



## Technical efficiency and environmental management: The Tunisian case



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### ARTICLE INFO

#### Article history:

Received 20 June 2013

Received in revised form

5 February 2014

Accepted 13 March 2014

Available online 28 April 2014

#### Keywords:

Environmental management  
Data envelopment analysis (DEA)  
Environmental efficiency  
Hospitality management  
Green practices

### ABSTRACT

Environmentally responsible attributes may enhance hotel efficiency. This analysis considers such effects in a Tunisian context, which confronts decreasing tourism competitiveness. To determine which hotels achieve the best performance, the analysis begins with an estimation of hotels' technical efficiency scores using data envelopment analysis (DEA). An extant model then serves a bootstrap function for the DEA scores with truncated regression, incorporating environmental variables. The investigations clarify changes in hotel tourism productivity; for example, hotels should seek to respect natural surroundings, use clean or renewable energies, and pursue ISO 14001 certification. These findings have clear managerial implications.

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### 1. Introduction

In the competitive tourism industry, attractiveness often depends on the efficiency<sup>1</sup> of the tourist destinations. Stakeholders associated with any destination must work to maintain and develop the tourism attraction (Leiper, 1990). For example, hotels come under great pressure to upgrade their efficiency relative to competitors, which implies the need for benchmarking analyses that can identify best practices (Wöber & Fesenmaier, 2004). This sector also faces new constraints, including environmental degradation, which represents a central concern for tourism (Oskamp, 2000). Consumer surveys highlight a growing segment of consumers who reward firms that address environmental concerns and reject those that pay no attention to environmental demands (Bohlen, Bodo, & Adamantios, 1993; Chang & Wong, 2006; Menon & Menon, 1997). In this context, hotel managers must recognize the need to adopt strategies that integrate the principles of sustainable

development in their service offers (Bohdanowicz, 2006; Kirk, 1998; Rodriguez & Cruz, 2007).

Such considerations are particularly crucial in developing countries such as Tunisia. In 2010, tourism contributed 7% to Tunisia's gross domestic product (GDP), covered 56% of its commercial deficit, and was directly responsible for approximately 10% of the nation's employment, as well as indirectly responsible for 17% of total employment (Office National du Tourisme Tunisien [ONTT], 2010). Whereas in 2000, Tunisia attracted about 5 million foreign tourists, that level reached 7 million in 2010 (i.e., one tourist for every 1.6 Tunisians).<sup>2</sup> These data suggest positive developments, yet the Tunisian government also notes several problems related to tourism and the hospitality sector. Several local area destinations, such as Egypt, Turkey, Cyprus, and Croatia, compete for the same market segment and similarly offer sea, sun, and cultural tourism. All these destinations also confront serious environmental issues, especially in terms of water resources and energy consumption (Perspectives Economique d'Afrique [PEA], 2011). As a consequence, hotel managers seek to differentiate their offers by adopting a sustainable development position. However, after

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<sup>1</sup> In the following, we use efficiency or technical efficiency as the link between the resources used and the results obtained.

<sup>2</sup> Tourism income increased substantially, to roughly 3540 million dinars (~2572 million USD) in 2010, or 1.65 times the amount earned in 2000 (ONTT, 2010).

implementing relevant actions in their organization, hotel managers also need to benchmark if and how these strategies might improve their efficiency.

By consequence, this paper aims to show how environmentally responsible attributes may enhance hotel efficiency and how the use of technical efficiency can help the understanding of operating hotels in Tunisia along sustainable management lines. This article therefore seeks to help hotel managers undertake technical efficiency evaluations of their own and a representative sample of hotels. We propose a two-stage procedure. In the first stage, using data envelopment analysis (DEA), we estimate efficiency scores to rank Tunisian hotels (Charnes, Cooper, & Rhodes, 1978). In the second stage, we apply the procedure suggested by Simar and Wilson (2007) to bootstrap the DEA scores through a truncated regression. Accordingly, we extend prior research by considering environmental variables (Assaf, Barros, & Josiassen, 2010; Barros et al., 2011).

The remainder of this article is organized as follows: Section 2 contains a survey of prior literature, with a detailed examination of environmental considerations from consumer and business perspectives. In Section 3 we describe the Tunisian tourism hospitality sector, along with its unique challenges. After we detail the methodology we use in Section 4, we describe the data, variables, and results in Section 5. Finally, we explain our key findings regarding sources of efficiency and the impact of environmental variables in Section 6.

## 2. The hospitality business and the environment: a literature survey

Since the development of a global political agreement, through the work of the Brundtland Commission (1987), interest in environmental considerations has expanded and applied to a wide range of activity sectors. The tourism and hospitality industry actors increasingly recognize the need to adopt environmentally positive actions (Bohdanowicz, 2006). Regarding literature, two kinds of studies can be analyzed. The first one concerns the analysis of tourist's behavior regarding these kinds of practices. The second one is relative to how and why is it mandatory for actors to adopt environmental management practices.

From a consumer point of view, several studies have focus on the tourist global attitudes toward environmental actions in hotels. The FEMATOUR report (*Feasibility and Market Study for a European Eco-Label for Tourist Accommodation*, 2000), based on a field survey of Dutch, German, and Italian consumers, offers an empirical vision of tourists' attitudes toward environmental issues in the hospitality industry. It reveals that for most German tourists, the natural environment strongly influences their choice of tourist destination and especially their choice of accommodation. Of all the people interviewed, 63% (73% of Germans) stated that they take information related to environmental protection into account when choosing accommodations. Similarly, a study in New Zealand by Fairweather, Maslin, and Simmons (2005) indicates that 61% of English respondents prefer hotel accommodations with environmental labels and would pay more for them.

However, numerous studies which have focus on tourist specific attitude toward environmental practices are not converging to unique results. This result confirms the main problematic regarding the lack of specificity of the attitudinal concept utilized (Ajzen & Fishbein, 2000). For example, Robinot and Giannelloni (2010) evaluate how each attribute of hotel service contributes to customers' overall satisfaction. Their study underlying the necessity to maintain a high level of performance for "green" attributes. For these authors it would be preferable not to inform customers about environmental initiatives in order to limit the risk of being

unfavorably evaluated on these attributes. On the opposite, Han, Hsu, and Sheu (2010) by using a TPB model show that formation of favorable/unfavorable attitude toward staying at a green hotel is influenced by how one's important others consider the performance of eco-friendly behavior. For these authors generating strong positive outcome beliefs by communicating with their customers through various media would contribute to enhancing attitude.

Finally, several studies such as Andereck (2009), Dolnicar and Leisch (2008), Dolnicar and Matus (2008), Kang, Stein, Heo, and Leed (2012) concluded that tourists' perceptions of environmentally actions are in many studies visitors with a stronger nature orientation. However, even if only these tourists have positive views of environmentally responsible practices by tourism businesses than tourists not nature-oriented there is still a room to develop, inform and engage consumers and managers in this sustainable development.

From a managerial perspective, these demands require a means to evaluate the positive externalities of taking a global certification approach to the environmental management of tourist destinations (Buckley, 2002; Kozak & Nield, 2004; Medina, 2005). Some recent studies focus on the advantages that producers gain from introducing environmental initiatives (Bohdanowicz, Piotr, & Novotna, 2011; Graci & Dodds, 2008; López-Gamero, Molina-Azorín, & Claver-Cortes, 2011; Shah, 2011). Gil, Jiménez, and Lorente (2001) specify factors that determine environmental management practices, such as the age of hotels' facilities; the size of the hotel, which can create economies of scale; chain affiliations, which provide access to environmental information procedures; and the influence strategies of stakeholders. Other authors also investigate the role of firm owners and their impacts on environmental considerations (Erdogan & Baris, 2007; King, Funk, & Wilkins, 2011). Rankings of environmental management activities suggest two main groups: The first includes managers who develop environmental management practices because they believe that it is the right thing to do (Menon & Menon, 1997; Varadarajan, 1992) and who choose innovation or technological solutions. Their entrepreneurial philosophy represents a convergence of social performance with environmental and economic objectives, so personal values are critical to these generally small firms' decision making, as is an understanding of the owner-managers (Kilic & Okumus, 2005). The second group considers legal or public constraints on managers, whose goal is to meet pollution specifications through waste reduction and revised waste disposal processes (Gil et al., 2001).

## 3. Contextual setting: the importance of the tourism sector in Tunisia

Tunisia is an important tourist destination with both natural and human-made offerings. Its Mediterranean location and rich cultural heritage (e.g., eight world heritage sites) are key assets. Since its independence, tourism has been a primary focus of Tunisia's development strategy; in the past two decades, the country has expanded its tourist capacity and reformed its tourist infrastructure (ONTT, 2010). Yet little effort has centered on investigating its role in the process of economic development. Other than a few articles noting tourism demand (e.g., Hathroubi, 2011; Ouerfelli, 2008; Poirier, 1995; Sahli & Nowak, 2007), no academic research broaches this topic.

In its hospitality sector, Tunisia maintains more than 834 tourist establishments, and 75% of the hotels rank as 3–5-star offerings. Hotels account for 95% of Tunisia's lodging capacity. In 2011, there were more than 239,000 beds available, representing 20% growth since 2000, and there were more than 35 million overnight stays. Despite this increased lodging capacity, occupancy rates actually

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