Chapter 70
An Approach Combining DEA and ANN for Hotel Performance Evaluation

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ABSTRACT

For a hotel to succeed in the long run, it becomes vital to achieve higher profits along with increased performance. The performance evaluation of a hotel can signify its sustainable competitiveness within the hospitality industry. This article performs a two-stage study that combines data envelopment analysis (DEA) and artificial neural network (ANN) to evaluate hotel performance. The first stage to evaluate the efficiency for hotels is by using the DEA technique. The input variables considered are the number of rooms and the ratings corresponding to six aspects of a hotel (service, room, value, location, sleep quality, and cleanliness). Also, revenue per available room (RevPAR) and customer satisfaction (CS) are the output variables. The distinguishing factor of this article is that it involves the use of EWOM for performance evaluation. In the second stage, the performance of the hotels is judged by using the ANN technique. The ANN results showed that the performance of the hotels is quite good. Finally, discussions based on the results and scope for future studies are provided.

DOI: 10.4018/978-1-6684-2408-7.ch070

INTRODUCTION

Due to the advancements in technology and changing market environment, the hotel industry is experiencing intense competition amongst its stakeholders. This insists for a breadth of resources along with various amenities being provided by hotels in order to handle the dynamicity within the industry along with sophisticated customer base. For a hotel to succeed in long run, it becomes vital for them to achieve higher profits along with increased performance (Kim, Cho, & Brymer, 2013). Hotel's performance is the aggregated efforts of all its departments, working in foreground or background. These efforts can be evaluated to get a good measure of performance, by ensuring whether the inputs are efficiently being transformed into outputs (De Pelsmacker, Van Tilburg, & Holthof, 2018). Therefore, the performance evaluation of a hotel can signify its sustainable competitiveness within the hospitality industry. Previous studies have evaluated hotel performance with reference to various domains such as strategy (Salem, 2014; Tavitiyaman, Qiu Zhang, & Qu, 2012; Tavitiyaman, Qu, & Zhang, 2011), quality management (Amin, Aldakhil, Wu, Rezaei, & Cobanoglu, 2017; Pereira-Moliner, Claver-Cortés, Molina-Azorín, & Tarí, 2012; Wang, Chen, & Chen, 2012), environment (Assaf, Josiassen, Woo, Agbola, & Tsionas, 2017; Marco-Lajara, Claver-Cortés, & Úbeda-García, 2014; Marco-Lajara, Claver-Cortés, Úbeda-García, & Zaragoza-Sáez, 2016), marketing and information technology (IT) (Hua, Morosan, & DeFranco, 2015; Shuai & Wu, 2011; Sirirak, Islam, & Ba Khang, 2011), human resource management (Al-Refaie, 2015; Chand, 2010; Kim et al., 2013), and many more. However, much of the studies were empirical in nature, using regression analysis or partial least squares (PLS) as the analysis technique. The frequently considered independent (input) variables under prior studies include the number of rooms, number of full-time employees, operating expenses (employee salaries, food and beverage costs, room costs, utilities, maintenance fees, and other relevant operating costs), service quality, human resource and information technology related strategies, competitive strategies and organization structure, and many more. On the other hand, the frequently used dependent (output) variables include revenue, occupancy rate, return on assets and investments, profitability, and turnover. The input variables in this study are number of rooms and the ratings corresponding to six aspects of a hotel (service, room, value, location, sleep quality, and cleanliness). The output variables are RevPAR (revenue per available room) and customer satisfaction (CS).

With the proliferation of digitalization into every domain, the significance of the feedbacks provided by the customers in the form of textual comments or ratings, termed as electronic word-of-mouth (EWOM), is being witnessed by practitioners (Sharma & Aggarwal, 2019). This is especially important for hotels, which come under experienced commodity, and so they cannot be judged by a customer prior to his stay (Radojevic, Stanisic, Stanic, & Davidson, 2018). Moreover, it is observed that customers pay heed to EWOM before making a booking decision (marketmyhotel, 2019). This behavior portrayed by the customers has encouraged many online travel websites such as Yelp, TripAdvisor, Expedia, and booking.com, which allow guests to share their stay experience (Tandon, Sharma, & Aggarwal, 2019; Zhang & Cole, 2016). In light of the above discussion, it becomes seamless to neglect the role of EWOM for evaluating the performance of hotels. Few empirical studies performed previously have introduced the importance of EWOM for hotel's performance evaluation (Blal & Sturman, 2014; Kim & Park, 2017; Phillips, Barnes, Zigan, & Schegg, 2017; Xie, So, & Wang, 2017; Xie, Zhang, & Zhang, 2014; Xie, Zhang, Zhang, Singh, & Lee, 2016). Apart from the financial variables, the additional input variables considered were valence (rating), volume (number of reviews), and variation in ratings (variance). Also, customer satisfaction is taken to be the additional output variable. Two key research questions are attempted to solve in this paper