

# A COMPARISON OF PERFORMANCE AND EFFICIENCY IN HOTEL INDUSTRY: EVIDENCES OF TAIPEI AND SCENIC AREA HOTELS IN TAIWAN

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**Abstract** - The aim of this paper is to examine the performance and efficiency changes of international hotels in Taiwan. Data Envelopment Analysis (DEA) is applied to a sample of international hotels in Taipei between 2006 and 2015. Malmquist Index is used to evaluate the relative importance of productivity changes. Five input variables (i.e. numbers of rooms, number of employee at administration department, number of employee at F&B department, number of employee at room department, number of employee at other departments,) and one output variable: total revenues are used in this model. The results showed that 2008 financial crisis did strongly impact performance for international hotels in Taipei City and Scenic Area in terms of Technical efficiency change (TEC), Pure technical change (PTC), and Total factor productivity change (TFPC), but only has slightly impact on the Technical change (TC) and Scale efficiency change (SEC). However, the performance after the open policy for tourists from mainland China is unstable between 2011 and 2015. It is found that the international hotel with highest TFPC growth is Imperial Hotel Taipei over the period of 2006-2015. On the contrary, First Hotel had the lowest TFPC. Several managerial implications and suggestions are discussed in the final section.

**Keywords:** Hotel, Operational Performance, Data Envelopment Analysis, Malmquist Productivity Index

## I. INTRODUCTION

Tourism has been one of the most essential economic sectors for countries globally. It contributes up to 5% of the world's GDP, one in twelve employments worldwide and is a major export sector for developing countries. Tourism is a main service industry with characteristics that make it valuable as a sector for economic development. In particular for Asian countries, the tourism industry is one of the major income sources creating employment and business opportunities for economy. According to World Tourism Organization (WTO), international tourist arrivals up 4% achieves a record 1.2 billion in 2015 and marks the 6th successive year of above-average growth, with international arrivals every year after financial crisis. The growth in the region of Asia and the Pacific is expected to be stronger up to 5%. This region recorded 277 million international tourist arrivals in 2015, 13 million more than in 2014. South-East Asia (+5%) led growth in the region of Asia and the Pacific, while North-East Asia recorded a raise of 4% (UNWTO, 2016).

A small number of leading countries, such as the USA, the UK and China (PRC), are the driving forces for tourism expenditure in 2015. Especially, the

expenditure for China has been enjoying double-digit growth for a decade, benefiting Asian countries such as Japan and Taiwan. On the other hand, the expenditures of traditional source countries, the USA and the UK, were booted by a strong economy growing up to +9% and +6%. International tourist arrivals are set to rise by around 40 million a year in the next two decades in a comparison with an average increase of 28 million per year between 1995 and 2010. Economic output in the Asia region is expecting to grow constantly (+5.7%) and predicted as the leading region in the world. The number of international tourist arrivals is expected to near to 1.4 billion worldwide by 2020, up from 1.5 billion in 2023. In the region of Asia and the Pacific is predicted to increase by 331 million in the next two decades from 204 million to 535 million between 2010 and 2030. The sub-region of North East Asia is viewed as the most attractable area by 2030, forecasting 16% of total arrivals [17]. The region of Asia and the Pacific will more than double its international tourist arrivals generated per 100 populations, from 5 to 12 in the period of 2010 to 2030.

The aims of this paper are to investigate the operation performance of international hotels in Taipei City and Scenic Area as following:

1. Understanding relative operational performance of international hotels in Taipei City and Scenic Area.
2. Comparing managerial efficiency of international hotels in Taipei City and Scenic Area,
3. Suggesting in increasing operational efficiency by technology and management activity for international hotels in Taipei City and Scenic Area.

This study contributes to the field of hotel sector by comparing the performance and efficiency of international hotels in Taipei City and Scenic Area. This paper is organized as follow: section two reviews

the related literature on hotel industry using DEA and Malmquist Index. Section three discusses methodology and samples. Section four presents findings and results of DEA and Malmquist Index. Conclusions and suggestions for further research are presented in the final section.

## II. LITERATURE REVIEW

The World Tourism Organization (WTO) further predicted that global tourists will rise to 1.6 billion and its revenue will enlarge to US 200 billion in 2020 worldwide. Therefore, it can be an observation that the tourism industry has been playing as a major role in the global economic expansion. The hotel industry has been gradually operating through extended periods of unsteadiness and looking for improving their operational efficiency and performance in 21 Century [18]. According to the Hotels.com Hotel Price Index (HPI), hotel price hit its peak of 117 in 2007, the year before the global financial crisis. Asia was the only region to record a fall of 2% in HPI in 2013 worldwide year-on-year. The Asia HPI located at 106 in 2013, a level high after financial crisis, signaling excellent news if you are an international traveler looking for value trips. The falls of major currencies in Asia region was one of the main reasons to explain the instability in hotel prices, such as Japanese Yen and Indonesian rupee. However, Taipei enjoyed a 4% raise in 2013 year-on-year, as the booming of inbound tourists from mainland China. For Asia region, it hit the peak of 129 in 2008 and drops to the floor of 107 in 2009, gradually fall to bottom of 99 in 2015. Comparing with 2014, the HPI of Asia fell 5% in 2015. It was the highest decline in the midst of all the regions worldwide (Hotels, 2016). On the other hand, according to the statistic of STR Global, the average daily rate of hotels in the Asia Pacific region was

108.79 U.S. dollars in 2015, up from 94.13 in 2008 [14].

The tourism industry has been building an important contribution to Taiwan's economy and foreign exchange earnings. Moreover, hotel sector has been providing various functions such as accommodation, shopping, social activities, conference place, and entertainment [3] [9] [10]. For tourism industry in Taiwan, International tourist arrivals had increased from 2.6 to 10 million in the period of 2000 and 2015. The top five inbound visitor countries are all in Asia. The total number of tourists visiting Taiwan reached 10 million in 2015, an increase of around 5 percent year-on-year. China stays the largest source of inbound tourists, with 4.5 million Chinese visiting Taiwan in 2015, a climb of around 6 percent. On the other hand, the number of Japanese tourists, 1.3 million visitors, declined but remained the second-largest source of inbound tourists to Taiwan in 2015. Visitors from Hong Kong and Macau area rose by roughly 8 percent to 1.25 million, but South Korean visitors increased approximately by 24 percent to reach half million [16]. Foreign tourists spent 3.7 billion US dollars in 2000 but increased to 14.83 billions and the hotel sector makes a large share to the tourism industry in Taiwan.

Various papers have been studied in the field of hotel performance using different methodologies and techniques, such as DEA or Malmquist Index to examine the operational performance and efficiency in the tourism industry [12] [13] [21]. Parte-Esteban et al. [13] employ DEA to examine the dynamic efficiency of hotel industry by using 1805 hotels in Spain between 2002 and 2011. It is found that the levels of efficiency are related to the location, size, and internationalization of the hotels. Hu, J. et al. [22] examine that public transportation facilities and

medical services may influence the efficiency of international hotels in Taiwan. It is found that the distance between MRT station and international hotels has negatively correlation.

Honma, and Hu [6] utilize both DEA and stochastic frontier analysis (SFA) to investigate the operating efficiency of hotels in Japan between 2004 and 2008. It is found that more than half of Japanese hotels relate increasing returns to scale technologies and that they can be more efficient by expanding their performance in terms of the DEA results. Moreover, the results from DEA also illustrates that hotels listed on the Tokyo stock market have significant, positive impacts on efficiencies, but the distances between international airports and hotels have significantly and negatively impacts. Huang et al. [8] aim to evaluate the impact of marketing cost on the efficiency of international hotels in Taiwan by using a hybrid DEA model. It is found that extra marketing cost is the major cause for lower efficiency in many international hotels, mainly chain hotels. Wu and Tasi [19] use a non-radial DEA model to evaluate the operational efficiency of international hotels in Taipei between 2006 and 2010. They offer a benchmarking frame to evaluate the efficiency and effectiveness of the hotel industry. It is found that only 10% international hotels are identified as the maintained high performances in Taipei. These hotels have excellent business strategies in terms of staff, products, prices, and customers. Chiu and Wu [4] employ DEA model to study the operating efficiency of 49 international hotels in Taiwan between 2004 and 2006. It is found that 17 out of the 49 have operating progress values in all levels.

### III. RESEARCH METHODS

It is an advantage to make use of DEA and Malmquist Index in evaluating performance of international hotels since the techniques do not need to employ specified

functional form. This paper aims to examine the long-term trend in efficiency changes of 40 international hotels in Taipei City and Scenic Area.

The data used in the study were collected from published annual reports of Taiwan Tourism Bureau. The test period in this research is between 2006 and 2015 as we hope to study the impact of the 2008 financial crisis on the evolution of efficiency scores of international hotels in Taipei City and Scenic Area. Moreover, we would like to compare the performance after open policy for tourists from Mainland China from 2010. The input and output variables used in the study are shown in the Table 2. It includes five inputs: (1) numbers of rooms, (2) number of employee at room department, (3) number of employee at F&B department, (4) number of employee at administration department, and (5) number of employee at other department, and two outputs: (1) room revenue, and (2) total revenue [1] [2] [5] [15] [19] [20].

#### IV. RESULTS

The Table 1 shows that the total efficiency change (TEC) shows a decline from 2008 to 2010. This indicated that the operation of international hotels in Taipei City and Scenic Area are not on the optimal scale right after the period of financial crisis. It is suggested of having some improvement capacity in terms of manpower utilization. The TEC profoundly decline between 2011 and 2013. It shows a pattern that TEC would improve exceptionally every three year then went down. Regarding the scale efficiency change (SEC), the change rate in the period of 2006-2007 is 1.014, but the rate decline in the following periods of 2007-2010. It points out that production scale was declining during the period of financial crisis. However, this rate had recovered from 2010 to 2012. Regarding the total factor productivity change (TFPC), it declines from 2008 to 2010 then went up

between 2010 and 2012. However, TEPC shows unstable pattern between 2011 and 2015.

Given that the total factor productivity change (TFPC) is a combination of technical efficiency change (TEC) and Technological change (TC), the most important source of productivity improvements would be decided by the assessments of TEC and TC. Moreover, the productivity improvements expressed the outcomes of efficiency and technological progress. The normally efficiency change is the results of pure technical change (PTE) and Scale efficiency change (SEC) in the similar approach. The TFPC in ranking order from the top one to the lowest hotels is presented in the Table 3, in which the indices (mean values) and the TFPC are computed with reference to the previous TC and TEC. In this situation, it shows that 28 out of 40 international hotels in Taipei City Scenic Area in Taiwan are taking advantages of innovation and hotel technology to admit new techniques of handling services. From the Malmquist indices in Table 3, the international hotel with highest TFPC intensification is Imperial Hotel Taipei. In contrast, Cosmos Hotel in Taipei had the lowest TFPC. In the Table 2, 23 out of 40 (57.5%) of the international hotels are lower than the mean score (1.020), 14 in Taipei City and 9 in Scenic Area each, in terms of TFPC. It indicates that more than half of international hotels in Taipei City and Scenic Area have not achieved in total productivity in the period of 2006 to 2015. Most of the productivity decrease is as a result of TEC. Only 3 out of 12 (25%) international hotels in Scenic Area are higher than the mean score (1.020), which indicates hotels in this area has not managed techniques well.

The scores of TEC are defined as the distribution of best-practice technology in the management of the achievement and are recognized to technical know-how in the international hotels in Taipei City and

Scenic Area. The breakdown of the TEC into PTEC and SEC exhibits mixed results, with some international hotels obtaining coexisting achievements in the PTEC and SEC. However, others might reach performance in one but losses in another. The progress in PTEC, which means an improvement in managerial capacity and technology, makes comprehensible that there was assumption in firm features such as balanced inputs and outputs, best-practice methods, quality improvement and so on. The SEC raises and the mean value of PTEC is 1.002 and of SEC is 0.999. The TC shows the outcomes of technological improvement, which is the achievement of latest technologies by best-practice international hotels such as booking system, internet facility, and transportation equipments and so on. Within the 40 international hotels, 34 are higher than efficient ratio one (85%), which illustrates the most of these hotels enjoyed technological innovation advance in satisfactorily improved skills between 2006 and 2015.

Overall, this paper's contributions in terms of TC and TEC are as following. Firstly, it is found that 27 out of 40 international hotels (67.5%), in which improvements in TEC with TC. Secondly, it is found 13 international hotels (32.5%), in which improvements in TC with decline of TEC. These 13 hotels, 8 in the Scenic Area, need to progress their managerial skills and operational scale with the purpose of performance improvement. On the whole, the means of TFPC rise in the Taipei City and Scenic Area between 2006 and 2015 was only 1.63 per cent, achieving from TC improvement. It is found that the international hotel with highest TFPC growth is Imperial Hotel Taipei over the period of 2006-2015. On the contrary, First Hotel had the lowest TFPC (see Table 2).

## V. CONCLUSIONS

This paper presents the findings of an evaluation of performance and efficiency in the international hotel in Taipei City and Scenic Area in Taiwan by using DEA and the Malmquist indices between 2006 and 2015. A sample of 28 international hotels in Taipei and 12 in Scenic Area in Taiwan has been employed. There is a extremely fall in 4 out of 5 changes between the period of 2008 and 2009, which illustrates the impacts of financial crisis on the international hotels in Taiwan. The findings of this study contribute to the existing comprehension on the performance and efficiency of the international hotels in Taiwan.

There are a number of ways that this study contributes to the existing literature in the field of hotel industry. One of the chiefly findings shows that overall efficiency in the international hotels in Taipei City and Scenic Area has improved after 2009 but unstable. The annual means of the Malmquist index shows that the financial crisis in 2008 had really impacts in declining the TFPC causing from the falling of TEC and TC. It is suggested that the incompetence of the international hotels in Taipei City and Scenic Area were largely due to TEC (0.975) rather than TC (1.001) during the period of 2008-2009. TEC inefficiency had huge impacts on the international hotels in Taipei City and Scenic Area. It demonstrates the difficulties caused by dreadful manpower exercise, employee ability and the inability to offer suitable training and development to improve performance. The findings suggest that the inefficiency of the international hotels in Taipei City and Scenic Area were typically due to TEC and partially by SEC in the period between 2006 and 2015. The results also advise that some international hotels in Taipei City and Scenic Area may be too small to benefit from the economies of scale. Hence, it is suggested that the comparatively smaller international

hotels in Taipei City and Scenic Area may lift their efficiency levels and performance by merging with other international chain hotels or joining alliances from the economic perspective.

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**TABLE 1**  
**MALMQUIST INDEX SUMMARY OF ANNUAL MEANS**

Period	TEC (1)	TC (2)	PTC (3)	SEC (4)	TFPC (5)
2006-2007	0.920	0.960	0.907	1.014	0.883
2007-2008	1.063	1.054	1.098	0.968	1.120
2008-2009	0.957	1.001	0.962	0.995	0.958
2009-2010	0.990	1.005	1.008	0.981	0.995
2010-2011	1.072	1.027	1.043	1.028	1.101
2011-2012	0.979	1.113	0.961	1.019	1.090
2012-2013	0.941	0.985	0.972	0.968	0.926
2013-2014	1.084	1.054	1.040	1.043	1.143
2014-2015	0.999	0.961	1.027	0.973	0.961
Mean	1.001	1.018	1.002	0.999	1.020

**TABLE 2**  
**HOTELS RANKING BY TOTAL FACTOR PRODUCTIVITY CHANGE OF MALMQUIST INDEX**

RANK	DMU*	International Hotels	TEC (1)	TC (2)	PTC (3)	SEC (4)	TFPC (5)
1	3	Imperial Hotel Taipei	1.045	1.082	1.044	1.001	1.132
2	31	Caesar Park Hotel Kenting	1.076	1.019	1.074	1.002	1.097
3	24	Empress Hot	1.06	1.02	1	1.06	1.082
4	23	Astar Hotel	1.042	1.015	1	1.042	1.059
5	6	Hotel Riverview Taipei	1	1.055	1	1	1.055
6	14	Sheraton Taipei Hotel	1.02	1.024	1.019	1.001	1.045
7	5	Emperor Hotel	0.976	1.069	0.956	1.02	1.043
8	15	Hotel Royal Taipei	1.025	1.016	1.025	1	1.041
9	7	Caesar Park Taipei	1	1.04	1	1	1.04
10	2	The Ambassador Hotel	1.009	1.026	1.007	1.002	1.035
11	11	Santos Hotel	1.008	1.025	1.009	0.999	1.033
12	27	Gala Hotel	1.002	1.031	1.003	0.999	1.033
13	12	The Landis Ritz Hotel	1.006	1.026	1.004	1.002	1.032

14	33	Silks Place Hotel, Taroko	1.036	0.993	1.03	1.006	1.029
15	37	Hotel Royal Chiao-His	1	1.027	1	1	1.027
16	18	Grand Formosa Regent Taipei	1	1.021	1	1	1.021
17	21	The Leofoo Hotel	1.015	1.007	1.021	0.994	1.021
18	13	United Hotel	1.003	1.016	0.997	1.006	1.019
19	40	South Formosa Hotel	1.018	1.002	1.013	1.004	1.019
20	4	Gloria Prince Hotel	0.996	1.021	0.996	1	1.017
21	25	Hotel Flowers	1	1.017	1	1	1.017
22	8	Golden China Hotel	0.988	1.027	0.988	1	1.014
23	29	Hotel Landis China Yangmingshan	0.978	1.037	1	0.978	1.014
24	36	The Lalu Sun Moon Lake	1	1.008	1	1	1.008
25	17	Grand Hyatt Taipei	1	1.006	1	1	1.006
26	26	The Riviera Hotel	0.986	1.018	0.976	1.01	1.004
27	9	San Want Hotel	1	1	1	1	1
28	19	The Sherwood Hotel Taipei	0.982	1.018	0.99	0.992	1
29	16	Howard Plaza Hotel	0.98	1.02	0.997	0.983	0.999
30	30	Grand Hotel Kaohsiung	0.99	1.001	0.992	0.998	0.991
31	39	Dragon Valley Hotel	0.965	1.022	0.969	0.995	0.986
32	1	The Grand Hotel	0.975	1.007	0.959	1.017	0.982
33	32	Hotel Royal Chihpen Spa	0.97	1.01	0.967	1.004	0.98
34	34	Howard Beach Resort Kenting	1	0.978	1	1	0.978
35	38	Alishan House	1	0.976	1	1	0.976
36	20	Far Eastern Plaza Hotel (Taipei)	0.969	1.006	0.987	0.982	0.975
37	22	First Hotel	1	0.966	1	1	0.966
38	35	The Hibiscus Resort	0.923	1.041	1.076	0.858	0.961
39	10	Brother Hotel	0.933	1.027	0.936	0.997	0.958
40	28	Cosmos Hotel	1	0.957	1	1	0.957
Number of Efficient ratio > 1			14(35%)	34(85%)	12(30%)	14(35%)	26(65%)
Number of Efficient ratio = 1			12(30%)	1(2.5%)	15(37.5%)	15(37.5%)	2(5%)
Number of Efficient ratio < 1			14(30%)	5(12.5%)	3(7.5%)	11(27.5%)	12(30%)

\*DMU 1-28: located in Taipei City; DMU 29-40: located at Scenic Area