

Efficiency of Hotels Using Data Envelopment Analysis in Dar es Salaam, Tanzania

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Abstract:

This paper aims to systematically investigate the most efficient hotel(s) for benchmarking in Dar es Salaam, Tanzania. This study employed systematic Data Envelopment Analysis (DEA) to measure the relative efficiency of 50 different hotels in Dar es Salaam. The study characterized the relative efficiency using three outputs (i.e. room revenue, food and revenue and other revenue) and four inputs (number of employees, operational costs and number of guest rooms). The results revealed that 24 relatively efficient hotels could be used for benchmarking, whereas 26 had inefficient management. As an avenue for future research, this study used a dataset of one year. However, it is recommended that future studies consider a broader period of data sets e.g. 2 - 5 years, to capture the efficiency change over time. Businesses in Tanzania are skeptical about sharing their data as it is considered confidential; thus, managers and hoteliers are encouraged to be optimistic about the results implications. To improve efficiency, Tanzanian hotels must re-think marketing strategies and enlarge their seasonal activities to ensure more efficiency. To our understanding, this is the first paper to systematically report on the efficiency of city and resort hotels in Tanzania. Thus, the study has set the benchmark results and comparable methodology for future hotel efficiency studies.

Keywords: Hospitality industry, Efficiency, Data Envelopment Analysis, Non-discretionary Inputs

1. Introduction

The United Nations World Tourism Organization (UNWTO) has reported that the tourism and hospitality sector/ industry is an important driver of economic growth and development globally (Nurmatov et al., 2021). According to FICCI (2020), the sector grew faster than the global GDP for nine years running prior to the COVID-19 pandemic, contributing USD 8.9 trillion, or 10.3% of the GDP, to the world economy. Developing nations in the Asian region and the Middle East have been the prime drivers behind this unprecedented growth (UNWTO, 2020). The World Travel and Tourism Council (WTTC) estimates that travelling to nations that are developing will grow at a rate twice as fast as those advanced economies and that this trend will continue until 2030. Apart from such promising figures associated with the hotel industry, there are certain significant factors which can seriously impact on its growth and development. One such prime factor is performance efficiency. The analysis of performance, and specifically the evaluation of efficiency, becomes especially significant in the hotel sector because this evaluation can not only identify the state of hotel operations with regard to resource allocation, but it can also produce significant policy implications to optimize operations and lower costs (Tan & Despotis, 2021).

Performance scrutiny is a fundamental issue in corporate governance research and in an ideal world a poorly performing company cannot endure in the market. The hotel sector is not an exception to this performance analysis required in corporate governance mechanisms (Barros et al., 2011). Since the mid-1990s, the number of researchers appraising the productivity of hotel businesses by using efficiency measures has been increasing overtime. Efficiency in hotel businesses is very important since they are all operating in oligopolistic market where control over costs and maximization of prices are key drivers of success (Barros, 2005; Günaydın et al., 2022). Based on this, it is of significant interest to examine the inputs and outputs of the hotel businesses. Ideally, hotels need to establish their productivity performance based on economic analysis of the ratios between inputs and outputs (Kim & Chung, 2022). Efficiency analysis is the key way of comparing production capabilities and profitability among several hotels (Kim & Chung, 2022). Therefore, this research implemented Data Envelopment Analysis (DEA) as established by Charnes et al. (1978) to measure the managerial efficiency of 50 hotels in Dar es Salaam, Tanzania.

The current paper is motivated by three main issues. First, the extant literature is mostly covered by studies conducted in developed and emerging economies. Most existing studies represents efficiency analysis of the hospitality sector in European countries such as France (Corne, 2015), Portugal (Barros, 2004; Oliveira et al., 2013), Turkey (Günaydın et al., 2022) and Asian countries such as India (Mahajan et al., 2024), China (Song & Li, 2019; Tsai, 2009), Taiwan (Hwang & Chang, 2003) and Sri-Lanka (Dasandara et al., 2022). Few studies have been undertaken in African countries such as Tunisia (El Alaoui et al., 2023; Sami & Mohamed, 2014) ; and Egypt (Nassar, 2012; Salem, 2014). Unlike the previous studies carried out in developed and emerging countries, to our information, this study is the first to explore efficiency of hotel businesses in Tanzania using a combination of multiple inputs and output variables. It is important to observe that the representation of Tanzania tourism sector and particularly hotel efficiency studies is very scarce in the available literature.

Second, about two decades ago, Sharma and Upneja (2005) investigated performance of small hotels in Tanzania using financial ratios. Their research did not consider hotels efficiency as neither inputs nor outputs were analysed. Similarly, many previous studies that analysed efficiency in the hotel sector adopted outdated financial ratios such as the occupancy rate (OR), the revenue per available room (RevPAR) and average daily rate (ADR) (Enz et al., 2001; Neves & Lourenço, 2009). However, these ratios are capturing hotel financial performance rather efficiency. It is argued that these ratios are not reasonably reflecting the multiple dimensions of a hotel efficiency (Enz et al., 2001; Neves & Lourenco, 2009). For this reason, it is rational to reconsider examination of hotel efficiency in Tanzania using a new data set and proxies of productivity.

Lastly, it is vital to note that Tanzania is among the top tourist attractions and destinations in Africa. Based on previous research, Tanzania is known as a fast-growing fresh tourism destination in Africa and has several attractions in rural areas, along the coast and on the island of Zanzibar (Okello & Novelli, 2014). According to the National Bureau of Statistics, Tanzania tourists' arrivals increased from 900,182 to 1,131,286 for the period of eight month from January to August 2023 (NBS, 2023). This is equivalent to 25.7 percent increase from the previous year. This is the evidence that there is increasing expansion of the tourism business and in particular the competition of hotels and restaurants is getting ferocious over time. It is believed that existence of adequate and quality hotels is one of the

factors that will enhance and increase tourism activities. However, to date it is not known how efficient hotels in Tanzania despite the significant increase of tourists in the country are. It is therefore important to explore the efficiency of existing hotels especially in largest commercial City of Dar es Salaam. The remaining section of the study is structured as follows: Section 2 presents the theoretical and empirical literature review. Section 3 describes the methods and techniques used to analyse the data. Section 4 discusses the findings of the paper and Section 5 presents the conclusions and policy recommendations.

2. Literature review

2.1 Overview

Baker and Riley (1994) were the first who investigated the hotel efficiency. The authors propose that the most effective way to measure hotel productivity is by evaluating management's capacity to predict demand and then comparing it with actual performance. After this initial study, many researchers examined hotel efficiency using various input and output attributes (Anderson & Fok, 2000; Mahajan et al., 2024; Morey & Dittman, 2003). A recent study published in September 2022 reveals that there are more than 5000 articles which have employed DEA technique in their methodology since 2017 (Piran et al., 2023). In most cases, hotel efficiency has been deliberated by studying the ratio between inputs (e.g. employees and fixed assets) and outputs (e.g. sales and profits) (Anderson et al., 2000; Tsai, 2009; Günaydın et al., 2022).

Evidence from the present literature indicates that several variables were adopted as inputs and outputs (Oliveira et al., 2013; Günaydın et al., 2022). Specifically, the output variables included in many studies consists of number of nights, occupancy rates, annual revenues and number of customers (e.g. Oliveira et al., 2013; Corne, 2015; Song & Li, 2019; Günaydın et al., 2022). The input variables are captured by labour costs, number of employees, number of beds and number of rooms (e.g. Assaf, 2012; Chiang et al., 2004), fixed asset and environmental governance investments (e.g. Song & Li, 2019) and scenic spots as well as advertising and marketing costs (Polemis et al., 2020; Song & Li, 2019). Raksmei Sann, Pei-Chun Lai & Shu-Yi Liaw (2024) has reviewed 47 papers on impact of COVID-19 on Hotel Industry. Santi Agustina Manalu, Togar Mangihut Simatupang & Santi Novani (2024) has suggested to study on inter connected elements of tourism industry.

2.2 Theoretical review

Several studies on hotel efficiency are analytically motivated, with no obvious academic framework (Barros et al., 2011). Firms choose the best efficient combination of resources that minimize costs. However, it is important to recognize that the end outcome of every company is to maximize shareholders value. It is therefore logical to state that firms aim to maximise their profits (Günaydın et al., 2022). According to Varian (2016), the DEA approach measures technical and allocative efficiency that minimizes costs. The authors clarified that technical efficiency measures the maximum production that the firm can attain given its production function while allocative efficiency captures the best combination of resources which the firm can realise given the values of the inputs. Hence, the total efficiency is a combination of allocative and technical efficiency.

The DEA approach is globally used to analyse the efficiency of the Decision Making Units (DMUs) due to its uniqueness among the numerous approaches existing for computing DMU productivity

scores (Tewari & Arya, 2023). Shahwan & Habib (2020) argued that DEA is a dynamic and effective method for apprehending the link between inputs and outputs. Bose and Patel (2015) suggested neural DEA approach for efficiency measurement. Also, the authors revealed that DEA provides important information for decision-making in improving and assisting ineffective DMUs in following performance standards. Unlike conventional approaches that focus on central tendencies' analysis, some of the previous studies indicated that DEA is a standard method that focuses on superlative practices of DMUs (Cooper et al., 2007; Shahwan & Habib, 2020). Additionally, recent research conducted by Habib & Kayani (2022) and Mourad et al. (2021) revealed that DEA is a non-parametric procedure that does not consider prior assumptions of data distribution. Sharma, Singh and Patel (2015) measured the brand equity of consumers. Overall, DEA is a commonly adopted method to estimate the managerial efficiency of various DMUs like schools, universities, hotels, banks and hospitals. This methodology has been previously adopted by various authors in tourism sector (Hwang & Chang, 2003; Mahajan et al., 2024; Nurmatov et al., 2021).

2.3 Empirical review

Efficiency evaluation is an essential part of firm control. The evaluation of firm efficiency is used as a basis of inducing improvements and decision making (Hwang & Chang, 2003). Based on this fact, measuring of firm efficiency is very important and therefore a subject matter of interest for economists, managers and other researchers (Hwang & Chang, 2003). There are several studies which have attempted to examine the efficiency of hotel businesses across the globe over the years. A study conducted by Barros et al. (2011) used data from 15 Portuguese hotels for the period of 1998 to 2005. In this work, they employed book value of property, operational costs and quantity of full-time workers as input variables and adopted sales and number of guests as output variables. By estimating a two-stage DEA approach, these authors proposed a simple framework for evaluating and restructuring operational activities of Portuguese hotels.

Oliveira et al. (2013) carried out an investigation of 84 hotels in Portugal for the period of 2005 to 2007 and they have adopted number of rooms, number of workers, capacity of food & beverage provisions and other costs as input variables and total revenue as an output variable. Their findings indicated that star rating is not an important factor of hotel productivity, however, presence of golf courses and location of the hotels were significant determinants of efficiency. Further, it was found that hotel businesses that do not own golf courses are the most productive (Oliveira et al., 2013). Another study by Sellers-Rubio & Casado-Díaz (2018) used data from Spain employed number of hotels and number of vacant hotel beds as input variables and revenue per available room as output variable. Their results revealed that generally that there is a high degree of hotel ineffectiveness for Spanish regions.

Using data from the 179 UK hotels for the period of 9 years from 2010 to 2018, Tan & Despotis (2021) investigated the performance using the network DEA paradigm. Consistent with the findings by Sellers-Rubio and Casado-Díaz (2018), their key finding revealed that the UK hotel sector is highly inefficient. Günaydın et al. (2022) used DEA to make comparison of productivity between all-inclusive hotels and hotels that offer both bed and breakfast services. The authors employed three inputs variables (labour, food and capital costs) and one output (total revenue) for the period from 2011 to 2019. Their findings indicate that all-inclusive hotels operate at 100% effectiveness in all year-round

while the bed and breakfast hotels operates at 89.6% efficiency during the summer season. Another recent research conducted by Tewari & Arya (2023) analysed the management productivity of 63 hotels in India for the period from 2019 to 2020. They found that there is a negative association between efficiency and pro social investments.

Table 1: Selected literature review on hotel efficiency for the past 15 years

S/N.	Authors and years	Country	Inputs	Outputs	Sample size/period	Method of analysis
1.	Assaf et al. (2010)	Taiwan	Number of rooms Number of full-time employees	Total revenue Market share for each hotel Employee performance	78 hotels Period 2004 to 2008	Metafrontier model
2.	Oliveira et al. (2013)	Portugal	Number of rooms Number of employees Food & beverage capacity Other costs	Total revenue	84 hotels Period 2005 to 2007	DEA
3.	Corne (2015)	France	Uniform value of 1	Occupancy rate Revenue per available room	16 DMUs Period 2013	The hierarchical category DEA model
4.	Arbelo-Pérez et al. (2017)	Spain	Materials Employees Physical Capital Other operating costs	Operating revenue Other operating revenue	838 hotels Period 2009 to 2013	Stochastic frontier methodology
5.	Sellers-Rubio & Casado-Díaz (2018)	Spain	Number of hotels Number of available hotel beds	Revenue per available room	1836 hotels Period 2008 to 2016	Two-stage double bootstrap DEA methodology
6.	Kim & Chung (2022)	North America	Number of properties Number of rooms	Customer satisfaction Occupancy rate	2631 hotels Period 2007 to 2016	DEA models

				Revenue per available room		
7.	Günaydın et al. (2022)	Turkey	Labour costs Food and beverage costs Capital costs	Total revenue	2 hotels	DEA
					Period 2011 to 2019	
8.	Tewari & Arya (2023)	India	Available rooms Employee salaries Administrative and general expenses	Annual revenue Profit after tax	491 hotels	DEA and Global Malmquist productivity index (MPI)
					Period 2009 to 2020	
9.	Mahajan et al. (2024)	India	Capital employed Gross fixed assets Current assets Operating costs	Operating income Profit	45 Hotels and restaurants	The bootstrap DEA

3. Methodology

This paper uses DEA, to measure efficiency of Dar es Salaam hotels in Tanzania. DEA was introduced by (Farrell, 1957) to measure the efficiency of a decision-making unit (DMU), which transforms inputs into outputs. For the present purpose, its principal strength lies in its ability to combine multiple inputs and outputs into a single summary measure without requiring pre-specified measures. This method of evaluating relative efficiency can examine multiple inputs and multiple outputs of different decision-making units. Its outcomes have nothing to do with dimensions. The basic principles and computation processes are briefly introduced here. Suppose there are n DMUs: $DMU_j, j = 1, \dots, n$. Let the input and output data for DMU_j be (x_{1j}, \dots, x_{mj}) and (y_{1j}, \dots, y_{sj}) , respectively. The matrix X , which represents inputs and the matrix Y , which represents output can be arranged as follows.

$$X = \begin{pmatrix} x_{11} & \cdots & x_{1n} \\ \vdots & \ddots & \vdots \\ x_{m1} & \cdots & x_{mn} \end{pmatrix} = (x_j) \quad Y = \begin{pmatrix} y_{11} & \cdots & y_{1n} \\ \vdots & \ddots & \vdots \\ y_{s1} & \cdots & y_{sn} \end{pmatrix} = (y_j)$$

The data deals with the pair of positive input and output vectors $(x_j, y_j), j = 1, \dots, n$ of n DMUs.

Out of many, one of the purposes of a data envelopment analysis study is to project the inefficient DMUs onto the production frontiers such as through constant to return to scale – projection (Charnes et al., 1978) and the variable return to scale- projection (Banker et al., 1984).

Different DEA models have been developed to assess the efficiency. Earlier models were developed with constant return to scale (CCR) in 1978 (Charnes et al., 1978) and variable return to scale (BCC) in 1984 (Banker et al., 1984). There are three directions,

1. Input-oriented that aims to reduce input amounts by as much as possible while keeping the output levels.
2. Output-oriented maximizes output levels under, at most, the present input consumption.
3. Additive and SBM models that deal with input excesses and output shortfalls simultaneously in a way that jointly maximizes both

In the case of improving the efficiency of hotels, we use the following output-oriented DEA model (BCC model), which can be expressed as below:

$$\begin{aligned} & \max \tau_0 \\ \text{s. t. } & \sum_{j=1}^n \lambda_j x_{ij} \leq x_{i0}, \quad i = 1, 2, \dots, m \\ & \sum_{j=1}^n \lambda_j y_{rj} \geq \tau_0 y_{r0}, \quad r = 1, 2, \dots, s \\ & \sum_{j=1}^n \lambda_j = 1 \\ & \lambda_j \geq 0, j = 1, 2, \dots, n, \quad \tau_0 \geq 0 \end{aligned}$$

As an output-oriented model, a DMU_o is said to be efficient if $\tau_o^* = 1$, where the asterisk represents the optimal values, whereas $\tau_o^* > 1$, then DMU_o is considered to be inefficient. Input resources for the tourist hotels include the number of guest rooms, hotel staff, the area in the square meter for each room, dining rooms, and beverages. The output variables include room revenue, food and beverages, and operating revenues from the lease of store spaces, laundry, swimming pool, ball courts, barber shop, beauty salons, and bookstores.

3.1 Non-discretionary Inputs

A model can have discretionary or non-discretionary inputs. In this situation, DMU can decrease only discretionary inputs and can increase desirable outputs.

Let

$D = \{1, 2, \dots, m_1\}$ be discretionary inputs and $ND = \{m_1 + 1, m_1 + 2, \dots, m\}$ be non-discretionary inputs. Therefore $D \cup ND = \{1, 2, \dots, m\}$ be the number of inputs.

Now the model can be written as:

$$\max \tau_0$$

$$\begin{aligned}
 & s. t. \sum_{j=1}^n \lambda_j x_{ij} \leq x_{i0}, \quad i \in D \\
 & \sum_{j=1}^n \lambda_j x_{ij} \leq x_{i0}, \quad i \in ND \\
 & \sum_{j=1}^n \lambda_j y_{rj} \geq \tau_0 y_{r0}, \quad r = 1, 2, \dots, s \\
 & \sum_{j=1}^n \lambda_j = 1 \\
 & \lambda_j \geq 0, j = 1, 2, \dots, n, \quad \tau_0 \geq 0
 \end{aligned}$$

3.2 The data set

Data related to hotel efficiency were collected from 3 -5-star hotels found in Dar es Salaam City of Tanzania. A total of fifty (50) different kinds of hotels were surveyed for one year of the study i.e. 2024. The database building followed a rigorous procedure whereby at first hotels, experiencing similar seasonality patterns over the year were mobilized. In this case a total of 60 hotels were preliminary identified. Second, hotels with the same quality classification (3-5 stars) were determined in which case only 50 hotels qualified. This standard procedure ensured a homogeneous sample size and avoided erroneous findings on the analysis of the efficiency of hotels. The final list of hotels (i.e. 50) included hotels with more in common than differences.

These hotels are located in four district councils in Dar es Salaam City: Ilala, Temeke, Kinondoni and Kigamboni. The 3-5 stars hotel status was used as a criterion because these hotels have large customer bases and can provide more efficient and reliable results. Following this selection process, the analysis considered hotels operating in the city (31) and (29) resort hotels. Based on the literature reviewed above, the sample of 50 hotels is adequate for applying the DEA. Since the research aimed to measure the efficiency of hotels, different parameters were considered and divided into two major classes: inputs and outputs. The number of beds and the total operational cost of a hotel present the capital inputs used (Chiang et al., 2004). Hwang and Chang (2003) defined input factors as the number of full-time employees, the number of guest rooms in the hotel, and the total area of the meal department measured by total floor area, and operating expenses that including salary, cost of meals, utility, fuel, insurance, and other relevant operating costs,

On the other hand, output factors include room revenue, which refers to revenues from the lease of rooms. Food and beverages revenue is related to income from selling food, snacks, alcohol, and beverages in the dining room, coffee room and nightclubs. Other revenues refer to revenues other than the two items mentioned above. It includes operating revenues from leasing store spaces, laundry, swimming pool, ball courts, barber shops, beauty salons and bookstores. Expected area of dining room and beverage the rest of variables were obtained from the hotel report availed to the researchers. The area of dining room and beverage were estimated using standard measuring tape (100 m). Overall, the

outputs covered all the sources of revenue for the target hotels, including rooms, food, beverages, conference rooms, swimming, gym, and halls. The descriptive of the data collected is given in Table 2.

Table 2: The descriptive statistics of the hotels in sample

	N	Minimum	Maximum	Mean	Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic
Operating Cost (In Million)	50	9.35	307.80	66.78	73.15
Number of Employees	50	5.00	152.00	45.18	37.76
Number of Guest Rooms	50	6.00	152.00	55.72	35.39
Room Revenue (in Million)	50	12.80	980.00	236.88	276.87
F&B Revenue (In Million)	50	16.00	230.00	70.38	56.58

4. Results and Discussion

This part of the paper provides possible consequences for practitioners and managers in the hotel industry to enhance hotel efficiency. We examine the relative efficiency of 50 Tanzanian hotels using a DEA model. Units with DEA scores equal to 1 (100%) are efficient, and a unit with a score of more than 100% is relatively inefficient (Barros et al., 2011). For this study, guest rooms and food and beverage revenues contributed more than 80 percent of the total revenues. The remaining revenue (minor) was accrued from laundry services, the swimming pool, and spurs. Considering data availability, we took fifty (50) hotels in Dar es Salaam in 2024 as the sample size.

According to the reviewed literature, the sample size is adequate for meaningful analysis and robust conclusions. This is evidenced by studies such as those of Hwang and Chang (2003), who used only 47 hotels to evaluate the operating efficiency of international tourist hotels in Taiwan, and Aissa and Goaid (2016), who employed 27 hotels to understand the determinants of tourism hotel market efficiency in Tunisia. This implies that other researchers interested in understanding the efficiency of hotels in different areas with similar socio-economic and political settings can adopt the methodology used in the present study. Results stemming from this study can also be used to reliably highlight and reach robust conclusions about the efficiency of hotels.

We analyzed relative managerial efficiency and benchmarked using the DEA model presented in the previous section. Out of 50 hotels, 33 (66%) were three-star hotels, whereas 16(32 %) were four-star hotels and 1(2%) were five-star hotels. Regarding location, 19 belong to the resort hotel, and 31 to the city hotel categories. The results of managerial efficiency are presented in Table 3. All hotels with a value of 1 show relative managerial efficiency, while those with values more than one have inefficient management. In general, 24 hotels had a managerial efficiency of 1, whereas 26 had more than 1. Examples of hotels with the highest relative efficient management include H1, H2, H3, and H5. Hotels with high efficiency indicate a balance of inputs to achieve optimal revenue and should continue to

explore newer ways to increase their efficiency and maintain their competitive advantages (Tewari & Arya, 2023).

On the other hand, hotels with relatively poor efficiency values (inefficient) include H9, H8, and H41. These hotels may require fewer employees to reduce operation costs (Mahajan et al., 2024). These hotels must improve their management workforce and capacity building for hotel workers to enhance their skills and improve efficiency. Moreover, several factors could have contributed to the low efficiency in the hotel industry, such as the increase in hotel construction and low occupancy rates (Assaf, 2012). The overall results show that the mean efficient value was 1.39 with a standard deviation of 0.85. Among efficient hotels, fifteen (15) were City and nine (9) resort hotels. Also, Among the inefficient hotels, seventeen (17) were city hotels, whereas 9 were resort hotels. This study found that City hotels are relatively efficient compared to resort hotels. These findings align well with (Hwang & Chang, 2003), who found city hotels more efficient than resort hotels. Among the reasons for such results, with city hotels performing better than resorts, are location and advertisement. Hotels close to the city are easily accessible, thus attracting strategic investments and customers compared to those on the outskirts.

Table 3: Relative Managerial efficiency of different hotels in Dar es Salaam, Tanzania

DM U	Efficienc y	Target I1	Target I2	Target I3	Target I4	Target O1	Target O2	Target O3
H1	1.00	48.60	25.00	45.00	97.50	70.00	90.00	152.00
H2	1.00	78.00	42.00	74.00	150.00	130.00	120.00	160.00
H3	1.00	68.50	30.00	52.00	95.70	109.00	98.00	148.00
H5	1.00	79.50	60.00	45.00	75.00	270.00	135.00	101.00
H6	1.00	92.50	152.00	62.00	210.00	800.00	140.00	128.00
H7	1.00	307.80	142.00	152.00	160.10	800.00	140.00	128.00
H10	1.00	124.80	51.00	61.00	162.50	450.00	177.00	109.00
H11	1.00	86.50	75.00	54.00	135.00	212.00	112.00	203.00
H14	1.00	14.60	13.00	33.00	15.00	35.00	18.00	3.00
H16	1.00	12.90	12.00	22.00	10.00	23.00	26.00	2.60
H19	1.00	113.40	80.00	80.00	885.00	900.00	180.00	150.00
H23	1.00	17.50	30.00	48.00	75.00	88.00	66.00	4.00
H25	1.00	10.95	20.00	30.00	212.50	98.00	45.00	4.00
H26	1.00	11.60	15.00	20.00	100.00	68.00	47.00	9.00
H30	1.00	18.60	29.00	43.00	230.00	190.00	16.00	9.00
H31	1.00	80.00	62.00	80.00	405.00	44.00	146.00	134.00
H32	1.00	132.50	109.00	139.00	763.00	980.00	230.00	174.00
H33	1.00	50.50	48.00	62.00	195.00	400.00	75.00	123.00
H43	1.00	10.45	9.00	16.00	100.00	40.00	25.00	10.00
H44	1.00	13.15	8.00	6.00	140.00	40.00	24.50	2.00
H45	1.00	12.30	8.00	8.00	100.00	42.00	26.00	2.50
H46	1.00	250.00	80.00	148.00	157.50	790.00	141.00	104.00

H47	1.00	251.00	91.00	116.00	210.00	860.00	150.00	99.00
H49	1.00	9.35	5.00	15.00	122.50	33.00	22.00	4.00
H9	1.02	120.19	72.77	72.00	340.10	612.70	178.70	124.08
H8	1.02	241.00	120.00	123.65	172.50	715.16	146.10	127.71
H41	1.04	24.65	15.00	23.84	212.37	145.43	44.67	23.89
H4	1.05	76.80	55.00	53.90	120.00	225.30	124.32	136.96
H22	1.20	17.90	15.00	23.79	182.50	117.33	37.11	15.41
H42	1.20	15.30	15.00	21.90	152.58	95.93	44.37	13.12
H18	1.20	18.70	15.00	21.70	114.30	86.69	49.37	15.65
H38	1.23	26.00	30.00	40.00	245.00	221.83	44.37	27.81
H24	1.28	17.60	29.02	35.05	207.50	160.77	39.87	12.23
H29	1.30	21.80	28.00	38.60	271.84	194.41	45.36	17.36
H20	1.33	112.56	68.00	72.00	650.00	734.49	153.71	120.19
H37	1.44	22.90	15.00	21.00	175.00	129.25	41.65	23.06
H28	1.48	36.60	40.00	44.93	347.94	311.07	66.66	39.14
H40	1.51	107.21	90.31	92.27	417.74	557.77	165.13	189.94
H48	1.77	16.95	28.87	34.84	216.72	156.14	42.58	11.48
H13	1.78	16.45	12.00	20.00	75.00	60.51	30.26	11.58
H36	1.78	43.80	30.00	37.69	350.00	313.45	72.15	54.50
H15	1.81	13.25	15.00	21.76	85.00	68.66	41.90	11.66
H34	1.84	48.90	35.00	47.21	250.00	322.00	69.92	75.35
H17	1.93	35.55	36.00	36.00	162.50	216.43	79.23	40.71
H39	2.05	19.30	17.00	22.00	110.00	98.37	51.24	17.99
H12	2.09	27.80	24.00	34.31	85.00	137.93	56.43	32.34
H27	2.10	26.60	35.48	52.00	106.64	140.21	77.78	17.78
H35	2.18	25.50	30.00	40.00	272.28	220.51	45.85	25.11
H21	2.21	13.35	16.98	21.16	85.00	73.08	44.75	10.00
H50	6.67	92.13	57.49	49.46	99.40	320.19	146.71	103.23

Note: DMU= Decision making unit Target I1 Operating costs: Target I2 No. of employees: Target I3 No. of guest rooms Target I4: Area Target O1 Room revenue Target O2 Food and beverage revenue Target O3 other revenue

On the other hand, in their study on the efficiency of hotels, Becerra and Fernandez (2015) found that resort hotels were more efficient than city hotels in Spain. Likewise, Aissa and Goaid (2016) reported that resort hotels were more efficient than city hotels in Tunisia. The likely explanations for these results are marketing strategies, as also attested by (Aissa & Goaid, 2016; Tumer, 2010).

5. Conclusion and Policy Implications

This study sought to analyse the managerial efficiency of different hotels using DEA, a model that allows the incorporation of multiple inputs and outputs in determining the relative efficiencies. A dataset of inputs and output variables from 50 hotels for one year was used to conclude. Benchmarks

were provided to improve the operations of the less-performing companies. Measuring efficiency offers insights into how a decision to improve efficiency can be undertaken. This is especially important in managing hotels in a competitive environment for optimal benefits. A further analysis of the DEA results helps managers to understand factors determining managerial efficiency. In this paper, 24 hotels had efficient management, whereas 26 had inefficient management. The general conclusion is that hotel companies should adopt procedures that induce greater efficiency in following the example of efficient peers identified in the benchmarking exercise.

Our study makes a significant contribution to research in the hotel industry. Our research has implications for both the corporate and policy markets. Our report provides a direction to hotel managers on the factors they should focus on to increase their efficiency. The government should focus on delivering a liberal framework and supporting infrastructure policies.

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