Untangling the Inefficiency of Hotel Industry: The Portuguese Teixeira Duarte Hotel Chain Analysis

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ABSTRACT

In this study the technical efficiency was analyzed for four hotels of the Teixeira Duarte Group - a renowned Portuguese hotel chain. An efficiency ranking was established for these four Portuguese hotels units using Stochastic Frontier Analysis. This methodology allowed discriminating between measurement error and systematic inefficiencies, enabling the identification of the main inefficiency causes. The results showed that distance to the airport and higher price of accommodations promote efficiency. Additionally, hotels with many standard rooms and sea views are likely to achieve higher levels of efficiency. These results should be carefully considered when aiming at improving hotel's efficiency, especially in Portuguese units with similar typology and location of the ones considered in this analysis.

Keywords: Hotel industry; Efficiency; Stochastic Frontier Analysis (SFA)

INTRODUCTION

The tourism industry has great strategic significance for the Portuguese economy due to its capability to generate wealth and create employment opportunities [1]. This is an economic sector where Portugal has clear competitive advantages due to the existing high-quality infrastructures, highly qualified human resources, natural diversity and pristine environments. Portugal has exceptional resources in terms of geographic location, temperate climate, security, historical and cultural heritage, high-quality beaches, biological variety (of species and environments), and a highly competitive quality coastal touristic development.

According to [2], the Portuguese touristic market is highly segmented, with hotel groups owning 63.8% of integrated housing units, while the remaining 36.2% belong to independent entrepreneurs.

The hotel sector is an essential component of the tourism industry, challenged by a competitive atmosphere managed by different pressure factors and driven by supply and demand ([3]-GDFHTS/2010, 2010).

Teixeira Duarte (TD), a renowned Portuguese hotel chain, was founded in 1921 as a family company and today is one of the largest Portuguese economic groups. Teixeira Duarte has a successful trajectory established through sustainable growth in the civil construction sector. Expanding the hotel industry in Portuguese-speaking countries consolidates its privileged financial situation. In fact, outside Portugal, there are TD Hotels in the main cities of Angola and Mozambique. In contrast, in Portugal, its central hotels are located in the southern region of the

Algarve region. However, several units can also be found on the coast of Alentejo (Southwest coast) and in the centre area of the country.

(see Teixeira Duarte in the World in the homepage of Teixeira Duarte, 2016).

Despite the competitiveness and excellence displayed by the Group, it is essential to guarantee that performance levels are improved or at least maintained. In fact, for management purposes, maintaining efficiency involves using scarcer inputs and producing additional outputs. It also means performing the assigned roles and preventing possible inaccuracies that can impede the progress of industry.

In this context, this study aims to analyze the efficiency of the four TD Group hotel units based in Portugal, namely: The Lagoas Park Hotel, the Sinerama Aparthotel, the Eva Hotel and the Oriental Hotel, to identify factors affecting efficiency and analyze what must be altered to promote better performances.

LITERATURE REVIEW

The efficiency analysis within the touristic hotel sector has been widely studied over the years. Among available literature on this subject, the Stochastic Frontier Analysis (SFA) methodology must be emphasized as a systematic approach. Authors such as [4]analyzed the estimation of the managerial efficiency of 48 hotels in the USA during 1994. In a subsequent paper, [5] applied both Data Envelopment Analysis (DEA) and SFA to estimate the efficiency of 31 corporate travel management departments. Also, [6] used a one-stage SFA approach to analyze the technical efficiency of 66 international hotels in Taiwan from 1992 to 2002 and incorporated the Malmquist productivity index in the results. Likewise, [7] examined the cost efficiency of 55 international hotels in Taiwan using an SFA model.

The use of the SFA approach can be found in many other studies and is often combined with different methodologies (e.g.[6];[8-10].

Different perspectives can drive the approaches to hotel industry efficiency analysis. For example, [11] analyzed other tourist markets and the relationship between the hotel industry and its macroeconomic contribution, e.g.[12-16]. Concerning the Portuguese hotel industry, the efficiency analysis has been addressed by different approaches, primarily by Barros (e.g.[17];[18];[19-20]; [21-22]and [23]).

TEIXEIRA DUARTE (TD) GROUP

The Teixeira Duarte Group currently employs more than 13,000 workers. It operates in 16 countries in seven different sectors: construction, concessions and services, Real Estate, hotel services, distribution, energy, and automobile.

Table 1 - The main indicators of Teixeira Duarte Group's business (the book values are expressed in million euros. Total Equity includes non-controlled interests)

Business Indicators (Teixeira Duarte Group)	Year				
	2010	2011	2012	2013	2014
Average number of workers	13036	11182	10853	12011	13261
Turnover	1380	1200	1383	1581	1680
Operating income	1445	1263	1440	1630	1716
Net debt	1067	927	990	1176	1293
Total equity	562	333	326	361	485
Total net assets	2721	2753	2767	2779	2954

In non-consolidated terms, and in order to provide an overall view of the total activity of the TD Group during 2014, we disclose that its operating income in the Construction sector reached the total value of 1,027,221€, reflecting an overall slight decrease of 0.7% regarding 2013 (source: TD Annual Reports (2012, 2013, 2014)).

Disregarding new contracts that may arise, the Group has already assured business levels in the construction sector for the foreign markets, which, despite the current adverse circumstances of the domestic market, achieve 904,808€ for 2015; 649€ for 2016; and 339,281€ for 2017 (source: TD Annual Reports).

After the first experience in 1974 in the Algarve, the Teixeira Duarte Group resumed its activity in the Hotel Services sector in the 1990s in Sines and currently operates 10 hotels, four of which are located in Portugal, three in Angola and three in Mozambique, covering a total of 2,908 beds and 1,465 rooms. TD Group's services are based on Tradition, Quality, Comfort and Kindness (see hotel services from TD homepage, 2016).

Table 2 – Location (city and country) of the hotels of the Teixeira Duarte (TD) Group

Hotels in Africa		Hotels in Portugal
Angola	Mozambique	
Hotel Alvalade, Luanda	Hotel Avenida, Maputo	Hotel Eva, Faro
Hotel Baía, Luanda	Hotel Tivoli Maputo, Maputo	Hotel Oriental, Portimão
Hotel Trópico, Luanda	Tivoli Hotel Beira, Beira	Lagoas Park Hotel, Oeiras
		Sinerana, Sines

Eva Hotel (4 star hotel) is acknowledged as a quality benchmark in Faro, both for leisure and business stays. The hotel was recently renovated to be architectonically integrated into Faro's historical and commercial downtown area. The Oriental Hotel, with a characteristic oriental style, is situated in one of the most popular sun and sea Portuguese touristic destinations. The Lagoas Park Hotel (4-star hotel) is located in one of the largest business centres of the country, providing all conditions needed for business meetings and for leisure, given its congress centre and its privileged location, fairly close to the beaches of Cascais, to Sintra, as well as to several other interesting touristic sites. Sinerama Hotel (3 star hotel) is located in Bay of Sines, in the vicinities of the Castle of Sines, and of the Vasco da Gama Museum. The hotel provides a family and quiet environment (www.tdhotels.com/pt).

METHODS AND MATERIALS

Dataset

For the stochastic frontier analysis, the data collected from Teixeira Duarte Group database comprises data from 01/01/2011 to 30/06/2015 (Table 1), and relates only to the Portuguese Hotels, to incorporate hotels facing similar seasonality patterns and having standard operational periods and homogenous quality of services. A total of 216 observations was gathered, corresponding to the 54 months (since January 2011 to June 2015) *per* hotel. The chosen *output* variable was the Operating profits. Table 3 defines the remaining *inputs* and exogenous variables.

Table 3 - *Output, Inputs* and Exogenous variables used in the stochastic frontier model.

TD Hotels SFA model	
Output	
	Operating profits (euros)
Inputs	
	Operating costs (euros)
	Employees (number)
Exogenous variables	
	Lodging price-range (euros)
	Standard rooms (number)
	Sea view (0=no; 1=yes)
	Airport distance (Kms)

DATA ANALYSIS

Using a **stochastic frontier** model, where i denote each Decision Maker Unit (DMU), the **individual operating profit** is obtained using the following production function ([24]):

$$\ln(y_i) = x_i\beta + (v_i - u_i) \quad (1),$$

where i = 1, 2,…, N; y_i measures the operating profits of the ith hotel; x_i is a 1 x K vector corresponding to the inputs (operating costs and employees), and β is a 1 x K vector of unknown scalar parameters to be estimated. For this model, the traditional error term ε is composed of two distinct terms (v_i-u_i) for each DMU where the error term v_i, similarly to traditional regression models, is assumed to be independent and identically distributed as $N(0, \sigma_v^2)$. Random variation in output caused by factors beyond DMUs control, such as measurement errors in dependent variables or explanatory variables eventually omitted, is captured by the v_i error term. The error term u_i is a non-negative random variable, accounting for the existence of technical inefficiency in production following a half-normal $u_i \sim |N(0,\sigma^2)|$ distribution.

According to [24], the inefficiency distribution parameter can also be specified as the **inefficiency model**:

$$u_i = \delta_0 + z_i\delta + \omega_i \quad (2),$$

where δ represents a vector of parameters to be estimated, z_i is a vector of DMU specific effects (lodging price range, standard room, existence of sea view and airport distance), that determine technical inefficiency, and ω_i is distributed following N(0, σ_ω^2). All observations either lie on or are beneath the stochastic production frontier, which is assured by $u_i \geq 0$ in Equation (2). The

variance terms are parameterized by replacing $\sigma_v{}^2$ and $\sigma_u{}^2$ with $\sigma^2 = \sigma_v^2 + \sigma_u^2$ and $\gamma = \frac{\sigma_u^2}{(\sigma_v^2 + \sigma_u^2)}$, according to [24]. The value of γ ranges between 0 and 1, where 1 indicates that all of the deviation from the frontier is entirely due to technical inefficiency [26]. The **technical efficiency (TE)** of each DMU is expressed as follows:

$$TE_i = \frac{E(Y_i | u_i, X_i)}{E(Y_i | u_i = 0, X_i)} = e^{-u_i} \qquad (3),$$

where E is the expectation operator; thus, the measure of technical efficiency is based on a conditional expectation given by Equation (3), considering that the value of $v_i - u_i$ evaluated at the maximum value of Y_i is conditional on $u_i = 0$[24].

The parameters of the stochastic frontier model (1) and the technical inefficiency model (2) were estimated using the FRONTIER version 4.1 software [25].

RESULTS

The SFA model results confirms that the inclusion of the inefficiency effects is highly significant (at the 1% significance level) in the analysis of Operating Profits (the estimate for the variance is close to one – γ = 0.999 in Table 5), indicating that 99.9% of the random variation in Operating Profit is due to inefficiency.

The mean efficiency of the four hotel units is presented in Table 4, and indicates that the Lagoas Park Hotel is the more efficient hotel unit, contrasting with the Oriental Hotel (the less efficient one).

Analyzing the yearly evolution, Eva and Lagoas Park recorded an increase in efficiency. Nevertheless, for the last one the efficiency level has decreased slightly during the analyzed 6 months of 2015.

Moreover, it must be emphasized that the Sinerama Hotel has been losing efficiency since 2011, whereas the Oriental Hotel did not indicate any pattern regarding the variation on the efficiency levels from 2011 to 2015.

Table 4 – Mean efficiency scores per hotel unit and per year (from 2011 to 2015) of the Portuguese hotels of Teixeira Duarte (TD) Group

Hotel	2011	2012	2013	2014	2015	mean efficiency *per* hotel
Eva	0.542	0.545	0.558	0.602	0.625	**0.569**
Lagoas	0.597	0.633	0.643	0.669	0.650	**0.637**
Oriental	0.414	0.411	0.465	0.502	0.485	**0.453**
Sinerama	0.662	0.632	0.524	0.570	0.418	**0.577**
TD hotels' mean efficiency *per* year	**0.556**	**0.559**	**0.547**	**0.586**	**0.545**	**0.560**

The SFA and the inefficiency models results are presented in Table 5.

Table 5 - The results of the SFA and of the inefficiency models from 2011 to 2015 for the Portuguese hotels of Teixeira Duarte (TD) Group

Variable	Coef.		Std. Error
Stochastic frontier model			
constant	2.790	**	0.116
ln(operating costs)	0.841	**	0.278
ln(employees)	-0.343	**	0.126
Inefficiency model			
constant	-0.125	**	0.014
Lodging price-range	-0.042	**	0.010
Standard rooms	-0.024	**	0.008
Sea view	-0.034	**	0.008
Airport distance	10.953	**	1.603
Variance parameter			
γ	0.999	**	0.000

** significant at 1%.

In both models all variables are statistically significant at the 1% significance level. The SFA results indicate that the hotels with higher "operating costs" and less "employees" are the ones that achieved higher operating profits.

Concerning the Inefficiency model, the "airport distance" is the most important factor that contributes to inefficiency (highlighted by the positive coefficient).

With negative coefficients, the "lodging price range" has a positive impact, meaning that more expensive prices contribute positively to efficiency.

Similarly, a hotel with many "standard rooms" and "sea view" also achieves higher levels of efficiency.

CONCLUSIONS AND FINAL REMARKS

The present research aimed to evaluate the efficiency of the Teixeira Duarte hotel chain on the Portuguese mainland. Using SFA allowed for assessing the efficiency level of each DMU (hotel unit). It simultaneously highlighted the factors that significantly affect the performance of the hotel units.

The results showed that an efficient hotel should be placed in the vicinity of an airport and be equipped with standard rooms and – preferentially – sea view. High lodging price range revealed not to be a problem to efficiency levels since high prices favour efficiency improvement.

It would be an asset to this analysis to add some factors regarding tourist experience valuation, such as satisfaction and length of stay ([13];[26]).

Results should be carefully considered in the management strategies adopted by the TD Hotel Group.

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