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Does firm efficiency matter in the hospitality industry?

An empirical examination of foreign demand for accommodation and hotel efficiency in Thailand

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Abstract

Purpose – A leading characteristic of international tourists at every tourist destination is their role as foreign–income disseminator, and a large number of papers have been dedicated to exploring their behavior. In contrast, this paper aims to shed light on the supply-side of tourism through the study of a hotels' ability to internationalize their businesses.

Design/methodology/approach – Based on each hotel's input data, its efficiency was estimated by a data envelopment analysis approach. Then, the hotel's intensity of demand from foreign guests was regressed against hotel efficiency along with firm' control variables.

Findings – Results from Heckman correction model indicate that ordinary least squares regression would be subject to selection bias, and the results from the correction model strongly indicate a positive linkage between the hotel's efficiency level and its foreign to total guest ratio, especially in the sub-sample of hotels located in non-tourist destinations. In addition, the results also reveal that the availability of certain services and facilities at hotels are positively related to the number of foreign guests, namely, a spa service and swimming pools.

Originality/value – Therefore, the main implications from this study are twofold. First, if a hotel's target market is international travelers, a swimming pool and the availability of a spa service are essential features for hotels in Thailand. Second, policies to improve productivity in hotels should be simultaneously implemented along with tourist-destination-promotion campaigns to optimize the economic impact of international tourist arrivals.

Keywords Hotel efficiency, Firm heterogeneity, Internationalization, Thailand

Paper type Research paper

Introduction

The number of international tourist arrivals in Thailand reached 35 million in the year 2017, and the Thailand Tourism Authority has estimated that the gross contribution to the

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country's economy could be as large as 1,824 billion Baht per annum. According to a World Travel and Tourism Council (WTTC) 2017 report, the tourism and travel industry in Thailand was ranked 15th in the world in terms of the importance of the travel and tourism industry to the nation's GDP and the WTCC has predicted that the total economic contribution from the industry will reach 25 per cent of the Thai GDP by the year 2027. For some major touristic provinces in Thailand, e.g. Phuket, the contribution from the hotel and restaurant sector individually is as high as 44 per cent of the province's gross provincial product in year 2017. Further, investigation of the composition of the expenditure of international tourists reveals that accommodation costs account for approximately one third of their daily expenditure (Faculty of Hospitality and Tourism, 2017). This substantial source of lodging income, therefore, consistently attracts the interest of both local and foreign entrepreneurs to compete in the Thai hotel industry.

Although Thailand is a major tourist destination, survey data from Thailand's National Statistical Organization (NSO) has recently revealed that there are still some hotels which have a zero foreign to total guest ratio. Specifically, 13 per cent of the hotels surveyed nationwide had had no international guest in their establishments throughout the year surveyed (2012). In addition, 24 per cent had a foreign guest to total guest ratio of less than 10 per cent. Altogether, establishments with foreign revenue earning capability have similar characteristics, e.g. size and number of years of operation. These preliminary findings from the NSO inspired the present researchers to further explore the performance of hotels with relation to international guests through a closer examination of micro-level data.

From a review of related literature, many empirical studies of company performance have adopted firm heterogeneity productivity models and they are commonly used in relation to manufacturing industries. The empirical application of heterogeneous productivity models to firms in the service sector, especially, firms in hotel industry is, however, relatively limited. Nevertheless, the results of studies relating to the hotel sector suggest a linkage between a hotel's productivity and the proportion of foreign to total guests. Moreover, the crucial role of hotel industry in the Thai economy encouraged the present researchers to investigate whether this suggested linkage is empirically supported in a sample of hotels operating in Thailand. Due to the availability of firm level data in Thai hotel industry and our reviews of literatures in hospitality field, technical efficiency (TE) was used as a focal point throughout our analysis. Hence, the main objective of the study reported in this paper was to investigate whether there is empirical support for linkage between the efficiency of hotels and their foreign customers' demands.

Since Thailand Tourism Authority recently implement different marketing and infrastructure development policies between tourist and non-tourist destinations, we also aim to compare the role of hotel's efficiency toward hotel's ability to internationalize their business between tourist and non-tourist destinations.

Literature review

Based on the firm heterogeneity model, Melitz (2002), Yeaple (2005) and Greenaway and Kneller (2007) have suggested that there is a positive relationship between a firm's productivity and the degree to which it is involved in international business, i.e. firm internationalization. In addition, Melitz (2003) have found that high-efficiency firms derive better gain in market share and profit from international trade more than low-efficiency firms and the exposure of industry to international trade could eliminate least efficiency firms in the industry. Then, the aggregate industry's efficiency could elevate. Melitz and Ottaviano (2008) further illustrated that although least efficient firm exist industry however, the average mark-up of survive firm generally decline. Another theoretical development in

firm heterogeneity productivity model was illustrated by Melitz and Redding (2015), authors purposed theoretical model which allow the empirical analysis of welfare gain from trade by using firm-level data.

Firms with foreign direct investment and multinational corporations (MNCs) tend to display higher productivity than exporting firms or firms which trade solely in their domestic market. Krugman *et al.* (2005) stated that MNCs can use their established marketing and distribution networks to accelerate their internationalization. Hence, their incremental cost in penetrating foreign markets is lower than the incremental cost incurred by domestic market firms in exporting to foreign markets. For instance, firms with existing multinational status can use their already established transport infrastructure, distribution network and existing marketing know-how to penetrate potential foreign markets.

A large number of papers have been devoted to testing the firm heterogeneous productivity model in various manufacturing sectors. For instance; Ramstetter (2006) used a probit model to verify whether foreign-owned firms in Thailand have a greater foreign to domestic sales ratio than their local counterparts. Meanwhile, the findings from Phucharoen's (2014) study supported the linkage between firms' export performance and productivity in various industries, and in a later study, Polperm (2016) further confirmed the connection between these two aspects of firm performance.

Barros (2005a, 2005b) used data envelopment analysis (DEA) to investigate the determinants of efficiency in a Portuguese hotel group finding a statistical linkage between the location of an establishment and its efficiency. Rigby and Brown (2015) investigated how the benefits of agglomeration accrue in the manufacturing sector, and Yang *et al.* (2012) considered how agglomeration affected location choice among hotels in Beijing. Neves and Lourenco (2009) in a review of the use of DEA to assess hotels' financial efficiency considered how management strategies such as cost control and debt reduction can be used to improve financial performance in international hotel chains.

Within the hospitality sector, Knutson (1988) and Cadotte and Turgeon (1988) investigated the major determinants of hotel guest satisfaction and they found that hotel facilities, comfortable and well-maintained rooms, convenient locations, safe environment and prompt services were the most important factors that contribute to traveller's overall satisfaction levels and the likelihood of their returning to the same hotel. Sim *et al.* (2006) used inferential statistical methods to investigate the determinants of guest retention and satisfaction in hotels in San Francisco. They concluded that the ambience of hotels and employee's hospitality were the key determinants of hotels' ability to generate loyalty among their guests. Meanwhile, Ramanathan (2012) found that perceived value for money and physical aspects of hotels in the UK are factors which influence overall guest loyalty. Meanwhile, Zhang and Enemark (2015) noted that the level of human skills, and the efficiency and productivity of the business was able to directly influence overall hotel performance. Hsu (2015) in a study of Chinese domestic and international hotels in China found that a major factor in the satisfaction of foreign travelers was their ability to trust the staff's problem-solving skills. Laowicharath (2017) found that facilities and tangible-sensorial experience could positively enhance foreign traveller's purchase intention to stay. Pantelic (2017) clearly illustrated that pool and game are very important factors for family travelers in hotel selection. Finally, McQuerrey (2018) recently showed that effective staff management is the crucial determinant for foreign traveller's satisfaction. To facilitate the reader's understanding in the development of testing model, related literatures of determinants of foreign demand for hotel were illustrated in the methodology part.

There has, however, been a lack of empirical studies which have focused on the efficiency of hotels and their internationalization capabilities. Therefore, this study aimed to

investigate the relationship between hotel efficiency and their capability to internationalize their business. This paper principally focuses on the linkage between hotels' foreign to total guest ratio and their TE level.

Methods

Under the basic Cobb–Douglas production function, a firm's labor productivity can be calculated by dividing a firm's output by the number of staff it employs and this ratio has been widely used as a proxy for a firm's labor productivity. In this paper, present researchers were interested in hotel TE. TE in hotel industry was generally defined as the difference between establishment's observed production and production frontier (Peypoch and Solonandrasana, 2006) In general, the TE of a hotel includes inputs from all aspects of its operation and one output (revenue). In addition, the available data for our analysis is cross-sectional data, the time varying technological progress could be disregarded. Then, each of the calculated establishment's efficiency would reflect the disparity between observed production level and frontier (Wiboonchutikula *et al.*, 2016). The difference between firms' economic performance within any given time period can be attributed to differences in their TE, and this is called efficiency throughout this paper. The study used DEA to assess the efficiency of each establishment. DEA was initially developed by Charnes *et al.* (1978), and the following section briefly discusses this method of estimating efficiency.

DEA is a non-parametric technique used to measure the efficiency of a firm, which aims to diagnose and outline the best practice for decision-making units based on their input and output vectors[1]. A number of previous studies have used DEA as a means of measuring the efficiency of firms in the hospitality industry, including Brown and Ragsdale (2002), Hwang and Chang (2003), Barros and Dieke (2008), Neves and Lourenco (2009) and Yu and Lee (2009). Poldrugovac *et al.* (2016) have found positive relationship between hotel size and efficiency index, calculated from DEA. Given micro-level data relating to a hotel's output and their factors of production, i.e. their inputs such as raw material, labor and capital, a best practice *frontier* is calculated, which is the extreme point of performance possible based on best practice in the industry, through a linear programing method. Then, each hotel's efficiency can be determined in relation to the best practice *frontier*. Thus, the efficiency of each establishment can be placed on a scale of 0 to 1, with 1 being efficiency equivalent to the frontier and figures close to 1 implying that establishments are operating at high efficiency, while, lower indices imply that hotels are less efficient. DEA can be generally implemented with either constant return to scale (CRS) or variable return to scale (VRS) assumption but VRS approach does not require the level of inputs/output to change with identical proportion[2].

A descriptive summary of relevant aspects of hotel operation and DEA-calculated efficiency is shown in Table II. It should be noted that DEA-calculated efficiency could be under or overestimated if the dataset contains outlier observations which could be potentially caused either by misfiled figures or establishment's economies of scale or diseconomies of scale. Hence, a data cleaning process is a prerequisite for DEA study, as explained at the end of this section.

In Thailand, Untong (2013) applied a DEA approach to estimating hotel efficiency. Based on the revenue, cost of goods sold, operating expenses of each hotel and variable returns to scale assumption, its efficiency was calculated based on the following equations:

$$\begin{aligned} &\mathrm{Min}_{\theta,\lambda}\ \theta \\ &\text{Subject to } -y_i + \mathrm{Y}\lambda \quad \geq \quad 0 \end{aligned} \tag{1}$$

$$\theta x_i - \mathrm{X}\lambda \quad \geq \quad 0 \tag{2}$$

$$\mathrm{N1}'\lambda \quad \geq \quad 1 \tag{3}$$

$$\lambda \quad \geq \quad 0 \tag{4}$$

where X is the input matrix (composed of three inputs, which are capital, wage and raw materials used); Y is the output matrix; y_i is the vector of outputs of the i-th hotel; θ is a scalar (*EFFICIENCY*); λ is vector of constant and $\mathrm{N1}'\lambda$ is set to be less than or equal to 1 to ensure the comparability of the calculated efficiency are in Non–Increasing Returns Scale (NIRS) interval. It should be noted that the above DEA estimation model was constructed based on VRS since we evaluated hotel efficiency nationwide. Hence we cannot presume that all sampled establishments were operating at their optimal scale as fundamentally assumed by CRS. Capital reflects hotel's accumulated investment in hotel's non-current asset. To reflect hotel's true labor cost, the used figures for each hotel wage include all type of fringe benefits of hotel's employees, including bonus, social security and other monetary benefits. Hotels Operating expenses, which include operation expense from all hotel operating departments, were used in DEA estimation. The lack of disaggregate data in operating expense and revenue could not allow the present paper to implement non-radial efficiency estimation as suggested by Wu *et al.* (2011). As the main purpose of this study is to investigate whether the linkage between obtained efficiency and hotel's internationalization performance, radial TE by DEA estimated model could sufficiently serve our inherited purpose. Our choices of used inputs for DEA estimation were similar like hotel's input for DEA estimation in hospitality by Barros (2005a, 2005b), Assaf and Magnini (2011) and Chen (2011).

The main advantages of DEA over Stochastic Frontier Analysis (SFA) are neither specification of production nor distribution function of error term are required as the operation of hotel business is relatively different from manufacturing operation, imposing an assumption with basic production functions to hotel establishment would be relatively myopia. However, DEA has its main pitfall arisen from the its failure to capture non-homogenous environments (Kneip *et al.*, 2011) of each establishment. We accommodate these differences and establishment's characteristic by our second stage analysis, explained as follow.

In the second stage of analysis, the efficiency scalar obtained would be coded as the key independent variable ($EFFICIENCY_i$) in the main regression, which can be briefly expressed by the following function:

$$INTER_i = f(EFFICIENCY_i, Z_i) \tag{5}$$

where $INTER_i$ is the international guest to total guest ratio of hotel i, the vector of control variables, Z_i consists of variables which represent the hotels' characteristics, which could potentially affect the internationalization performance of the hotel. To fully describe equation (5), the regression model could be outlined as:

$$INTER_i = \alpha_0 + \alpha_1 ROOM_i + \alpha_2 STAFFINTENSITY_i + \alpha_3 \mathrm{AGE}_i + \alpha_4 ROOMINVESTMENT_i + \alpha_5 CONTROLINTENSITY_i + \alpha_6 DLOCATION_i + \alpha_7 DMNC_i + \alpha_8 EFFICIENCY_i + \alpha_k DFACILITY_{ik} + \varepsilon_i \quad (6)$$

Testing regression model [equation (6)] aims to verify the effects of a hotel's TE, its location and its characteristics on the hotel's degree of internationalization (i.e. the ratio of international to total guests). The description and means of measurement of each variable relating to the hotel facilities ($DFACILITY_{ik}$) are described in Table I. $ROOM_i$ is the number of rooms which hotel i possesses; $STAFFINTENSITY_i$ represents the number of paid staffs per room; $CONTROLINTENSITY_i$ is the ratio of managers to staff; $ROOMINVESTMENT_i$ is the log of the value of the hotel's fixed assets per room for 2012, the year in which the data on which the study relied was collected, and AGE_i is the age in years of the hotel. All the variables are in log form. The purpose of including these firm characteristics in the study was to control for the differences in staff employed and accommodation quality among the hotels, which could influence the hotel's internationalization performance (Wu *et al.*, 2011). Barros (2005b) and Assaf and Agbola (2011) had found that large hotels relatively have better performance than small hotels in Portugal and Australia, respectively hence $ROOM_i$ variable was added to control for size effect. For location effect, Tundis Corsino and Zaninotto (2012), Oukil and Al-Zidi (2014) and Oukil *et al.* (2016) have remarked important role capital city and tourist destination on TE of hotels. Meanwhile, Shieh and Huang (2010) have found that hotels incorporated in the territory with international airport generally have higher efficiency than hotels operated in the region without international airport. In addition, results from Ramsey reset test were reported in the Appendix to verify whether our suggested testing model [equation (6)] was suffered from misspecification.

To prevent the problem of selection bias, which could arise in the testing of regression equation (6) using ordinary least squares (OLS) analysis through either the non-availability of data or unobserved non-intentions to target foreign guests, the Heckman (1979) selection approach was used[3]. To avoid selection bias, census data on all hotels with positive foreign guest ratio can be used, yet, researcher must still strictly project the finding to only foreign guests serving hotels. Neither census hotel data was available, nor the application of results was beneficial to different types of hotels were reasonable to present researchers. Hence, the two-step Heckman correction estimating technique requires both response and selection equations, and regression equation (6) would be treated as a response equation while the following equation was used as the selection equation in the two-step process:

$$DINTER_i = \beta_0 + \beta_1 ROOM_i + \beta_2 \mathrm{AGE}_i + \beta_3 ROOMINVESTMENT_i + \beta_4 DLOCATION_i + \beta_5 EFFICIENCY_i + \beta_k DFACILITY_{ik} + \theta_i \quad (7)$$

where $DINTER_i$ is a proxy ratio which indicates 0 if the hotel has no foreign guest revenue. With the exception of $DFACILITY_{ik}$, to which other basic facilities and services (e.g. F&B and Internet) were added to the equivalent variable in equation (6), $DFACILITY_{ik}$ all the remaining variables remain the same as in the response equation. The following table summarizes the variables used in both regression equations.

The dataset was derived from unpublished firm-level data from the National Statistical Office of Thailand (NSO 2013) survey of hotels and guesthouses[4]. It should be noted that there were 7,566 observations in the data but some included fields relating to revenue and

Variable	Explanation	Measurement	Expected sign
$INTER_i$	Foreign guest intensity of hotel i	Foreign to total guest ratio of hotel i	Dependent variable (Response Equation)
$DINTER_i$	Dummy variable for foreign guest intensity of hotel i	0 if hotel has no foreign guests, 1 otherwise	Dependent variable (Selection Equation)
$ROOM_i$	Size of hotel	Number of rooms which hotel i possesses	+
$STAFFINTENSITY_i$	Number of staff per room	Number of paid staff per room	+ (Response Equation)
AGE_i	Age of hotel	The age (years) of the hotel	−/+
$ROOMINVESTMENT_i$	Quality of accommodation	The log of the value of hotel's fixed assets in the year 2012 per room (Surveyed year)	+
$CONTROLINTENSITY_i$	Manager to staff ratio	The ratio of mangers to staff	+(Response Equation)
$DLOCATION_i$	Location of hotel	1 if hotel located in tourist destination, 0 otherwise	+
$DMNC_i$	Foreign-investment status	1 if foreign equity participation $\geq 10\%$, 0 otherwise	+(Response Equation)
$EFFICIENCY_i$	Efficiency of hotel i	Efficiency calculated from DEA based on firm level data	+
$DFACILITY_{ik}$	Vector of hotel facilities (Dummy variables)	DFB (1 if hotel has restaurant facilities, 0: otherwise) DNET (1 if hotel has Internet facilities, 0: otherwise) DTRAN (1 if hotel has transportation service, 0: otherwise) DSPA (1 if hotel has spa facilities, 0: otherwise) DPOOL (1 if hotel has pool facilities, 0: otherwise) DMICE (1 if hotel has meeting facilities, 0: otherwise)	(Selection equation only) + (Selection equation only) +

Table I.
Explanation of key variables used in equations (6) and (7)

labor employment filled with a zero in the survey. As the DEA assessment model required these fields to be completed, those observations had to be excluded. It should be noted this cut off also eliminate the possibility that establishments which inherently experience extreme economies of scale or extreme diseconomies of scale. In addition, to avoid a disproportionate number of semi-hotel operation in the assessment, observations with less than ten employees were excluded since the scope of the study is hotel[5]. Once the sample had been cleaned and duplicated records and other anomalies eliminated, the number of hotel establishments in the dataset analyzed was 1,356 located nationwide. It should be noted that, at a provincial level, the dataset used yielded similar statistical indices to the original dataset, except that the variance of the original dataset was larger than the cleaned dataset analyzed in this study.

Results and discussion

The TE of each hotel was calculated through the DEA approach[6], and a summary is presented in Table II. It was found that hotels with no foreign guests generally had the

lowest TE relative to the other groups defined, based on the ratio of foreign to total guests. In addition, it was found that the average efficiency of establishments was highest in the two groups of hotels with the highest foreign guest ratios. Thus, there was a clear correspondence between a hotel's TE and its foreign to total guest patronization rate.

Table III shows the results of an ANOVA testing for differences in the hotels' foreign to total guest ratio across groups of hotels, classified based on their calculated efficiency.

The results from ANOVA table also clearly indicate that the differences in the foreign to total guest ratios between the moderately high to highly efficient hotels (DEA from 0.51 to 0.75, and DEA from 0.76 to 1.00, respectively) and the moderately low to low efficiency hotels (DEA from 0 to 0.25 and DEA from 0.26 to 0.50, respectively) were statistically significant ($p < 0.01$). Further, there were no significant differences found between the foreign to total guest ratios of the low and moderately low efficiency hotels nor between the moderately high and highly efficient hotels. In addition, the measured efficiencies of all the hotels were plotted by Kernel Density distribution, which is also a non-parametric method. As can be seen from Figure 1, the density of the hotels with low efficiency is most intense at the extreme left of the figure in the low foreign guest intensity area, and the high efficiency hotel density is least intense in the low internationalization zone.

On the extreme right of the figure, which reflects high foreign-guest intensity, it can be observed that the plotted line of the highly efficient hotel groups is at the top, followed, respectively, by the moderately-high efficiency group, the moderately-low efficiency group and the low efficiency group. This pattern generally conforms with a heterogeneous productivity model and appears to confirm that a hotel's internationalization performance and its TE are related. However from this basic analysis, it was not clear whether this linkage was statistically significant and would prove to be maintained if other firm and location characteristics which might affect the number of foreign guests accommodated in the hotel, such as the size of establishment, the operating years, and the guest facilities provided, were controlled for because DEA estimation does not initially integrate the operating environments and firm characteristics in their process. Accordingly, regression

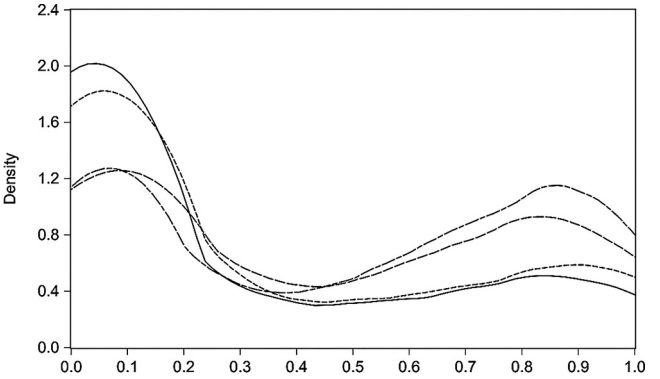
Table II. Summary of hotels' foreign guest ratio and TE

Foreign guest ratio of hotel	Average foreign guest ratio (%)	Average revenue	Average fixed assets	Average no. of staff	Average DEA efficiency (%)
Ratio = 0%	0.00	7,803,860	28,676,358	26	45.78
0% < Ratio ≤ 10%	3.37	18,456,704	59,105,691	48	59.57
10% < Ratio ≤ 50%	25.57	35,280,899	118,165,600	63	66.82
50% < Ratio ≤ 90%	72.97	46,212,425	123,240,637	72	74.38
90% < Ratio ≤ 100%	96.54	45,041,779	113,824,541	62	74.22

Table III. ANOVA Test – multiple comparisons of foreign to total guest ratio

Hotel's efficiency group	Low efficiency (0.00-0.25)	Moderately low (0.26-0.50)	Moderately high (0.51-0.75)	High efficiency (0.76-1.00)
Low efficiency (0.00-0.25)	N/A	−0.0522 (0.0336)	−0.1780*** (0.0353)	−0.2265*** (0.0285)
Moderately Low (0.26-0.50)	0.0522 (0.0336)	N/A	−0.1258*** (0.0340)	−0.1743*** (0.0268)
Moderately High (0.51-0.75)	0.1780*** (0.0353)	0.1258*** (0.0340)	N/A	−0.0485 (0.0289)
High efficiency (0.76-1.00)	0.2265*** (0.0285)	0.1743*** (0.0268)	0.0485 (0.0289)	N/A

Note: Number in parenthesis is the standard error of the mean. Figures marked with * are significant at the 0.10 significance level, figures marked with ** are significant at the 0.05 significance level and figures marked with *** are significant at the 0.01 significance level



Notes: Foreign Guest ratio. Line of each hotel group classified by efficiency: ———— Low efficiency (0.00 – 0.25); ---------- Moderately low (0.26 – 0.50); – – – – – – Moderately High (0.51 – 0.75); ---------- High efficiency (0.76 – 1.00)

Figure 1.
Kernel density function graph of foreign to total guest ratio categorized by different efficiency types

analysis using hotel characteristics as exogenous and control variables was next conducted. based on a two-step Heckman correction model using equations (6) and (7). The results are presented in Table IV. The correlation matrix of independent variables and results from Ramsey Reset Test are illustrated in the appendix tables.

		Heckman selection model		
Factor	OLS	Selection equation	Response equation	Marginal effect of selection Equation
C	0.0258 (0.1192)	−1.1113 (0.7036)	0.1186 (0.1356)	
LOG(ROOM)	0.0064 (0.0132)	0.0293 (0.0812)	0.0187 (0.0138)	0.0040 (0.0112)
LOG(STAFFINTENSITY)	0.0010 (0.0147)		−0.0054 (0.0153)	
LOG(AGEMONTH)	−0.025** (0.0098)	−0.0185 (0.0595)	−0.0245** (0.0106)	−0.0025 (0.0082)
LOG(ROOMINVESTMENT)	0.02601*** (0.0070)	0.1030*** (0.0394)	0.0184** (0.0077)	0.0142*** (0.0054)
LOG(EFFICIENCY)	0.0788*** (0.0138)	0.2692*** (0.0751)	0.0748*** (0.0173)	0.0371*** (0.0105)
DLOCATION	0.2509*** (0.0185)	0.3683*** (0.1052)	0.2685*** (0.0228)	0.0556*** (0.0175)
DMNC	0.1552*** (0.0406)		0.1258*** (0.0404)	
CONTROLINTENSITY	−0.0558 (0.0795)		−0.0918 (0.0841)	
DFB		0.4631*** (0.1253)		0.0805*** (0.0273)
DEXCURSION	0.0495*** (0.0192)	0.1821 (0.1406)	0.0355 (0.0203)	0.0241 (0.0177)
DSPA	0.0774*** (0.0198)	0.1440 (0.1380)	0.0751*** (0.0204)	0.0194 (0.0181)
DPOOL	0.1445*** (0.0200)	0.4796*** (0.1493)	0.1263*** (0.0223)	0.0640*** (0.0186)
DINTERNET		0.5721*** (0.1113)		0.0968*** (0.0230)
DMICE	−0.2226*** (0.0182)	−0.1180 (0.1183)	−0.2573*** (0.0196)	−0.0163 (0.0164)
Lambda		0.08218 (0.0737)		
SIGMA		0.2892		
RHO		0.2842		
Number of observations	1,356	173	1.183	
R-squared	0.4051		0.3896	
Pseudo *R*-squared		0.2444		

Table IV.
Results from OLS and Heckman selection models

Notes: Results from OLS, Probit and Heckman selection models, numbers in parenthesis are the standard error of the coefficients. Figures marked with * are significant at the 0.10 significance level, figures marked with ** are significant at the 0.05 significance level and figures marked with *** are significant at the 0.01 significance level

The findings from the regression analysis clearly indicate positive linkage between a hotel's efficiency ($EFFICIENCY_i$) and its foreign to total guest ratio. It should be noted that the reported coefficients of hotel efficiency are statistically significant in both the Heckman two-step regressions and the OLS regression. It is also noteworthy that the magnitude of the hotel efficiency variable in the Heckman response model is slightly less than its magnitude based on the OLS method. The calculated Lambda in the 3rd column reveals that the null hypothesis of an uncorrelated error term in the selection and response estimations is accepted. Hence, it can be assumed that there was no selection bias in our selection of the sample hotels from which data was included. It is also notable that the size of the establishment does not significantly affect either the probability to hiring rooms to foreign guests or the foreign guest intensity. On the other hand, the notional asset per hotel room (as a proxy for the quality of the accommodation at the hotel), the availability of pool facilities and whether the hotel offers a spa service, are the main factors contributing to a hotel's foreign to total guest ratio. The significance of these facilities variables are relatively similar to paper by Pantelic (2017). For instance, the availability of pool is among prioritized factor for family travelers when they select hotel. For location effect, Oukil *et al.* (2016) had previously shown that hotels in major cities were generally more efficient than hotels in ordinary cities, as competition in accommodation business is relatively intense in major cities. Result also suggests a positive relationship between the multinational status of hotels and their foreign guest intensity as suggested by previous empirical findings (Phucharoen, 2018). The last column of Table IV shows the marginal effect of the selection equation (Probit model), which reveals that a unit increase in firm efficiency would be expected to yield an increase in the probability of hiring rooms to foreign guests. Results from Ramsey Reset test indicate that the main testing regression model [equation (6)] was not suffered from misspecification since the P value indicates that the null hypothesis of correct functional form could not be rejected.

As would be expected, hotels in major tourist destinations have a significant advantage in foreign guest intensity ratio, which for hotels located in major tourist destinations is 27 per cent higher than for hotels located in non-tourist destinations. In previous empirical studies of the Thai hospitality industry, Sangkaew and Phucharoen (2018) and Phucharoen (2018) also remarked on the important role of location, as the major tourist destinations in Thailand are confined to a small number of provinces. An evidence from this present paper further empower the critical question as stated in the finding by Barros (2005a, 2005b). Peypoch and Solonandrasana (2006) further applied this finding to hotel industry by raising the question about "to which extent can hotel manager use/minimize wage, operating cost while increasing revenue to achieve for better TE".

This finding remarks the intuition to the development in Thailand Tourism Authority, recently an important new tourism plan for Thailand has been implemented nationwide, which aims to promote international tourist to visit non-tourist-destination provinces. To further investigate the effect of hotel efficiency on internationalization in non-tourist destinations., the sample analyzed in this study was divided into two different sub-samples, consisting of hotels located in tourist destinations and hotels located in non-tourist-destination provinces. The results are shown in Table V.

First, the lambda term of the non-tourist destination sample indicated that the error terms between the selection and response regressions were positively related indicating the existence of selection bias in this sub-sample. Thus, estimating based on the OLS model could yield an incorrect interpretation. Based on the sample of 453 hotels operating in non-tourist-destination provinces, it was found that the effect of a hotel's efficiency on its foreign guest intensity is even more prominent than in hotels located in tourist-destination provinces. As, the magnitude of coefficient from efficiency variable in the non-tourist-destination is

Table V.
Results from Heckman selection models based on hotels grouped as being in non-tourist vs tourist destinations

	Non-tourist destinations			Tourist destinations		
Factor	Selection equation	Marginal effect	Response equation	Selection equation	Marginal effect	Response equation
C	−0.8053 (1.0762)		−0.2864 (0.2578)	−1.9798 (1.2023)		0.5331 (0.1778)
LOG(ROOM)	0.2515** (0.1262)	0.6832** (0.0342)	0.0691** (0.0348)	−0.0909 (0.1174)	−0.0056 (0.0073)	0.0169 (0.0166)
LOG(STAFFINTENSITY)			0.0523 (0.0301)			−0.0207 (0.0186)
LOG(AGEMONTH)	0.0109 (0.0817)	0.0030 (0.0222)	−0.0268 (0.0203)	−0.0696 (0.0948)	−0.0043 (0.0059)	−0.0191 (0.0138)
LOG(ROOMINVESTMENT)	−0.0067 (0.0625)	−0.0018 (0.0170)	0.0207 (0.0130)	0.2582*** (0.0714)	0.0160*** (0.0047)	0.0087 (0.0109)
LOG(EFFICIENCY)	0.1590 (0.1156)	0.0432 (0.0315)	0.1210*** (0.0350)	0.3344*** (0.1067)	0.0206*** (0.0071)	0.0403** (0.0202)
DMNC			−0.1616 (0.1379)			0.1500*** (0.0438)
CONTROLINTENSITY			−0.0743 (0.1340)			−0.0642 (0.1060)
DFB	0.2524 (0.1759)	0.0724 (0.0531)		0.6412*** (0.1890)	0.0651*** (0.0302)	
DEXCRUSION	−0.3159 (0.2034)	−0.0925 (0.0636)	−0.0522 (0.0466)	0.6747*** (0.2334)	0.0397*** (0.0130)	0.0299 (0.0260)
DSPA	0.2734 (0.2118)	0.0701 (0.0571)	0.1406*** (0.0453)	−0.0325 (0.1956)	−0.0020 (0.0122)	0.0519** (0.0251)
DPOOL	0.2977 (0.2487)	0.0749 (0.0571)	0.1006** (0.0491)	0.5285*** (0.2030)	0.0353*** (0.0147)	0.1208*** (0.0273)
DINTERNET	0.6554*** (0.1623)	0.1900*** (0.0495)		0.4533*** (0.1673)	0.0369*** (0.0185)	
DMICE	0.2167 (0.1748)	0.0594 (0.4842)	−0.1314*** (0.0486)	−0.3335* (0.1756)	−0.0218* (0.0123)	−0.2656*** (0.0242)
Lambda	0.3411*** (0.1169)			−0.1483 (0.1020)		
SIGMA	0.3411			0.3031		
RHO	1.000			−0.4891		
Number of observations	453			903		
R-squared			0.2099			0.2312
Pseudo *R*-squared	0.1888			0.2795		

Notes: Results from Heckman selection models, numbers in parenthesis are the standard error of the coefficients. Figures marked with * are significant at the 0.10 significance level, figures marked with ** are significant at the 0.05 significance level and figures marked with *** are significant at the 0.01 significance level. RHO (ρ) is the estimated correlation between the error terms of the selection and response equations

stronger than the reported parameter of same variable in tourist destination provinces which is merely 0.04. In addition, it was also observed that the coefficient of the hotel efficiency variable was statistically significant at the 0.01 level in the non-tourist destination sample. These results importantly remark the role of firm's efficiency is even more important in a more hostile business environment. A plausible explanation for this stronger role of efficiency in non-tourist destinations could be the fact that hotels located in Thailand's non-tourist-destination provinces have relatively low TE as indicated by Sangkaew and Phucharoen (2018). Hence, foreign guests might prioritize their selection criteria based on hotel compensatory factors (Sohrabi *et al.*, 2011), determined by the hotel's efficiency, rather than by hotel comfort factors. In addition, the results also suggest that the size of a hotel does not lead to higher demand from foreign guest in tourist destination provinces, while size of hotel in non-tourist destinations could affect the demand from foreign guests. This part of the results again reflects an important role of hotel's compensatory factors in non-tourist destination.

Analogous in the context of the finding from hotels in non-tourist destinations sample, the study by Charoenrat and Harvie (2014) revealed a positive linkage between the national level of exports and the efficiency of the nation's non-exporting industries. Further, while the multinational status of hotels appears to significantly enhance foreign guest intensity in tourist destinations, there is no evidence of this linkage in the sub-sample of hotels in non-tourist-destination provinces. However, the availability of a spa service and pool facilities still appears to affect a hotel's foreign to total guest ratio in both tourist and non-tourist destinations alike.

Conclusion, policy implications and further research

Recent theoretical work within the framework of the heterogeneous productivity model, suggests a relationship between a firm's economic performance and its internationalization capability, although most previous empirical work in this area has investigated the prevalence of this linkage in the manufacturing sector. In view of the increasing importance of tourism and hospitality-based industries in Thailand, the study reported aimed to shed light on the role of firm efficiency on internationalization in hotels. Firstly, within the sample analyzed, the efficiency of each hotel was calculated through the DEA method. The coefficient obtained was then used along with other exogenous variables and control variables in regression analyses against the hotel's foreign to total guest ratio. Potential selection bias due to the method of selecting the final sample from the original data available and the possibility of unobserved hotel foreign market participation was identified through the use of a Heckman selection model throughout the analysis.

The results were analyzed by ANOVA based on the sample grouped according to DEA-assessed efficiency, which was also plotted as a non-parametric, Kernel Density distribution showing the distribution of the sample based on the grouping of the hotels according to their efficiency level. The pattern of differences in the hotels' foreign to total guest ratio performance showed that the highly and moderately highly efficient hotels were significantly different from those with low and moderately low efficiency. The results of the two-step Heckman correction model indicated that the nationwide sample was free from selection bias but sample selection bias was detected when the sample was divided into hotels in tourist- and non-tourist-destination provinces, in the sub-sample consisting of hotels in non-tourist destinations. The results of the regression models consistently revealed a strong positive linkage between hotel efficiency and demand from foreign guests, regardless of whether the hotels are located at tourist or non-tourist destinations. Therefore, a hotel's efficiency clearly influences its foreign to total guest ratio, and it is notable that hotel efficiency appears to play an even more important role in a hotel's ability to attract foreign guests in hotels in non-tourist destinations. In addition, the size of the hotel, whether

it offers a spa service and the availability of pool facilities are factors which contribute to the foreign guest intensity of hotels. Previous studies which evaluated tourist behavior and tourist's characteristics have provided practical and policy guidance to those responsible for marketing tourism, based on which they promote their destination with the aim of maximizing local earnings from international tourists. On another hand, the results of the present study suggest that supply-side issues also have a direct effect on tourism. Therefore, a firm-level efficiency enhancement policy in the hotel industry must be simultaneously implemented along with policies to promote destination competitiveness, aimed particularly at hotels in non-tourist destinations. For instance, Goh (2010) remarked that each hotel should has their manning-guide to ensure optimal number of staffs with respect to hotel estimated revenue. As Poldrugovac *et al.* (2016) had previously remarked, improving hotel efficiency is relatively sophisticated because it involves a balance optimization between revenue and cost management (Peypoch and Solonandrasana, 2006). Hence, an efficiency benchmarking tool at micro level, training platform for both yield and cost management should be available to hotel operators nationwide as part firm-level efficiency enhancement policy.

In addition, the results of this study also have implications for entrepreneurs wishing to invest in hotels in Thailand; in particular that hotels should offer pools and a spa service if their target market is foreign travelers. The availability of these two features might result in an advantage in terms of foreign guest bookings of approximately 20-25 per cent over hotels which do not have these two key features. Besides the clear linkage between firm's efficiency and financial performance of the firm in every industry, the present paper suggests the positive relationship between firm efficiency and firm internationalization competency in one of the Thailand promising industry, the hospitality industry.

Due to the type of data available, this study used a cross-sectional approach to estimate firm efficiency. With the availability of longitudinal data, more technical analysis which recognizes time-varying technology could be implemented. During the last decade, the Thai Hospitality industry has faced many challenges such as political crises and major floods and the availability of longitudinal data would allow researchers to track how business units perform, react, and alter in periods of crisis. Moreover, the economic impacts of international tourist spending are not confined to the hotel industry, and tourists' spending in restaurants, retail businesses and on transportation is also of economic importance. These factors should attract further attention from researchers to investigate how efficiency performance in this sector is linked with internationalization competence.

Notes

1. For more detailed DEA model development in Charnes *et al.* (1978) and revision of model in Charnes *et al.* (1995)
2. For further detail, please refer to Charnes *et al.* (1978) for CRS assumption and Banker, Charnes and Cooper (1984) for VRS approach.
3. In the sample of manufacturing firms, Phucharoen (2014), Polperm (2016), noted that there is a group of manufacturing firms which have a 0 export ratio because they do not have any intention to export their products.
4. The hotel and guesthouse survey was conducted throughout Thailand in 2012. Undisclosed firm=level data is available on request. Readers can find further details of the sampling techniques which the NSO employed from the full report of the NSO 2013 hotel and guesthouse survey, available on www.nso.go.th
5. In the survey, these observations (less than 10 employees) were being classified as guesthouse
6. Full details of the calculated data are available upon request.

References

Assaf, A.G. and Agbola, F.W. (2011), "Modelling the performance of Australian hotels: a DEA double bootstrap approach", *Tourism Economics*, Vol. 17 No. 1, pp. 73-89.

Assaf, A.G. and Magnini, V. (2011), "Accounting for customer satisfaction in measuring hotel efficiency: evidence from the US hotel industry", *International Journal of Hospitality Management*, Vol. 31 No. 3, pp. 642-647.

Barros, C.P. (2005a), "Evaluating the efficiency of a small hotel chain with a Malmquist productivity index", *International Journal of Tourism Research*, Vol. 7 No. 3, pp. 173-184.

Barros, C.P. (2005b), "Measuring efficiency in the hotel sector", *Annals of Tourism Research*, Vol. 32 No. 2, pp. 456-477.

Barros, C.P. and Dieke, P.U.C. (2008), "Technical efficiency of African hotels", *International Journal of Hospitality Management*, Vol. 27 No. 3, pp. 438-447.

Brown, J.R. and Ragsdale, C.T. (2002), "The competitive market efficiency of hotel brands: an application of data envelopment analysis", *Journal of Hospitality and Tourism Research*, Vol. 26 No. 4, pp. 332-360.

Cadotte, E.R. and Turgeon, N. (1988), "Key factors in guest satisfaction", *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 28 No. 4, pp. 44-51.

Charnes, A. and Cooper, W.W. (1984), "The non-archimedean CCR ratio for efficiency analysis: a rejoinder to Boyd and Fare", *European Journal of Operational Research*, Elsevier, Vol. 15 No. 3, pp. 333-334.

Charnes, A., Cooper, W.W. and Rhodes, E.L. (1978), "Measuring the efficiency of decision making units", *European Journal of Operational Research*, Vol. 2 No. 6, pp. 429-444.

Charnes, A., Cooper, W.W., Lewin, A.Y. and Seiford, L.M. (1995), *Data Envelopment Analysis: Theory, Methodology and Applications*, SpringerVerlag, New York, NY.

Charoenrat, T. and Harvie, C. (2014), "The efficiency of SMEs in Thai manufacturing: a stochastic frontier analysis", *Economic Modelling*, Vol. 43, pp. 372-393.

Chen, G.Q. (2011), "Clinical study of tanreqing combined with cefoperazone/sulbactamt in treatment of community acquired pneumonia", *Journal of Clinical Pulmonary Medicine*, Vol. 16, pp. 1258-1259.

Faculty of Hospitality and Tourism (2017), *Phuket Tourist Experience Index Project*, Faculty of Hospitality and Tourism, Prince of Songkla University, Phuket Campus, Hat Yai.

Greenaway, D. and Kneller, R. (2007), "Firm heterogeneity, exporting and foreign direct investment", *The Economic Journal*, Vol. 117 No. 517, pp. 134-161.

Heckman, J. (1979), "Sample selection bias as a specification error", *Econometrica*, Vol. 47 No. 1, pp. 153-161.

Hsu, C.H.C. (2015), "Brand performance of Chinese domestic vs international hotels: perceptions of operators as well as domestic and foreign guests", *Research in Hospitality Management*, Vol. 5 No. 2, pp. 123-133.

Hwang, S.N. and Chang, T.Y. (2003), "Using data envelopment analysis to measure hotel managerial efficiency change in Taiwan", *Tourism Management*, Vol. 24 No. 4, pp. 357-369.

Kneip, A., Simar, L. and Wilson, P. (2011), "A computationally efficient, consistent bootstrap for inference with non-parametric DEA estimators", *Computational Economics*, Vol. 38 No. 4, pp. 483-515.

Knutson, B.J. (1988), "Frequent travelers: making them happy and bringing them back", *Cornell Hotel and Restaurant Administration Quarterly*, Vol. 29 No. 1, pp. 82-87.

Krugman, P., Obstfeld, M. and Melitz, M. (2005), *International Economics: Theory and Policy*, 11th ed., Addison-Wesley, Boston, MA.

Laowicharath, Y. (2017), "Factors positively affecting purchase intention to stay at budget hotels of foreign customers in Bangkok", Independent Study Manuscript Presented to The Graduated School of Bangkok University in Partial Fulfillment of the Requirements for the Degree Master of Business Administration, Graduate School, Bangkok University.

McQuerrey, L. (2018), "Importance of staffing management. Small business", available at: http://smallbusiness.chron.com/importance–staffing–management–49551.html

Melitz, M.J. (2002), "The impact of trade on intra-industry reallocations and aggregate industry productivity", NBER working paper (8881).

Melitz, M.J. (2003), "The impact of trade on intra-industry reallocations and aggregate industry productivity", *Econometrica*, Vol. 71 No. 6, pp. 1695-1725.

Melitz, M.J. and Ottaviano, G.I.P. (2008), "Market size, trade, and productivity", *Review of Economic Studies*, Vol. 75 No. 1, pp. 295-316.

Melitz, M.J. and Redding, S.J. (2015), "New trade models, new welfare implications", *American Economic Review*, Vol. 105 No. 3, pp. 1105-1146.

National Statistical Office of Thailand: NSO (2013), *The Hotel and Guest Houses Survey in 2012*, available at: www.nso.go.th, www.nso.go.th

Neves, J. and Lourenco, S. (2009), "Using data envelopment analysis to select strategies that improve the performance of hotel companies", *International Journal of Contemporary Hospitality Management*, Vol. 21 No. 6, pp. 698-712.

Oukil, A. and Al-Zidi, A. (2014), *Benchmarking the Hotel Industry in Oman through a Three-Stage DEA-Based Procedure*, VII International Tourism Congress, Muscat.

Oukil, A., Channouf, N. and Al-Zaidi, A. (2016), "Performance evaluation of the hotel industry in an emerging tourism destination: case of Oman", *Journal of Hospitality and Tourism Management*, Vol. 29, pp. 60-68.

Pantelic, V. (2017), "Factors influencing hotel selection: decision making process", Thesis for: BBA (Hons.), International Hospitality Management, available at: www.researchgate.net/publication/333356298_Factors_influencing_hotel_selection_Decision_making_process

Peypoch, N. and Solonandrasana, B. (2006), "A note on technical efficiency in tourism industry", *Tourism Economics*, Vol. 12 No. 4, pp. 653-657.

Phucharoen, C. (2014), "Testing for FDI externalities in Thailand: a firm level analysis of horizontal and vertical spillovers", *International Review of Business Research Papers*, Vol. 5 No. 1, pp. 12-24.

Phucharoen, C. (2018), "Comparing and finding the linkage between indigenous-operated and foreign-invested hotels in Thailand", *Southeast Asian Journal of Economics*, Vol. 6 No. 1, pp. 43-69.

Poldrugovac, K., Tekavcic, M. and Jankovic, S. (2016), "Efficiency in the hotel industry: an empirical examination of the most influential factors", *Economic Research-Ekonomska Istraživanja*, Vol. 29, pp. 583-597.

Polperm, I. (2016), *Export Spillovers of Foreign Direct Investment on Domestic Manufacturing Firms in Thailand*, Chulalongkorn University Intellectual Repository, available at: http://cuir.car.chula.ac.th/handle/123456789/55159

Ramanathan, R. (2012), "An exploratory study of marketing, physical and people related performance criteria in hotels", *International Journal of Contemporary Hospitality Management*, Vol. 24 No. 1, pp. 44-61.

Ramstetter, E.D. (2006), "Are productivity differentials important in Thai manufacturing?", in Ramstetter, E.D. and Sjöholm, F. (Eds), *Multinational Corporations in Indonesia and Thailand: Wages, Productivity, and Exports*, Palgrave Macmillan, Hampshire, pp. 114-142.

Rigby, D.L. and Brown, W.M. (2015), "Who benefits from agglomeration? Regional studies", *Regional Studies Journal*, Vol. 49 No. 1, pp. 28-43.

Sangkaew, N. and Phucharoen, C. (2018), "The efficiency analysis of incorporated hotels in Thailand", *Chulalongkorn Business Review*, Vol. 157, pp. 49-78.

Shieh, J.I., Wu, H.H. and Huang, K.K. (2010), "A DEMATEL method in identifying key success factors of hospital service quality", *Knowledge-Based Systems*, Vol. 23 No. 3, pp. 277-282.

Sim, J., MaK, B. and Jones, D. (2006), "A model of customer satisfaction and retention for hotels", *Journal of Quality Assurance in Hospitality and Tourism*, Vol. 7 No. 3, pp. 1-23.

Sohrabi, B., Vanani, I.R., Tahmasebipur, K. and Fazli, S. (2011), "An exploratory analysis of hotel selection factors: a comprehensive survey of Tehran hotels", *International Journal of Hospitality Management*, Vol. 31 No. 1, pp. 96-106.

Tundis, E., Corsino, M. and Zaninotto, E. (2012), "Revealing the influence of managerial practices and entrepreneurs' characteristics on hotel efficiency", DISA Working Papers, Trento University, Italy.

Untong, A. (2013), "Competitive advantage in tourism of southeast Asian countries", *Applied Economics Journal*, Vol. 1, pp. 80-98.

Wiboonchutikula, P., Phucharoen, C. and Pruektanakul, N. (2016), "Spillover effects of foreign direct investment on domestic manufacturing firms in Thailand", *Singapore Economic Review*, Vol. 61 No. 2.

Wu, J., Tsai, H. and Zhou, Z. (2011), "Improving efficiency in international tourist hotels in Taipei using a non-radial DEA model", *International Journal of Contemporary Hospitality Management*, Vol. 23 No. 1, pp. 66-83.

Yang, Y., Kevin, K.F.W. and Wang, T. (2012), "How do hotels choose their location? Evidence from hotels in Beijing", *International Journal of Hospitality Management*, Vol. 31 No. 3.

Yeaple, S. (2005), "A simple model of firm heterogeneity productivity, international trade and wages", *Journal of International Economics*, Vol. 65 No. 1, pp. 1-2.

Yu, M.M. and Lee, B.C.Y. (2009), "Efficiency and effectiveness of service business: evidence from international tourist hotels in Taiwan", *Tourism Management*, Vol. 30 No. 4, pp. 571-580.

Zhang, J. and Enemark, A.E. (2015), "Factors influencing business performance in hotels and restaurants", *Asia–Pacific Journal of Innovation in Hospitality and Tourism*, Vol. 5 No. 1, pp. 1-2.

Futher reading

Berry, L.L. and Parasuraman, A. (1991), *Marketing Service: Competing through Quality*, Simon and Schuster, New York, NY.

Department of Tourism (2018), *Tourist Arrivals in Thailand 2017*, Ministry of Tourism and Sports, Bangkok.

Farrell, M.J. (1957), "The measurement of productive efficiency", *Journal of the Royal Statistical Society*, Vol. 120 No. 3, pp. 253-281.

Krugman, P. (1989), "Differences in income elasticities and trends in real exchange rates", *European Economic Review*, Vol. 33 No. 5, pp. 1031-1046.

Marković, S., Raspor, S. and Šegarić, K. (2010), "Does restaurant performance meet customers' expectations? An assessment of restaurant service quality using a modified DINESERV approach", *Tourism and Hospitality Management*, Vol. 16 No. 2, pp. 181-195.

Oberoi, U. and Hales, C. (1990), "Assessing the quality of the conference hotel service product: towards an empirically based model", *The Service Industries Journal*, Vol. 10 No. 4, pp. 700-721.

Poudel, S. (2013), *The Influence of the Accommodation Sector on Tourism Development and Its Sustainability*, Case Study: Strand Camping, Larsmo.

Ramanathan, R. (2006), "Data envelopment analysis for weight derivation and aggregation in the analytic hierarchy process", *Computers and Operations Research*, Vol. 33 No. 5, pp. 1289-1307.

Serti, F., Tomasi, C. and Zanfei, A. (2009), "The links between internationalization, skills and wages. The role of differences across firms and across partner countries", LEM Papers Series 2009/19, Laboratory of Economics and Management (LEM), Sant'Anna School of Advanced Studies, Pisa.

Thanassoulis, E. (2001), *Introduction to the Theory and Application of Data Envelopment Analysis: A Foundation Text with Integrated Software*, Kluwer Academic Publishers, Norwell, MA.

Wongchai, A., Liu, W.B. and Peng, K.C. (2012), "Dea metafrontier analysis on technical efficiency differences of national universities in Thailand", *International Journal on New Trends in Education and Their Implications*, Vol. 3 No. 3, p. 3.

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Appendix

Tourist destination

The Tourism Authority of Thailand (TAT) conducted an online survey during February to April 2011 to find out the "Most Amazing Places in Thailand". The provinces which were considered as tourist destinations comprised Bangkok, Buriram, Chiang Mai, Chiang Rai, Kanchanaburi, Krabi, Loei, Lopburi, Mae Hong Son, Nakhon Ratchasima, Phangnga, Phetchaburi, Phra Nakhon Si Ayutthaya, Phuket, Rayong, Ratchaburi, Samut Songkhram, Sukhothai, Surat Thani, Trang, Trat, and Ubon Ratchathani.

Ramsey reset test

Table AI.
Ramsey Reset test result of regression model (6) for Table IV

Ramsey RESET test	Value	df	Probability
t-statistic	0.508263	1169	0.6114
F-statistic	0.258331	(1, 1169)	0.6114
Likelihood ratio	0.261396	1	0.6092

Table AII.
Ramsey Reset test result of regression model (6) for Table V

Ramsey RESET test	Value	df	Probability
t-statistic	0.616302	1170	0.5378
F-statistic	0.379828	(1, 1170)	0.5378
Likelihood ratio	0.383986	1	0.5355

Table AIII.
Correlation matrix

Correlation	Forguestratio	Log (room)	Log (staff intensity)	Log (age month)	Log (room investment)	Log (efficiency)	Dlocation	DMNC
Inter	1.000							
Log (room)	0.047	1.000						
Log (Staff intensity)	−0.188	0.128	1.000					
Log (age month)	−0.067	0.302	0.026	1.000				
Log (room investment)	0.186	−0.142	−0.399	−0.188	1.000			
Log (efficiency)	0.245	0.480	−0.250	0.176	−0.053	1.000		
Dlocation	0.490	0.027	−0.154	−0.020	0.143	0.188	1.000	
DMNC	0.186	0.059	−0.090	−0.025	0.087	0.098	0.116	1.000
Control intensity	0.033	−0.079	0.059	−0.047	0.000	0.048	0.060	0.022
DFB	0.191	0.176	−0.238	−0.044	0.141	0.284	0.195	0.064
Dexcrusion	0.253	0.112	−0.274	−0.035	0.177	0.198	0.211	0.095
DSPA	0.256	0.262	−0.280	0.051	0.129	0.285	0.167	0.027
DPOOL	0.373	0.287	−0.313	−0.025	0.229	0.314	0.312	0.107
DINTERNET	0.165	0.148	−0.179	−0.090	0.153	0.240	0.190	−0.007
DMICE	−0.220	0.382	−0.154	0.050	0.080	0.222	−0.118	−0.047
Revenue	0.173	0.433	−0.304	0.118	0.182	0.142	0.128	0.075
Capital	0.138	0.366	−0.219	0.035	0.454	0.090	0.106	0.119
Wage	0.174	0.483	−0.349	0.142	0.184	0.152	0.151	0.115
Raw material	0.127	0.376	−0.234	0.124	0.115	0.125	0.083	0.063

(*continued*)

Table AIII.

Correlation	Controlintensity	DFB	Dexcrusion	DSPA	DPOOL	DINTERNET	DMICE	Revenue	Capital	Wage	Raw material
Inter											
Log											
(room)											
Log (Staff intensity)											
Log (age month)											
Log (room investment)											
Log (efficiency)											
Dlocation											
DMNC											
Control intensity	1.000										
DFB	−0.027	1.000									
Dexcrusion	0.068	0.245	1.000								
DSPA	−0.003	0.229	0.440	1.000							
DPOOL	0.010	0.295	0.350	0.437	1.000						
DINTERNET	0.030	0.314	0.257	0.242	0.353	1.000					
DMICE	−0.043	0.250	0.146	0.221	0.216	0.257	1.000				
Revenue	−0.051	0.144	0.231	0.261	0.301	0.145	0.220	1.000			
Capital	−0.039	0.128	0.202	0.220	0.262	0.121	0.193	0.533	1.000		
Wage	−0.066	0.146	0.253	0.287	0.316	0.141	0.229	0.869	0.650	1.000	
Raw material	−0.052	0.114	0.175	0.212	0.235	0.113	0.190	0.874	0.365	0.727	1.000