



## Research Note

## Benchmarking and tourism efficiency in France



Aurélie Corne

University of Perpignan, IAE, CRESEM-CAPEM, 52 Avenue Paul Alduy, F-66860 Perpignan Cedex, France

## H I G H L I G H T S

- Tourism performance in France is analyzed at the conurbation level.
- Three categories of hotels are considered: mid-price, economy and budget.
- A hierarchical category DEA model is used.
- Paris is the benchmark for the different categories.
- Budget hotels are more efficient than the other categories.

## A R T I C L E I N F O

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## A B S T R A C T

The purpose of this note is to improve our understanding of the French tourism paradox. A technical efficiency analysis of the French hospitality sector is carried out that includes different categories of hotels – mid-price, economy and budget. A hierarchical category Data Envelopment Analysis (DEA) model is employed to take account of the heterogeneity across the categories. Several research hypotheses are tested with regard to the location and category of the hotels. The results show that Paris is the benchmark and budget hotels are more efficient than other categories.

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## 1. Introduction

Since the 1990s, France has been the world's foremost international tourist destination in terms of tourist arrivals. According to the World Tourism Organization (WTO), in 2012, France saw 83 million international tourist arrivals, ahead the United States (67 million), China and Spain (57.7 million). France is a very attractive destination with a large number of tourist attractions in the form of museums, monuments, festivals, coastal areas and beauty spots. In spite of its leading position, France generates less tourism expenditure than some other countries, and is only ranked third in this regard. This is the so-called "French tourism paradox" (Barros, Botti, Peypoch, Robinot, et al., 2011). Nevertheless tourism contributes over \$54 billion to the French economy, less than in the United States (126 billion) and Spain (56 billion). Tourism is an important global market, which generated \$1040 billion in 2012 in the world, representing 9% of global GDP (WTO).

Hospitality is one of the key sectors in tourism. In order to attract customers, hotels must be competitive, so the measurement of hospitality efficiency is an important aspect of tourism research. The hospitality sector is suffering from the economic crisis and tourist behavior and expenditure are both impacted. For almost two years, occupancy has been at a low level, not as the result of a sharp drop in activity, rather due to stagnation. The economy and budget hospitality sectors have stagnated since 2012 and the mid-price sector has only grown very slowly. Average prices are under pressure due to the weakness of demand and intense competition (Deloitte, 2014), and only luxury hotels seem to be faring better than the average with a real increase in occupancy.

The purpose of this note is to measure the technical efficiency of the hospitality sector in order to identify best practices and improve our understanding of the French tourism paradox. This contribution focuses on economy, budget and mid-price hotels which are the most affected by the crisis and competition. In France in 2013, mid-price, economy and budget hotels accounted for 384,406 rooms out a total of 508,135 and 10,531 hotels out of a total of 12,224. Efficiency analysis is an important technique for

E-mail address: [aurelie.corne@univ-perp.fr](mailto:aurelie.corne@univ-perp.fr).

identifying best practices in the different categories of the French hospitality sector. For this purpose, Data Envelopment Analysis (DEA) is a useful and effective technique which has been applied in several studies of the hospitality sector. The present research is innovative in that it proposes a benchmarking and efficiency measurement of the French hospitality sector by using a hierarchical category DEA model (Tone, 1997). A sample of 16 French conurbations that are representative of France's main cities in the hospitality sector has been selected; more precisely, among the 16 Decision Making Units (DMUs) in the sample, 15 are in France's top 20 most populated cities.

The remainder of the paper is structured as follows. Section 2 provides a brief literature review on efficiency in the hospitality sector. Section 3 describes the methodological framework, and Section 4 presents the data and the empirical results. Finally, the conclusion and discussion are given in Section 5.

## 2. Literature review

The tourism industry includes different sub-sectors, for example hospitality, transportation, tour operators/travel agencies, etc. Since the 1990s, many scholars have investigated the measurement of tourism efficiency and a number of studies have used production frontier models (Barros, Botti, Peypoch, Robinot, et al., 2011; Botti, Briec, & Cliquet, 2009). There are two main approaches for analyzing efficiency: Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA). This paper focuses on non-parametric approaches based on DEA. For the hospitality sector, some of the main contributions that have used DEA in the last decade are Assaf and Agbola (2011), Assaf and Barros (2011), Assaf, Barros, and Josiassen (2010), Barros (2005), Barros and Mascarenhas (2005), Barros, Botti, Peypoch, and Solonandrasana (2011) and Hathroubi, Peypoch, and Robinot (2014). As there is quite an extensive literature on hospitality efficiency using DEA, we refer the reader to the recent paper by Assaf, Cvelbar, and Pahor (2012) for a complete overview of this topic.

Innovative tools derived from DEA have also been applied in order to measure efficiency in the tourism sector (Peypoch, 2007; Peypoch & Solonandrasana, 2008). However, to our knowledge, no studies of the tourism and/or hospitality sector have used the hierarchical category DEA model, with the exception of a recent paper by Mansourirad (2013) which applied a fuzzy DEA method. The hierarchical category DEA model is useful for analyzing a sample where the units are divided into different categories and makes it possible to consider this heterogeneity. Previous studies on hospitality efficiency failed to consider the heterogeneity of the hotels on the basis of their star rating (Barros & Dieke, 2008; Hathroubi et al., 2014). In this paper, the hierarchical category DEA model developed by Tone (1997) is used to evaluate the relative efficiency of a sample of French hotels segmented into three categories.

## 3. Methodology

The methodology applied in this paper is based on DEA. DEA is a non-parametric approach based on linear programming which has two key benefits: i) it is not necessary to assume a functional form for the production technology; ii) it is possible to deal with multi-output production technologies. The two most popular DEA models are the CCR and BCC models and were developed respectively by Charnes, Cooper, and Rhodes (1978) and Banker, Charnes, and Cooper (1984).

The production technology of the Decision Making Unit (DMU) transforms the inputs  $x = (x_1, \dots, x_N) \in \mathbb{R}_+^N$  into the outputs  $y = (y_1, \dots, y_M) \in \mathbb{R}_+^M$ . In other words, the production technology  $T$

can be rewritten as  $T = \{(x, y) \in \mathbb{R}_+^{N+M} : x \text{ can produce } y\}$  and is defined by:

$$T = \left\{ (x, y) : x \geq \sum_{i=1}^k \theta_i x^i, y \leq \sum_{i=1}^k \theta_i y^i, \theta_i \geq 0, i = 1, \dots, k \right\}. \quad (1)$$

The linear program for computing the efficiency score of each DMU is given by:

$$\begin{aligned} \text{Max } & \delta \\ \text{s.t. } & x \geq \sum_{i=1}^k \theta_i x^i \\ & \delta y \leq \sum_{i=1}^k \theta_i y^i \\ & \sum_{i=1}^k \theta_i = 1 \\ & \theta_i \geq 0, \quad i = 1, \dots, k. \end{aligned} \quad (2)$$

This program is run  $k$  times (one time for each DMU).

More recently, Tone (1997) has introduced a hierarchical DEA model with different categories. The DMUs from the weakest category are evaluated only with DMUs from the same category. After, the next category is analyzed by including the DMUs from the previous category etc. Finally, the highest category is analyzed against all the DMUs from all the categories in the sample. In our context, the categories are differentiated according to the price range of the hotel: mid-price, economy and budget.

In the second stage, the Kruskal–Wallis (K–W) test, which is a generalization of the Mann–Whitney test with more than two groups, is used in order to test several assumptions. To reveal statistically the existence of a categorical and geographical effect on hotel efficiency, the K–W test, a distribution-free rank-order statistic test, is then applied (Goncalves, 2013; Kruskal & Wallis, 1952; Sueyoshi & Aoki, 2001). The K–W test analyzes the relationship between a quantitative and a qualitative characteristic with  $l$  classes or categories.

The K–W test statistic, denoted by  $H$ , is given by:

$$H = \frac{12}{n(n+1)} \sum_{i=1}^l \frac{R_i^2}{n_i} - 3(n+1), \quad (3)$$

where  $l$  is the number of categories,  $n$  is the total number of units ( $n = 48$ ),  $n_i$  is the number of units in category  $i$  and  $R_i$  is the sum of the rank for the category  $i$ .

The K–W test statistic is then compared with a  $\chi^2$  tabled value with  $(l - 1)$  degrees of freedom at the 95% level of confidence.

We have tested the null hypothesis  $H_0$  versus the alternative  $H_1$ . Two tests were performed for each tested hypothesis.

Research hypothesis #1 concerns a categorical effect on hotel efficiency. In other words, we consider the potential link between hotel category ( $l = 3$ : mid-price, economy and budget) and hotel efficiency. Previous studies have stressed that efficiency increases the higher the category of the hotel (Assaf & Agbola, 2011; Oliveira, Pedro, & Marques, 2013). We shall then test the null hypothesis  $H_0$ : There is no difference in the mean efficiency score across the categories against the alternative hypothesis  $H_1$  that there is a difference in the mean efficiency score across the categories.

Research hypothesis #2 concerns the link between efficiency and location (Barros, Botti, Peypoch, Robinot, et al., 2011). More precisely, the location of the French area on the basis of city size ( $l = 3$ : small, medium, large) is analyzed. These three groups are derived from the ranking of most populated cities in terms of population according to INSEE (Institut National de la Statistique et des Etudes Economiques): small (size < 200,000), medium

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