EFFICIENCY AND EFFECTIVENESS OF THE HOTELS IN THE COVID-19 PERIOD: EVIDENCE FROM CAPPADOCIA IN TURKIYE[*]

Covid-19 Dönemi Konaklama Tesisi Etkinlik ve Verimlilikleri: Kapadokya/Türkiye Örneği

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Abstract

Performance of the accommodation facilities should be measured and monitored periodically for sustainability in many dimensions which have potential to affect profitability directly. In this study, efficiencies of 88 hotels from Cappadocia/Türkiye are measured via data envelopment analysis. Four inputs and five outputs are considered to measure efficiencies and effectiveness in 2020 during the COVID-19 period. The data are collected via phone calls, hotels' web pages and Tripadvisor in 2020. 83% of these hotels (73 hotels) are small-sized hotels which have equal or less than 20 rooms. Constant return to scale, variable return to scale and scale efficiencies of hotels are exposed via input-oriented data envelopment analysis. The findings show that facilities which have higher scale had lower classical efficiency. Additionally, it is observed that one of the main reasons for the inefficiency is revenue per available room. In terms of effectiveness, hotels working with travel agencies had a lower performance.

Öz

Karlılığı doğrudan etkileyen konaklama tesisleri performansları, tesislerin sürdürülebilir gelişimi için pek çok boyutta düzenli olarak ölçülmeli ve takip edilmelidir. Bu çalışmada, Kapadokya/Türkiye'de bulunan 88 hotelin etkinlikleri ölçülmüştür. 2020 yılı COVID-19 döneminde faaliyet gösteren tesislerin etkinlik ve verimlilikleri, dört girdi ve beş çıktı yardımı ile veri zarflama analizi kullanılarak analiz edilmiştir. Bu tesislerin %83'ü (73 otel) oda sayısı 20 veya daha az sayıda olan küçük otellerden oluşmaktadır. Tesis etkinlikleri, ölçeğe göre sabit, ölçeğe göre değişken ve ölçek etkinlikleri bazında, girdi odaklı veri zarflama analizi kullanılarak hesaplanmıştır. Bulgular, tesis ölçeği büyüdükçe, tesis klasik verimliliğinin düştüğünü göstermektedir. Ayrıca düşük verime sebep olan en önemli değişkenlerden birisinin oda başı gelir kriterinin olduğu görülmüştür. Etkinlikte ise, seyahat acenteleri ile yoğun çalışan tesislerin daha düşük performans gösterdiği bulgusu ortaya konmuştur.

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1. Introduction

With the development of economies, leisure-time activities in the world are getting popular and demand is continuing to increase. One of the main cultural tourism destinations in Turkiye is Cappadocia. Each year, more than 2,5 million guests visit the region based on the Nevsehir Culture and Tourism Office reports. Visitors lodge in 2 nights on average in 519 small, medium and big size hotels/pensions operating in the region.

Since the main economic driver of the region is hospitality and tourism and there are many small and medium-sized hotels, efficiency evaluation of the accommodation facilities is one of the major concerns for investors. Total investment amount, total income, number of employees, scale, ADR (Average daily rate), REVPAR (Revenue per available room), customer satisfaction level and occupancy levels are very critical performance indicators for the sector. COVID-19 has severely affected the tourism sector all over the world. To see how the efficiencies have changed in hospitality sector, efficiency and effectiveness of hotels have been measured in 2020 by using data envelopment. By the way, the study will help the researchers how the tourism sector was affected and how the efficiencies have been affected by COVID-19 in Cappadocia/Turkey.

In the past, performance evaluation was restricted to performance indicators. However, as these are partial measures of productivity, and do not take into account either the multiple variables of the hotel industry, or the interactions between them, it is suggested that these measures have not been wholly effective. Recently, methods such as SFA (Stochastic frontier analysis) or DEA (Data envelopment analysis) have included multiple inputs and outputs of the hotel industry in their analysis and as a result they have produced more comprehensive, accurate, and understandable performance measures (Oliveira et al., 2013). Methodologically, DEA is used to provide a synthetic indicator of efficiency, considering sales revenue as the output variable, while the inputs are labour costs, depreciation, and operational costs (Lado-Sestayo and Fernandez-Castro, 2019).

According to the literature, no study has yet directly exposed hotel efficiency, effectiveness and determinants in Cappadocia/Turkey region on large scale. Since the Cappadocia destination has unique characteristics such as many natural beauties (valleys, fairy chimneys), tourist attractions (balloon ride, horse riding, motorcycle tours, safari tours, mountaineering), cultural objects (churches, underground cities, cave houses), factors affecting the efficiency of hospitality industry may vary. In line with this scope, the aim of this study is determined as to figure out how the efficiencies and the effectiveness of the hotels change based on determined variables and discuss the factors that have the potential to affect the efficiencies/effectiveness. So, the results obtained will help the managers of the accommodation facilities and the policymakers in the Cappadocia region to show the points they need to focus on in order to increase their efficiency both on the basis of facilities and in the field of destination management.

The paper is organized as follows: Following the introduction section, section 2 presents the literature review. The research methodology is provided in section 3. Finally, the findings of the study and conclusion are presented in sections 4 and 5 respectively.

2. Literature Review

DEA is applied in hospitality successfully starting from Morey and Dittman (1995). After this date, many studies used DEA to measure efficiency of hotels. A review of these studies prior

to 2007 can be found in Wöber (2007). Lado-Sestayo and Fernandez-Castro (2019) compiled studies on hotel efficiency using the DEA methodology after 2007. It includes the inputs/outputs used in the previous studies. These studies are mainly done in Spain, Portugal and Taiwan.

Hwang and Chang (2003) utilized data envelopment window analysis model to analyze hotels managerial performance and examined the efficiency changes from 1994 to 1998 in China. They considered number of rooms, number of employees and fixed asset as an input and total revenue and average occupancy rate as output in 31 different regions. They also grouped the regions into four categories in terms of efficiency and stability level. Chen (2009) utilized DEA model to figure out the performance of hotels in Taiwan by using five inputs and five outputs. Findings show that number of rooms has impact on efficiency.

De Yorge and Suarez (2014) assessed factors which have the potential to impact hotel efficieincy in Spanish market by DEA and Tobit regression. They emphasize that hotels with minimum 841 beds have the optimal size to be efficient.

Oliviera et al. (2015) analyzed the efficiency of 28 hotels in Portugal by DEA. They found that while higher inputs with monetary units has higher levels of efficiency, the use of weak infrastructure has negative impact on efficiency.

Barros et al. (2011) assessed the performance of French hotels in 22 different regions for the years 2003-2007 via DEA and analyzed the determinants of the efficiency via regression analysis. They used two inputs and one outputs and the effect of variables, monuments, museums, theme parks, beaches, ski resorts and natural parks, are investigated.

In Turkiye, there are limited studies that utilize DEA methodology to measure efficiencies of hotels. Tarım et al. (2000) analyzed the four- and five-star hotels in the Antalya region via DEA. Davutyan (2007) also made a similar study on four and five-star hotels to measure efficiency. Tumer (2010) measured the technical efficiencies of resort hotels located in coastal cities. Shuai and Wu (2011) utilized DEA to analyze the impact of digital marketing on hotel performance. In addition to these, there are many studies analyzed the hotel efficiencies in Ankara and Antalya region (Aksu and Köksal, 2005; Rouyendegh and Erkan, 2010; Benli, 2012; Uyar and Alış, 2014; Yakut et al. 2015).

In terms of determinants affecting hotel efficiency, there are many studies in the literature. Parte-Esteban and Alberca-Oliver (2015) analyzed the factors affecting the efficiency of hotel in Spain via DEA and Tobit regression analysis. The findings show that the location and the size of the hotel and tourist flow in the region were the main factors. Honma and Hu (2012) also found that hotel size has a positive impact on hotel efficiency in study done in Japan. Huang et al. (2012) analyzed regional trade openness, tourism attractiveness and market competition variables if they have any effect on hotel efficiency. The found that human incentives and market share are the key factors in greater efficiency. Hwang and Chang (2003) also used the Tobit regression model to examine factors effective on hotel efficiency. They found that the education level of employees, average annual earnings of employees and tourism attractiveness factors have a positive impact on technical efficiency significantly. Sainaghi (2011) exhibited that hotel location in terms of the distance to the center, effect hotel efficiency positively. De Jorge and Suarez (2013) showed that organizational autonomy affects efficiency positively. However, the number of stars had a negative effect on efficiency. In contrary, Barros and Dieke (2008) exhibited that number of stars

has a positive effect on efficiency as an indicator of quality. Although both studies have been utilized on Spanish hotels, the number of stars had different effects on efficiency.

Dogan and Tanc (2008) analyzed only 18 hotels efficiency in region in 2008. They suggest that inefficient hotels should reduce total expenses (25%), the number of rooms (28%), and the number of employees (22%).

3. Research Methodology

There are several types of accommodation facilities in Cappadocia such as small, boutique, pension, cave, medium-sized and 4-5 stars hotels. More than 80% of these facilities are small-sized hotels. However, there are no studies that have focused on the efficiencies of the hotels in terms of scale, effectiveness, size, ADR and sub-locations. In this study, based on Klimberg et al. (2010), the efficiency and effectiveness of the accommodation facilities in Cappadocia are investigated. Klimberg et al. (2010) observed that effectiveness and efficiency are objectives that are to some degree in conflict with each other. Instead of aggregating the variables in one ratio, they divided the modified single-objective into two independent single-objective DEA models in an attempt to better measure and isolate the effect of these conflicting objectives. Although inputs/outputs are used in classical efficiency measurement systems via DEA, effectiveness variables can be the dominant factors in measuring the performance of companies (Klimberg et al., 2010). Main objective of the study is to figure out how the classical efficiencies and the effectiveness of the hotels change and discuss the factors that may affect the efficiencies/effectiveness. One of the most common efficiency measurement methodologies in both literature and practice is DEA which is introduced by Charnes et al. (1978).

3.1. Data

The data from 88 hotels and pensions located in Cappadocia are analyzed in the study. 9 different inputs and outputs are determined and categorized in two dimensions: Classical efficiency and effectiveness score as Klimberg et al. (2010) referred. Inputs and outputs are chosen based on Lado-Sestayo and Fernandez-Castro (2019) study which analyzed the literature and exhibited the inputs/outputs used in the literature. Based on that study, the most used inputs in literature are number of full time employees, number of rooms (as an indicator of scale), fixed asset and labor cost. In terms of output, total revenues and total sales are most used variables. REVPAR variable is used by Barros and Dieke (2008). Hwang and Chang (2003) imply that r*evpar* measured as the ratio of sales to the number of rooms is one of the most common output indicators in the hotel industry. They found that occupancy ratio is also used as an output by Huang et al. (2012). In addition to these variables, the agency rate, the number of guests stayed per year, satisfaction level, ADR as an indicator of financial statements are also considered to see the impact on efficiency. The data are collected via phone calls, hotels' web pages and Tripadvisor in 2020. 83% of these hotels (73 hotels) are small-sized hotels (< 20 rooms). In total, 12 variables are considered and the data summary about the variables are shown in Table 1. The data are categorized into two groups (classical efficiency and effectiveness) as mentioned in the literature review section.

Table 1. Descriptive Statistics of the Hotels

Variable Description	Input/ Output	Efficiency/ Effectiveness	Mean	Std Dev.	Min	Max
Number of Employees	Input		12	14.25	1	95
Number of Rooms			29.4	48.8	4	352
Occupancy (%)	Output	Efficiency	52.6%	11.0%	30,0%	75.0%
Total Room Rev. (TL/Year)			1698666	3197910	76650	20892600
Agency Rate (%)	Input		29.0%	27.6%	0.0%	80.0%
# of Guest Stayed per Year			11658	19793	1445	142998
Customer Satisfaction Index		Effectiveness	4.55	0.38	3,00	4.96
ADR	Output		554	402	170	2200
Tripadvisor Ranking Score			60.1	76.2	2	735

3.2. Methodology

The methodology is summarized below:

Formally, consider that n DMUs (Decision making unit) $\{1, ... , n\}$ and each DMU j for $j = 1, 2, ..., n$ uses m different inputs, x_{ij}, for $i = 1, 2, ..., m$ and produces s different outputs y_{rj} for $r = 1, 2, ..., s$. The optimal efficiency score (ϕ) for o-th DMU can be obtained by the following linear programming model (1):

$$Max\ \phi_o$$

$$s.t.$$

$$\sum_{j=1}^{n} \lambda_j\, x_{ij} \leq x_{io}$$

$$\sum_{j=1}^{n} \lambda_j\, y_{rj} \geq \phi_o y_{ro} \tag{1}$$

$$\lambda_j \geq 0$$

Here λj is a vector of weights assigned to each DMU. The assumptions made on this vector determine the shape of the efficient frontier (envelopment) and the production return to scale. Both are valid under the CRS (Constant return to scale) assumption. Coelli (2005) has modified the CRS linear programming by adding a convexity constraint to account for a VRS (Variable return to scale). The convexity constraint ensures that an inefficient firm is only "benchmarked" against firms of a similar size (Cinar and Kaya, 2021).

The above problem is run n times to measure the relative efficiency scores for each DMU in the sample. The obtained value of ϕ represents the j-th DMU's efficiency score. This unit is considered efficient if ϕ = 1; otherwise, it is assumed inefficient. The CRS efficiency score represents the overall efficiency, which measures inefficiencies due to the input and output configuration as well as the size of the operations. Avkiran (1999) points out that pure technical efficiency level which is purified from scale is presented by VRS efficiency score. Fare and Grosskopf (1985) imply that a scale efficiency of a DMU is presented as the ratio of CRS and VRS. It is possible that a firm is both technically and allocatively efficient but the scale of operation of the firm may not be optimal (Coelli, 2005). Hence, Cinar and Kaya (2021) admit that it shows if the DMUs are scale efficient or not.

In this study, CRS, VRS and scale efficiency of 88 DMUs are calculated via input- oriented DEA in two categories. Dobrovič et al. (2021) imply that the input-oriented DEA models analyze the efficiency of the enterprises based on the input variables. So, this study focused on input savings and struggles to reduce inputs. In addition, many authors used input-oriented DEA models in efficiency measurement in the tourism sector (Karakitsiou et al. 2018; Higuerey et al. 2020). The results are interpreted in terms of total revenue amount, company scale, and destination.

4. Findings of the Study

First, the CRS, VRS and scale efficiencies are obtained. Figure 1 presents the overall results in terms of efficiency and effectiveness. While the overall efficiency score is around 50% on average, the effectiveness of the hotel is around 60% COVID-19 term. As expected, efficiency and effectiveness of the hotels are very low. This means that hotels have more ability to change inputs such as agency-based operations and the number of guests stayed into outputs such as satisfaction level and ADR comparing the inputs such as the number of employees and the number of rooms. Although a huge deviation in the number of rooms among hotels (from 4 to 352), scale efficiencies are around 90%.
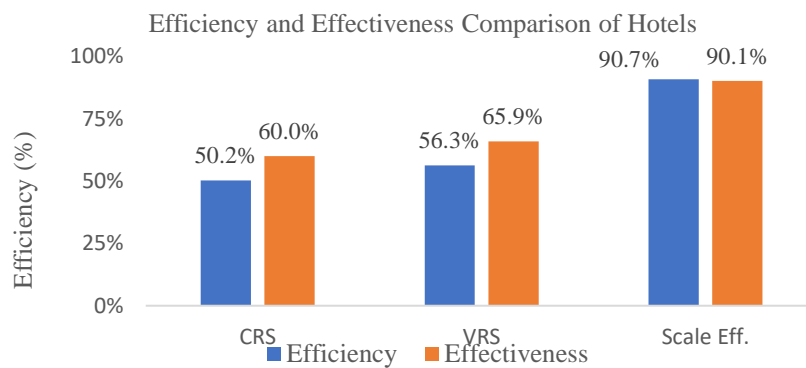

Figure 1. Classical Efficiency and Effectiveness Score of the Hotels (CRS, VRS and Scale Eff.)

By using the EMS (Efficiency measurement system) software, the importance or weighting of the inputs and outputs is calculated. In table 2, the most weighted input was the number of rooms while room revenue was slightly more important than occupancy ratio. This exposes that hotels are not using their rooms effectively. In other words, REVPAR is very low in COVID-19 terms as expected. In terms of effectiveness, the agency ratio is the most important input. It is almost 2 times and three times more important than the number of guests stayed and number of employees respectively. This may be commented that hotels should carefully determine the sales distribution portions. Regarding the output weights, CSI is the most important variable. This shows that customer satisfaction is still one of the key factors in facilities' performance. On the efficiency side, 4 hotels are efficient on CRS and VRS. Two of these hotels are small-sized, one is big-sized and the other is medium-sized hotel. In addition, no specific sub-location is observed for these efficient DMUs. On the effectiveness side, 11 hotels are efficient and all of them were small-sized hotels (on average, 10,5 rooms per hotel).

**Table 2. Weights of the Inputs and Outputs (on average)**

Inputs / Outputs	Inputs			Outputs			
Efficiency / Effectiveness	**Number of Emp.**		**Number of Room**		**Occupancy**		**Room Revenue**
Classical Efficiency Score	39.2%		60.8%		48.2%		51.8%
Effectiveness Score	**Agency Ratio**	**Num. of Guest Stayed**	**Num. of Emp.**	**CSI**	**CSI**	**ADR**	**Tripadvisor Rank. Score**
	55.9%	30.3%	13.9%	65.9%	65.9%	24.4%	9.7%

Regarding the optimal scale of economics, which indicates that a higher scale means higher efficiency, (considering the positive slope of the linear CRS line) Figure 2 shows that increases in the scale, which is measured and indicated here by the number of rooms, the efficiency level is reducing. Figure 2 also shows gaps between CRS and VRS scores which is the reason for scale inefficiencies. Here the gaps are higher on higher scales. This might be the reason of why the small sized hotels in Cappadocia have higher ADR than medium or big sized hotels.
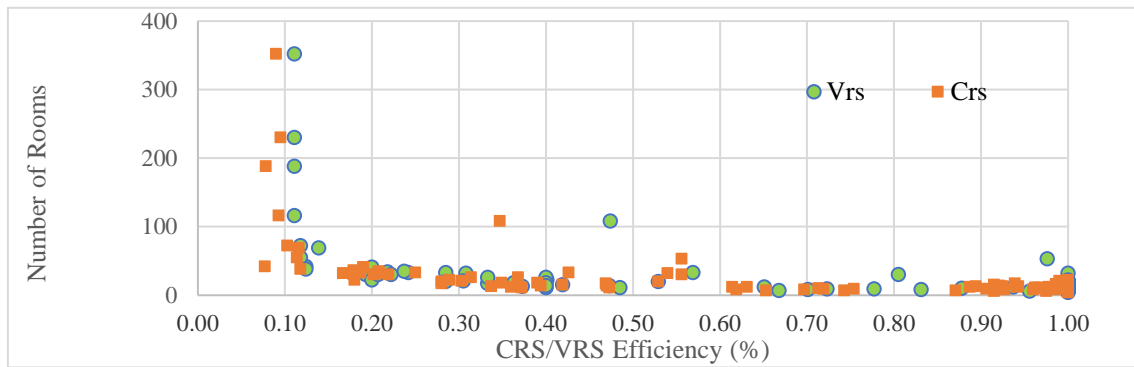
Figure 2. Relation of the Total Number of Rooms and Efficiency (CRS and VRS)

In terms of effectiveness, CRS/VRS efficiencies and total room revenue relations show that (Figure 3) the gap between CRS and VRS are lower in lower revenues. However, it is not possible to identify a specific inference about the relation between total revenue and CRS/VRS efficiency.
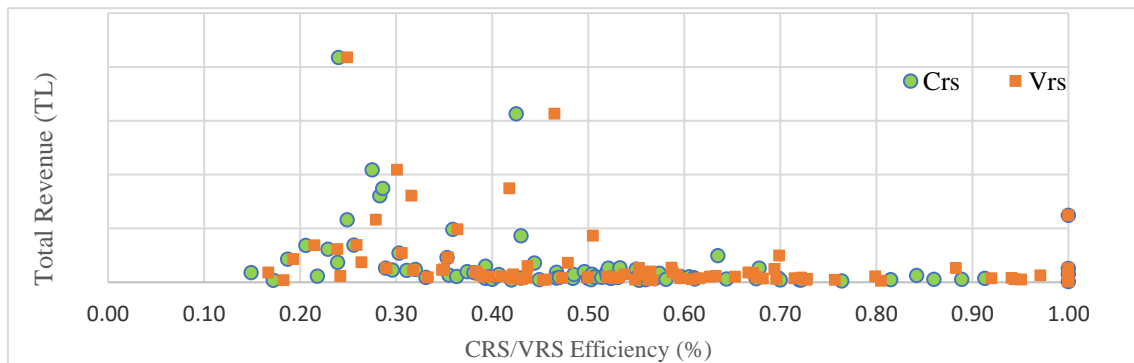
Figure 3. Relation of Total Room Revenue and Efficiency (CRS and VRS)

5. Conclusion

Performance measurement and evaluation are key factors for companies. In order to see where they are and what to do, they need to measure the key variables, put the targets and take the countermeasures to reach targets. Efficiency analysis of accommodation facilities are also very important. By these analyses, companies may find the right way on the way of higher profitability and sustainability.

The results of the study show that the efficiency of the analyzed hotels operating in Cappadocia has no inefficiencies based on their scales in the COVID-19 term. In other words, the efficiencies of the facilities are not dependent on their scale. However, the majority of the hotels' classical efficiency scores are very low (Half of the hotels have less than 0,5) during COVID-19. Oliveira et al. (2013) presents that a higher scale means higher efficiency. Parte-Esteban and Oliver (2013) also imply that hotel efficiency score is significantly influenced hotel size positively. This may vary because of different types of tourism and location. In addition, the facilities should focus on agency ratio and REVPAR to increase their efficiency after COVID-19. Barros and Dieke (2008) also prove that REVPAR is the indicator of efficiency in hospitality. In the literature, there is no study focusing on the effect of working with travel agencies ratio on the efficiency of hotels. On the other hand, the weight of the room revenue and occupancy variables are nearly the same. These two findings show that hotels should focus on revenue management as a part of REVPAR in line with the findings of Wassenaar and Stafford (1991) and Wijeysinghe (1993). Customer satisfaction index is observed as the most important factor in hotel efficiency. Assaf and Magnini (2012) also prove that customer satisfaction can have a significant influence in efficiency.

For future studies, both classical efficiency and effectiveness scores can be measured in one model and the results can be compared. The findings of this study can be used in further studies by comparing before and after COVID-19 performance or to see the effect of COVID-19 on the tourism sector in Cappadocia.

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