. D. & Ormrod, J. E. (2013). *Practical Research: Planning and Design,* (10th ed.). Upper Saddle River, New Jersey: Pearson Education Inc.

Lombard, L. (2016). *Overview: SA tourism growth over the last decade*. Available from http://traveller24.news24.com/overview-sa-tourism-growth-over-the-last-decade. [Accessed 19 September 2018].

Meeusen, W. & van den Broeck, J. (1977). Efficiency estimation from Cobb-Douglas production function with composed error. *International Economic Review*, 18(5): 435-444.

Mhlanga, O., Hattingh, Z. & Moolman, H.J. (2013). Expectations and experiences of customers in formal full service restaurants in Port Elizabeth. *African Journal for Physical, Health Education, Recreation and Dance*, 19(4):1109-1120.

Mhlanga, O., Hattingh, Z. & Moolman, H.J. (2014). The effect of restaurant attributes on customers' expectations and experiences in formal full service restaurants in Port Elizabeth, South Africa. *African Journal of Hospitality, Tourism and Leisure*, 3(1): 1-11.

Mhlanga, O. (2015). Electronic meal experience: a gap analysis of online Cape Town restaurant comments. *African Journal of Hospitality, Tourism and Leisure*, 4(1):1-18.

Mhlanga, O., Hattingh, Z. & Moolman, H.J. (2015). Influence of demographic variables on customers' experiences in formal full-service restaurants in Port Elizabeth, South Africa. *Tourism*, 63(2):143-160.

Mhlanga, O. & Machingambi, S. (2016). The influence of demographic variables on customers' expectations in restaurants in the Eastern Cape Province of South Africa. *African Journal of Hospitality, Tourism and Leisure*, 5(1):1-16.

Mhlanga, O. & Tichaawa, T.M. (2016). What are the current factors affecting consumer selection criteria in formal full service restaurants in Port Elizabeth, South Africa? *African Journal of Hospitality, Tourism and Leisure*, 5(2): 1-11.

Mhlanga, O. & Tichaawa, T.M. (2017). Influence of social media on customer experiences in restaurants: A South African study. *Turizam*, 65(1): 45-60.

Mhlanga, O. (2018). Factors impacting restaurant efficiency: a data envelopment analysis. *Tourism Review*, 73(1):82-93.

Neves, J. C. & Lourenco, S. (2009). Using data envelopment analysis to select strategies that improve the performance of hotel companies. *International Journal of Contemporary Hospitality Management*, 21(6): 698-712.

Parsa, H.G., Gregory, A. & Terry, M. (2010). Why do restaurants fail? Part III: An analysis of macro and micro factors. *Emerging Aspects Redefining Tourism and Hospitality*, 1(1): 16-25.

Poldrugovac, K., Tekavcic, M. & Jankovic, S. (2016). Efficiency in the hotel industry: an empirical examination of the most influential factors. *Economic Research*, 4(3): 583-597.

Price Waterhouse and Coopers (PWC). (2017). *Rooms with an African view. Hotels outlook: 2016-2020*. Available from http://www.pwc.co.za/hospitality-and-leisure. [Accessed 23 May 2018].

Pulina, M., Detotto, C. & Paba, A. (2010). An investigation into the relationship between size and efficiency of the Italian hospitality sector: A window DEA approach. *European Journal of Operational Research*, 20(4): 613-620.

Republic of South Africa National Department of Tourism (RSA NDT). (2011). *National tourism sector strategy*, Department of Tourism, Pretoria.

Roh, E.Y. & Choi, K. (2010). Efficiency comparison of multiple brands within the same franchise: Data envelopment analysis approach. *International Journal of Hospitality Management*, 29(6): 92-98.

Sanjeev, G. M. (2007). Measuring efficiency of the hotel and restaurant sector: the case of India. *International Journal of Contemporary Hospitality Management,* 19(4): 378-387.

Shang, J. K., Wang, F.C. & Hung, W.T. (2009). A stochastic DEA study of hotel efficiency. *Applied Economics*, 15(3): 1-14.

Statistics South Africa (SSA). (2017). *Stats SA releases 2016 accommodation statistics*. Available from: http://www.gov.za/stats-sa-releases-2016-accommodation-stats. [Accessed 18 October 2017].

Tourism Grading Council of South Africa (TGCSA). (2017). Tourism Grading Council of South Africa. Available from http://www.tourismgrading.co.za. [Accessed 9 August 2017].

Wang, L.W., Tran, T.T. & Nguyen, N.T. (2014). Analysing factors to improve service quality of local specialties restaurants: A comparison with fast food restaurants in southern Vietnam. *Asian Economic and Financial Review*, 4(11): 1592-1606.

World Travel and Tourism Council (WTTC). (2017). Travel and tourism economic impact summary. Available from http://www.wttc.org/bin/pdf/tempo/exec-summary-final.htm. [Accessed 11 July 2017].