Hotel chain affiliation as an environmental performance strategy for luxury hotels

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ABSTRACT

Stakeholders are increasingly aware of the potential of environmental performance to benefit their health; however, there is a paucity of sustainability studies addressing the relationship between corporate social responsibility (CSR) performance and the brand equity of hotel chains. Unlike traditional economics that treat undesired outputs such as carbon emissions as costless, this research presents an accurate, concise and clear empirical examination of hotel chain affiliation strategy through the Malmquist-Luenberger index to measure the brand competitiveness of the strategy while considering carbon emissions reduction using objective official panel data from Taiwan. The findings reveal that a group of hotel chains has a significantly higher average energy efficiency and branding value than those of a group of independent operators when holistic carbon emissions reduction is considered. Thus, this study encourages stakeholders to promote green hotel policies to independent hotel operators to achieve a higher brand value with lower carbon emissions and to adopt greater use of business intelligence to assist the decision-making of hotel operators in conformity with the United Nations (UN) Sustainable Development Goals (SDGs).

1. Introduction

With adoption of the COP 21 Paris Agreement and the UN SDGs, addressing global climate change, reducing carbon emissions and fostering global sustainability have emerged as high-profile international concerns, and a significant number of studies on sustainability have been published. Nielsen indicates that technology and economic development fail to match our expectations and accelerate the deterioration of the environment worldwide while only benefiting a small proportion of the world’s population (Nielsen, 2006). As climate change can have a great impact on human health, it will require hoteliers to redesign entire environmental management systems with the specific goal of a sustainable quality of life rather than unlimited material growth (Costanza, 1980; Costanza et al., 2014; Watts et al., 2015). Knowledge transfer and isomorphism in franchises may not only improve the quality of service for customers but also satisfy the customers’ requirement for environmentally-conscious approach to business operations (Brookes and Altinay, 2017). However, most attention has been devoted to international comparisons of productivity growth or manufacturing sectors (Ozturk, 2010). As guests are more willing to pay higher prices for hotels’ green practices, measuring the sustainability of luxury and mid-priced hotels can fit stakeholders’ needs (Kang et al., 2012; Tasci et al., 2017).

Although business intelligence can help solve real-life problems, there has not been a systematic application of big data analytic techniques in hospitality. Xiang et al. indicated that big data analysis could yield new insights, contributing to the existing hospitality literature (Xiang et al., 2015). Bilgihan’s study revealed that investments in IT could lead to the superior technical competitiveness of hotel companies, especially for small and medium enterprises (SMEs), and such competitiveness could subsequently result in better efficiency and economic value for customers as well as better customer service (Bilgihan et al., 2011). However, SMEs also have other needs, as they are compelled to innovate to differentiate themselves from their competitors while also being efficient, as they do not have the economies of scale possessed by larger organizations. On the other hand, although consumers in Southeast Asia enjoy booking hotels using cross-border e-commerce, they have at the same time gradually become aware of corporate social responsibility (CSR). Big data analysis can assist with the need to analyze a rapidly growing volume of consumer-generated data on the Internet to help individuals who need innovative and cost-effective ways to choose hotels with good CSR for booking. As with most developing countries or territories, most hotels (including ITH) in Taiwan are SMEs. This study aims to be of interest to both SMEs and individuals.

Although Taiwan has initiated energy-saving policies and adopted a
Greenhouse Gas Act providing regulations for CO₂ emissions reduction, it has tended to pursue steady economic growth and overlook the sustainability of the most significant natural ecosystems of the island (The Bureau of Energy, 2009; Yeh et al., 2010; Wang, 1995). As one study’s findings reveal, sustainable tourism development is generally product-centered, or inward, due to the tourism industry’s complex, sectoral, fragmented and benefit-oriented nature (Sharpley, 2000). One example of the currently narrow vision of growth is observed in Taiwan’s policy on agricultural tourism focused more on growth than sustainable eco-systems (Kuo and Chiu, 2006). Such a myopic approach generally involves a tradeoff between environmental sustainability and productivity growth, as the former generally sustains sufficient natural ecosystems one generation after another (Howarth and Norgaard, 1992). In 2011, although the announcement of Taiwan’s Environmental Protection Agency (EPA) indicated that the daily carbon footprint was triple the UN-recommended standard, the tourism industry had a positive impact on both short- and long-term economic growth (CAN, 2011; Fayissa et al., 2011).

Stakeholders are increasingly aware of the potential of environmental performance to benefit their health. Unlike traditional economics that treated undesired outputs such as carbon emissions as costless, this study applies the Malmquist-Luenberger index to measure the brand competitiveness of hotel chain affiliation while considering carbon emission reductions. This study is based on the original strength of franchise chains and brand consistency, which can make hotel chain affiliation beneficial either through cost reduction due to the economy of scale or through technological improvement in management skills, training or the adoption of new technology (Youn et al., 2015; Brookes and Altinay, 2017; Sun and Lee, 2018). As a franchise chain is characterized by brand consistency, customers are willing to accept a higher room price. A sustainable business cannot experience unlimited financial growth without concern for environmental performance or CSR (Costanza, 1980; Costanza et al., 2014). As there is an increasing widespread awareness of environmental and ecological conservation, enterprises are facing pressure to adopt CSR from regulations and customers. However, the cost of such an initiative may generally be high in the beginning.

Through additive size effects on the environmental CSR result, hotel chain affiliation can be a good branding strategy for marketing and financial performance (Youn et al., 2015). Given possible higher initial costs of green certification and joining an international hotel chain, alternative strategies aiming towards effective higher environmental performance and financial performance for CSR branding may be interesting to both hoteliers and researchers. A previous study has shown that higher brand values (or customer ratings) resulted in customers being more willing to accept higher prices (Oh, 2000; Öğüt and Onur Taş, 2012). If the CSR performance of hotel chain affiliation can result in a higher brand value, it can be an alternative strategy to CSR. This observation motivates a study of how hotel chains can achieve greater environmental sustainability for brand value.

As there may be greater gaps in the short term between the planned green practices and actually implementing them, this paper suggests an alternative approach to improving environmental performance while considering economic branding value with a lower cost than that of green certification. The results can answer the question, “Can environmental protection facilitate competitive success in the hotel industry?”

2. Literature review

Can environmental performance become a successful competitive strategy in the hotel industry? To address globalization and increasing awareness of environmental protection, a company must adopt a business strategy that engages with the evolving environment and market by enhancing its technological capabilities and acquiring the resources needed (González-Rodríguez et al., 2018).

Taiwan’s international tourist hotels (ITHs) are classified into three groups based on their patterns of operations: independent operators (Ci), domestic hotel chains (Cd) and international hotel chains (Ch). The international hotel chains can be further subdivided into franchises, management contracts and membership chains (Hwang and Chang, 2003). There is a paucity of research on the comparative productivity of independent operators and hotel chains (franchises, contracted management, and hotel consortia). Hwang and Chang indicated that international hotel chain ITHs are more efficient (Hwang and Chang, 2003; González-Rodríguez et al., 2018). Hu, Chiu, Shieh and Huang demonstrated that there was a positive effect on efficiency from joining an international hotel chain (Hu et al., 2009). Barros applied data envelopment analysis (DEA) to analyze efficiency and productivity growth in the hotel industry (Barros et al., 2010). Pérez et al. calculated a sustainability index with multiple criteria following the decision theory methodology, according to a firm’s ability to represent the participants’ opinions in the decision-making process (Pérez et al., 2017). However, there are few sustainability studies considering ITHs that belong to hotel chains.

Hotel facilities rate among the top five subsectors by energy consumption in the service and commercial buildings sector (U.S. Energy Information Administration, 1998). As the hotel sector is an important subsector of the hospitality industry, it accounts for a large amount of overall energy consumption and environmental impact of the largest export industry worldwide (Gössling, 2002). It is further believed that there is ample space for significant growth in resource conservation and energy efficiency, as a significant portion of used energy is wasted (Bohdanowicz and Martinez, 2007). A hotel chain affiliation can be beneficial by broadening marketing through uniform service quality and brand awareness and reducing operational and cost risks (Whitla et al., 2007; Xiao et al., 2008). Choi et al. indicated that brand equity from intangible assets (such as brand value) was a competitive advantage in the service industry (Oneill and Mattila, 2010; Choi et al., 2017). This finding was consistent with a higher brand value being reflected in the price and quality of the respective service (Oh, 2000). González-Rodríguez et al. suggested that a firm’s assets and strategies could influence performance (González-Rodríguez et al., 2018). Can environmental performance become a feasible strategy for competitive success in the hotel industry?

Before the subject of the environment became popular, several countries encouraged green certification for buildings. For instance, the Green Building Council of the USA issues the LEED certification for buildings in environmental and energy design. The ISO14001 certification is offered to companies that initiate and follow an environmental management system (EMS) specified by that international standard. As eco-labels and EMSs of formal certification systems have been effective ways to guarantee practical improvements in the firms’ environmental (and sustainable) performance with the broadest scope, Ayuso indicated that these tools were the most effective metrics (Ayuso, 2007). Although these tools were effective and voluntarily implemented instruments, they had higher costs and complexity than did others studied at the practical level (Ayuso, 2007). Thus, in addition, certain hotel chains such as Hyatt Earth have teams that promote green policies to satisfy customers’ environmental demands and enhance a favorable brand awareness.

In addition, environmental stewardship had a lesser priority than other operational concerns of many non-chain hotels, according to a survey of hoteliers. Chain-affiliated hotel managers in eco-label practices were generally more willing to engage in environmental management than were independent operators (Bohdanowicz, 2005). This finding implies that hotel chains with higher levels of CSR benefit from higher firm performance, resulting from advertising spending on branding.

In the short term, there may be greater gaps between the planned green practices and their actual implementation. We hope the gaps can be reduced gradually. Considerations of both brand value and...
sustainability motivate this research to propose the following sustainability hypothesis:

H0: Hotel chains experience higher productivity and growth of brand value when accounting for carbon emissions reduction.

If there is a branding effect, it is expected that there is a premium in revenue per room (i.e., TRevPAR), which is the total hotel revenue divided by the number of available rooms.

Although the Malmquist index is often suitable for measuring production efficiency during a period, it implies that undesired outputs such as CO₂ increase proportionally as desired outputs increase with inputs of decision-making units (DMUs), which is inconsistent with this study’s focus on sustainability. Barro’s study analyzed the relative production efficiency of selected Portuguese hotels with a directional distance function and the Luenberger productivity index. The study had a key benefit of considering both the reduction of inputs and outputs at the same time. The model ranks the hotels in the sample by the generated hotel efficiency scores. The researchers reached the conclusion that both inputs and outputs are important in hotel efficiency (Barros et al., 2010). Similarly, Chung, Färe and Grosskopf proposed a revised Malmquist-Luenberger (ML) index to include the undesired output reductions when desired outputs increase in the output-oriented mode (Chung et al., 1997). A similar ML index has been applied by Zhou, Ang and Han to include the undesired output (i.e., CO₂) reduction and energy as a required input (Zhou et al., 2010). In this study, two kinds of international luxury hotels belonging to the ITH class, the sets of hotel chains (Cₜ) and independent operators (Cᵢ), were measured by the ML index to determine the optimal decrease in undesired outputs while desired productivity increased concomitantly.

3. Methodology

Data envelopment analysis (DEA) was first proposed by Charnes et al. (1978) and improved by Banker et al. (1984). It is an excellent experience-based model using quantitative indicators to evaluate a decision-making unit (DMU) with an efficient frontier. DEA is a popular efficiency evaluation tool used in many fields that have important and widespread applications (Banker et al. 1984).

Similarly, this study embraced the methodology of Chung et al. while adopting a different Malmquist reference type referred to as the global Malmquist index. The ML total productivity index may indicate which part, cost efficiency or technical change is primarily related to the branding effect in environmental performance. The following conditions are needed to model the production of desired outputs with accompanying undesired outputs. If we denote desired outputs by y ∈ X, undesired outputs by b ∈ R⁺, and inputs by x ∈ Rₙ, we can denote the output sets by

\[ F(x) = \{ (y, b): x \text{ can produce } (y, b) \} \quad (1.1) \]

The reduction of undesired outputs is costly and can be modeled as

\[ (y, b) \ni F(x) \text{ and } 0 \leq \theta \leq 1 \implies (\theta y, \theta b) \ni F(x) \quad (1.2) \]

The production of desired outputs jointly with the undesired outputs can be modeled as follows:

if \((y, b) \ni F(x)\) and \(b = 0\), then \(y = 0\). \quad (1.3)

Based on conditions 1.1 ~ 1.3, the definition by Chung et al. (1997) of the ML index of productivity between periods \(t\) and \(t + 1\) is as follows:

\[
ML^{t+1} = \frac{1}{2} \left( \left( 1 + D_{D0}^{t+1}(x', y', b'; y', -b') \right) \left( 1 + D_{B0}^{t+1}(x', y', b'; y', b') \right) \right)^{-1} \]

\[
= MLEFFCH^{t+1} \ast MLTECH^{t+1} + 1
\]

where \(D_0\) is a directional distance function, MLEFFCH is the efficiency change, MLTECH is the technological change, and

\[
D_0(x, y, b; y', b') = \sup \{ \beta: (y, b) + \beta (y', b') \ni F(x) \}, \quad g \text{ is a vector of "directions" in which outputs are scaled.}
\]

For efficiency of calculation, the ML index can be indirectly induced from the Malmquist index. The relationship between the ML and Malmquist indexes can be obtained by linking the directional distance function and Shephard’s output distance function. The relationship between the directional distance function and Shephard’s output distance function is as follows:

\[
D_0(x, y, b; y', b') = \sup \{ \beta: (y, b) + \beta (y', b') \leq 1 \}
\]

\[
= (1/D_0(x, y, b)) - 1
\]

where \(D_0(x, y, b)\) is the Shephard’s output distance function used in the Malmquist index.

[Fig. 1] (Chung et al., 1997)

4. Data and results

The study applied the methodology of the ML index by Chung et al. to three periods of panel data for 45 luxury hotels obtained from the official data published for 2003, 2005 and 2007 (AOIRTH, 2003, 2005, 2007; Chung et al., 1997). All luxury hotels are either 4- or 5-star hotels. The total count of ITHs is more than 45 for 2005 and 2007; only 45 ITHs have complete panel data for the three periods 2003, 2005 and 2007. According to our study, more than half of them are five-star hotels. In addition, the official hardcopy publications include the respective affiliated hotel chains and their contracted years. We collected data items and empirical data according to reviewed references. The input variables are the number of rooms, catering area, the number of employees, and annual expenses as considered by previous studies; the output variables are the revenue per room (i.e., TRevPAR), profit per
Table 1
Decomposition of average ML indexes for groups, and differences among them.

<table>
<thead>
<tr>
<th></th>
<th>TFP</th>
<th>EFFCH</th>
<th>TECH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch</td>
<td>1.0619</td>
<td>0.9821</td>
<td>1.0042</td>
</tr>
<tr>
<td>Ci</td>
<td>1.0002</td>
<td>1.0109</td>
<td>0.9903</td>
</tr>
</tbody>
</table>

Note: C_h: hotel chains; C_i: independent operators. TFP: total productivity; EFFCH: efficiency change; TECH: technological change.

Table 2
Hypothesis testing using the basic t-test.

<table>
<thead>
<tr>
<th>DMU Groups</th>
<th>Hypothesis</th>
<th>P-value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>C_h vs. C_i</td>
<td>MLEFFCH_C_h &gt; MLEFFCH_C_i</td>
<td>0.0053</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MLTECH_C_h &gt; MLTECH_C_i</td>
<td>0.0000</td>
<td></td>
</tr>
</tbody>
</table>

Note: C_h: hotel chains; C_i: independent operators; TFP: total productivity; EFFCH: efficiency change; TECH: technological change.

room (i.e., GOPPAR) and the undesired outputs (Hwang and Chang, 2003; Hu et al., 2009; Chen, 2013). The selected output variables, revenue per room and profit per room measure whether there is a premium in brand competitiveness entailed in price per room. The electricity, gas and water expenses were transformed to energy-efficiency and environmental performance through smart buildings and is also a future research area. Furthermore, a hotel chain can increase its cost efficiency and branding effect by mergers and acquisitions. The beneficiaries of mergers and acquisitions also deserve to be studied in the future (Pizam, 2016, 2017).

6. Limitations
Due to the limitations of time and budget, we used secondary official data in the empirical study. Due to the limitation of the official paper-based data ending at 2011, we could not obtain quantitative data on waste processing and recycling from the secondary data. Neither can we examine the gas, electricity and water expenses over longer periods of data after 2012. We hope that in the future, potential researchers can use questionnaires to explore waste processing and recycling of garbage.

7. Conclusions
As there is an increasing societal awareness of environmental and ecological conservation, this study hypothesizes that hotel chains can obtain a higher environmental performance of brand value if CO2 reductions are accounted for by applying the ML index as BI to measure the productivity of ITHs.

The ML index applied a nonparametric directional distance function to examine ITHs. The results support the notion that the average value of hotel chains (C_h) is higher with branding value than that of independent operators (C_i). Although hotel chain affiliation is a good branding strategy for independent operators, a more complete approach may be to promote green hotels and energy taxes by public policies among the panoply of sustainable practices throughout the industry. The study demonstrated that the hotel chains group enjoys a higher productivity and branding value if there is concomitant accounting for carbon emissions reduction.

Since the Taiwanese announcement of its EPA’s Green Hotel Certificate in November 2008, only 10 ITHs have been certified thus far. The factors such as the IoT or mergers and acquisitions that impede or affect green certification are also important topics for future research, as they may have a synergistic effect on environmental performance.

Notes
1. TRevPAR is calculated by dividing the total revenue of a hotel by the total number of available rooms. GOPPAR is the total revenue of a hotel less expenses incurred earning that revenue and divided by the number of available rooms (Ladosestayo et al., 2017).
2. In this study, DMUs are used to represent processes or business operations. Each DMU has a group of inputs and outputs to represent performance measures (Zhu, 2008).
3. The green seal certification for members of C_h was not mandatory (see Appendixes A and B). The water and gas expenses can first be transformed into their respective consumption amounts (i.e., 12.08 NT$ is the cost of 1 unit of water, while 13.66 NT$ is that of 1 unit of gas). The respective consumption amounts can be then transformed into equivalent carbon emissions (i.e., 1 NT$ of electricity expenses is equivalent to 0.138 kg, 1 unit of water equals 0.195 kg, and 1 unit of gas equals 1.5 kg) using data released by EPA in 2007.
Acknowledgements

None.

Appendix A. Hotel chain and consortia systems, members in Taiwan and the requirements of membership and green hotel policies

<table>
<thead>
<tr>
<th>Hotel Chain or Consortium</th>
<th>Headquarters</th>
<th>Number of DMUs</th>
<th>Green Certification</th>
<th>D/V*1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shangri-La Hotel</td>
<td>Hong Kong</td>
<td>1</td>
<td>ISO14001</td>
<td>D</td>
</tr>
<tr>
<td>EIH*3</td>
<td>N/A</td>
<td>1</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>SRS Europe/Germany</td>
<td></td>
<td>3</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Nikko</td>
<td>Japan</td>
<td>1</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Prince</td>
<td>Japan</td>
<td>2</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Appendix B. Green certifications and the respective conditions of obtaining certification

<table>
<thead>
<tr>
<th>Green Certification</th>
<th>Requirements</th>
</tr>
</thead>
</table>
| ISO14001            | Developing and implementing EMS in four stages:  
EMS Stage 1: Assign environmental responsibility and perform the environmental status review.  
EMS Stage 2: Develop the environmental policy and establish environmental objectives and targets.  
EMS Stage 3: Implement the environmental management program.  
This involves the following:  
• Reducing water use;  
• Reducing energy use;  
• Reducing waste output;  
• Purchasing environmentally preferable products;  
• Lowering emissions;  
• Improving indoor air quality;  
• Reusing waste water;  
• Reducing noise;  
• Internal communication, delegation and training;  
• Communicating environmental performance to guests; and  
• Monitoring and documenting environmental performance.  
EMS Stage 4: Complete the EMS audit report on environmental performance. |
| EPA’s Green Hotel*    | a. No violation of regulations in a year  
b. Enterprise environmental policy and environmental management system  
c. Energy conservation  
d. Water conservation  
e. Green procurement  
f. Reduction of disposable products and waste  
g. Hazardous substance management  
h. Garbage sorting and recycling  
There are 38 criteria, including the following:  
a) Limiting the use of elevators and escalators outside of peak hours;  
b) Resetting the room’s automatic thermostat to its normal preset value once the guest has left;  
c) Separate filtering and recycling treatment of wastewater from spas and swimming pools, and restaurants/bathrooms;  
d) Not giving guests disposable bathroom utensils unless they ask for them;  
e) Not using cleaning products containing halogenated solvents; and  
f) Installing drainage for waste cooking oil and recycling food waste. |

References


Further reading


