

PAPER • OPEN ACCESS

## An effect of tsunami to hotel occupancy: A case of Phuket, Thailand

To cite this article: J Tang *et al* 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **273** 012033

View the [article online](#) for updates and enhancements.

# An effect of tsunami to hotel occupancy: A case of Phuket, Thailand

J Tang<sup>1</sup>, N Leelawat<sup>2,3,4,\*</sup>, A Suppasri<sup>5</sup> and F Imamura<sup>5</sup>

<sup>1</sup> School of Management Technoogy, Sirindhorn International Institute of Technology, Thammasat University, 131 Moo 5 Tiwanont Road, Bangkadi, Pathum Thani 12000 Thailand

<sup>2</sup> Department of Industrial Engineering, Faculty of Engineering, Chulalongkorn University, Phayathai Road, Pathumwan, Bangkok 10330 Thailand

<sup>3</sup> Disaster and Risk Management Information Systems Research Group, Chulalongkorn University, Phayathai Road, Pathumwan, Bangkok 10330 Thailand

<sup>4</sup> Risk and Disaster Management Program, Graduate School, Chulalongkorn University, Phayathai Road, Pathumwan, Bangkok 10330 Thailand

<sup>5</sup> International Research Institute of Disaster Science, Tohoku University, 468-1 Aramaki-Aza Aoba, Aoba-ku, Sendai 980-0845 Japan

\*Corresponding author, natt.l@chula.ac.th, n.leelawat@gmail.com

**Abstract.** As a popular city for global tourists, more than one third of the Phuket GPP depends on the hotel and restaurant sector. The 2004 Indian Ocean Tsunami caused a serious physical damage to hotels and a high cancellation of bookings in the post disaster period, which, in turn, led to most THB 3 billion drop of the hotel and restaurant sector income in 2005 in Phuket. In addition, many tourism facilities in Phuket suffered bankruptcy or a slump, because they started their business again immediately after the reconstruction phase, while tourists did not really come back. This paper is an initiative study of our research project to evaluate the effects of the 2004 Indian Ocean Tsunami on Hotel Occupancy, with a focus on the speed for the physical reconstruction and tourism market recovery. We collected the physical reconstruction period and the hotel occupancy recovery data of six hotels that located in the Patong Beach of Phuket from 2003 to 2017. Through calculation, the average of damage rate (i.e., unavailability of the rooms in this study) is 55.89%, with an average speed for the physical reconstruction to rebuild the rooms about 6.07% of the overall rooms per month. The quotient of these two values indicates that the reconstruction period is around 9.2 months. However, the average period for reconstruction and tourism recovery is about 20 months. There is an about 11 months' delay between that hotel and resorts have finished the reconstruction and the tourists start to visit Phuket as usual. Therefore, the local government, local tourist authority, and hotel entrepreneurs can consider these findings in order to prepare the recovery plan for tourism industry in the future tsunami.

**Keywords:** 2004 Indian Ocean Tsunami, Hotel Occupancy, Patong Beach, Tourist Industry, Tourist Business Recovery

## 1. Introduction

Nowadays, tourism contributes to more than 9% of Thai GDP (Gross Domestic Product) [1]. Phuket has the third-highest GPP (Gross Regional and Provincial Product) among Thailand's provinces, and its



economy heavily depends on this industry [2]. Especially, the hotel and restaurant sector accounted for more than one third of the Phuket GPP [2].

Back on the 26th December 2004, there was an earthquake in Sumatra Island in Indonesia with a magnitude of 9.1 [3] generating a massive tsunami that claimed lot of lives in 15 different countries with a maximum height approximately 50 meters [4]. In Thailand, it not only resulted in the death of at least 8,000 people [5], but also the devastation of many facilities, such as resorts, roads, households, telecommunication systems, pipeline systems and electricity facilities [6]. Phuket is considered to be the one of the most affected provinces in the 2004 Indian Ocean Tsunami in the south of Thailand, which includes Phang-nga, Krabi, Trang, Ranong, Satun and Phuket. It led to almost THB 3 billion drop of the hotel and restaurant sector income in 2005 [7], because of the serious facility damage and a high cancellation of bookings in the post disaster period. According to Airport of Thailand, the total international passenger arrivals at the Phuket internal airport in 2005 dropped almost 50%, comparing to 2004.

Many tourism facilities in Phuket suffered bankruptcy or a slump, because they started their business again immediately after the reconstruction phase. However, tourists did not really come back to the area for a long time [8]. In other words, the key issue of the tourism industry in Phuket in the post tsunami recovery was not the reconstruction of the tourism facilities, but how to bring back the visitors who have been scared away by the tsunami [9]. Nevertheless, there is a big gap between the anticipated period for the rebuilding of the tourism infrastructure and the real one. Although more than half of the hotels in Phuket were able to re-open a week after the tsunami, the period estimated by the government officials varied from weeks to a year. This would result in a delay in the tourism promotion. Moreover, a good anticipation the average speed for the physical reconstruction and tourism market recovery could help hotels to decide a proper time for their reopening. Patong beach was the beach in Phuket that got the worst hit by this tsunami. Based on a case study of Patong beach in Phuket, this paper tends to study the effects of the 2004 Indian Ocean Tsunami on Hotel Occupancy, with a focus on the speed for the physical reconstruction and tourism market recovery.

## 2. Background

The 2004 Indian Ocean Tsunami caused a huge damage and affected many different areas in Thailand. Table 1 summaries its economy impacts on three main sectors: social, production, and infrastructure sectors in detail. Out of the total damage and losses 85,747 million Baht, 83.9% (about 71,972 million Baht) is caused by the tourism. As shown in Table 2, the damage and losses of tourism facilities is about 14,648.3 million Baht. The remaining 80% (about 57,324 million Baht) are revenue losses because of the unavailability of rooms and the slow pace recovery of the tourists to arrive in the affected areas. Following Phang Nga, The damage and losses of tourism facilities in Phuket is the second largest in Thailand, around 4,103 million baht (*see* Table 2).

**Table 1.** Impacts of the 2014 Indian Ocean Tsunami to Thailand.

Sectors	Sub-Sectors	Description	Damage & Losses (Million Baht)
Social	Population	Death of people	--
	Housing	Damage and losses of housing units	866
	Education	Damage and losses of schools	340
	Health	Damage and losses of health facilities	115
Production	Agriculture	Losses of standing crops, together with the reductions in productivity	376
	Livestock	Losses of livestock numbers	18
	Fisheries	Damage and losses of fishing fleets & gears, together with the reductions in productivity	6,481
	Industry	Subsequent losses caused by the losses in agriculture and fishery	2,182
	Commerce	Subsequent losses caused by the losses in agriculture and fishery	1,479
	Tourism	Damage and losses of tourism facilities, together with the drop-in tourist arrivals, and further leads to losses of revenue	71,972
Infrastructure	Water Supply	Damage of water supply systems, together with the loss of revenue	153
	Electricity	Damage of electrical subsystems, together with the loss of revenue	557
	Transportation & communication	Damage and losses of roads, bridges, drainage works, airports and tele-communication facilities	632
	Others	Damage and losses of piers, dams and retaining walls, buildings and others	576

*Note.* Source [6].

**Table 2.** Estimated replacement and repair value of tourism facilities of the 2014 Indian Ocean Tsunami (Million Baht).

	Hotels and Resorts				Other Commerce				Total
	#	Bldgs	Goods	Damage	#	Bldgs	Goods	Damage	
Krabi	131	3,256.9	473.7	3,730.6	984	13.4	3.6	17.0	3,747.6
Trang	4	150.0	24.0	174.0	142	1.3	0.2	1.5	1,75.5
Phang Nga	93	5,953.0	340.2	6,283.1	858	20.4	4.9	25.3	6,616.1
Phuket	100	3,170.9	637.8	6,590.8	2,858	367.6	103.3	470.9	4,103.0
Ranong	2	4.4	0.6	5.0	62	0.8	0.2	1.0	6.1
Satun									
Total	328	12,535.2	1,597.8	14,132.6	4,904	403.5	112.2	515.7	14,648.3

*Note.* Source [6]

### 3. Background

This study is a pilot study of our research project. In the beginning of 2018, we collected the occupation rate and the availability of room for service data in the post tsunami period from 2003 to 2017 for the hotels existed before the tsunami and remained their operation until now, through face-to-face interviews with managers. Among them, we received responses from six hotels that located in the

Patong Beach of Phuket to allow us to conduct the data collection. As shown in Table 3, two of them are 3-star hotels, and another four are 4-star hotels. Most of them are located very close (less than 100 meters) to the Patong Beach. Only one hotel is around 500 meters away, where it is just at the boundary of area that was heavily damaged by the 2004 Indian Ocean Tsunami. The majority of tourists during that period came from Europe, Austria, China and Japan. Only four hotels were selected, because other two hotels could not provide the confidential data of their damage and the reconstruction rate.

**Table 3.** Descriptive information of the six samples sections, subsections and subsubsections.

	Hotel Star	No. of Rooms	Nationality of main customers	Location	
				Distance from Patong Beach (m)	Direction in Patong Beach
A	★★★★	72	European	50	South
B	★★★★	63	European & Australian	50	South
C	★★★★★	403	--	100	South
D	★★★★★	182	Australian, Chinese	100	South
E	★★★★★	350	Australian, Chinese, Japanese	500*	Middle
F	★★★★★	71	European, USA, Chinese	50	Middle

*Note.* \* Out of the heavily damaged area during the 2004 Indian Ocean Tsunami.

#### 4. Results

Table 4 shows the average occupation rate before and after the 2004 Indian Ocean Tsunami of the six samples. Before the Tsunami in Dec. 2004, the occupancy rates of all six hotels were above 80%. However, it immediately dropped 30% to 50% in Dec. 2004 after the Tsunami happened. As most of hotels did not provide us the monthly occupation rate in the normal year, so only the yearly occupation rate has been shown in Table 4. In all of our six samples, the occupation rate from before 2014 dismember, and after 2008 for each hotels in our sample are similar, so these periods are treated as Normal situation. It means during these periods, the occupation rate is not affected by the 2014 Indian Ocean Tsunami. Then, the average and standard deviation of the occupation rate in each hotel are calculated. In Table 4, only the values that are highlighted in the bold and italic font are significant different from the average occupation rate in the Normal situation based on the t-test. There are strongly affected by the Tsunami. The impacted periods are several months to 3 years differently on each hotel, according to the data shown in Table 4.

As shown in Table 5, there are only four hotels provide the room ratio that available for service before and after the 2004 Tsunami. Other two hotels did not provide us the confidential data, so we excluded them in Table 5. Table 5 shows that the Tsunami all the hotel rooms are restored by 2005. The availability of rooms directly after the Tsunami varies from only 24% to 95% of rooms in our sample. If we recalculated them based on the room number, on average in 2005, there are only 392 rooms out of 888 rooms that available on service. If the damage rate is defined as the unavailability of the room for service in this research, through calculation, the average damage rate is 55.89%. Among these hotels, three of them decided to close the hotel, and to reopen their business after the reconstruction, and the other one decided to continue its business even during its reconstruction.

The reconstruction of the hotel room is comparatively fast, even the longest one in our sample spent only around a year, and the shortest one spent just 2 weeks (see Table 5). The reconstruction speed for each month is recalculated based on the reconstruction period in Table 5, with the assumption that the reconstruction speed of each hotel is constant (suggested by hotel managers). Weighted by the room number of each hotel, the average speed for the physical reconstruction is about 6.07% per month. This reflects 6.07% restoration of rooms on average per month. The quotient of the average damage rate and the average speed for physical reconstruction indicates that the reconstruction

period is around 9.2 months. If we calculated the recovery period of the occupation rate of these 4 hotels that shown in Table 4, the average recovery period for their hotel business is 20 months.

**Table 4.** Average occupation rate of the six samples (2004~2017).

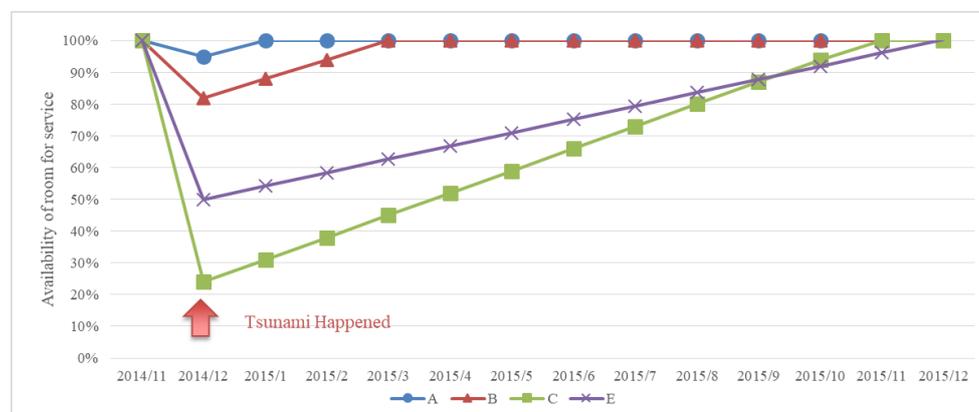
Hotel	Before Dec. 2004	Dec. 2004	2005	2006	2007	Average in Normal (before Dec. 2004, 2008~2017)	SD in Normal (before Dec. 2004, 2008~2017)
A	90.0%	40.0%*	70.0%*	80.0%*	90.0%	90.0%	0.0%
B	92.0%	60.0%*	98.0%	90.0%	90.0%	90.4%	1.1%
C	82.0%	38.0%*	38.0%*	77.0%	94.0%	83.1%	4.4%
D	90.0%	40.0%*	30.0%*	40.0%*	50.0%*	90.0%	0.0%
E	80.0%*	30.0%*	35.0%*	40.0%*	78.0%*	89.1%	2.9%
F	80.0%	50.0%*	80.0%	89.0%	80.0%	83.4%	5.6%

Note. \* significant at 0.05 (One-tail  $t$ -distribution,  $df = 10$ ).

**Table 5.** Availability of room for service (2004~2017).

Hotel	No. of Rooms	2003	Before Dec. 2004	Dec. 2004	2006	2007~2017	Closed Business for Reconstruction Period (Year)
A	72	100%	100%	95%	100%	100%	0.05
B	63	100%	100%	82%	100%	100%	0.25
C	403	100%	100%	24%	100%	100%	0.90
E	250	100%	100%	50%	100%	100%	0
Total No. of Room	888	888	888	392	880	880	--

Note. Availability of room for service of Hotels D and F are not available.



**Figure 1.** Reconstruction of the hotel room (2004~2005).

Note. This figure is drawn based on the linear assumption of reconstruction rate.

## 5. Conclusions

As mentioned before, through this case study, we found out that the average of damage rate at Patong beach in the Indian Ocean Tsunami is 55.89% of the hotel rooms. On average, the hotels spent around 9.2 months for the reconstruction, which means the average speed for the physical reconstruction about 6.07% per month. However, on the other hand, it took around 20 months to boom up the occupancy rate, which is much longer than the reconstruction period of the rooms. It indicates that many hotels suffered a long period with a low income, after they had spent a big amount of money for the reconstruction. The reason is that the speed of tourists came back to Phuket is much slower than the local people expected. We can image how serious was this problem to the small business. Just as Karatani mentioned in his research [8], many family business in Phuket were bankrupt not because of the damage from the Tsunami, but the slow recovery speed of the tourist.

There are two ways to solve this problem. One is to shorten the recovery time for the tourism industry. In other words, it is to motivate the tourists to come back faster. Combining Table 3 and Table 4, it shows that there is a slower recovery pace of the average occupation rate of hotels (Hotel D and E in the samples) that a part of their major customers is Chinese and Japanese. Meanwhile, most of managers that we have interviewed for this research agree that the Asian tourists came back to Phuket much slower than European and Australian. How to motivate Chinese and Japanese to come back to the Thailand after the disaster will be an important topic for the Thai tourism industry. Meanwhile, when another disaster happened, if the local government knows the average damage rate of hotels, the approximately reconstruction rate could be estimated, based on the Phuket experience that shown in this study. Therefore, it can help the tourism officers to create the tourism promotion strategy and campaign to encourage the tourists to come back right after most of the tourist facilities have been recovered.

The other solution is to provide a forecasting of the recovery speed of the tourism after the disaster to support the business owner to decide a "right time" to reopen the property. This research suggests the average occupation rate of the hotel to be one of the potential index for the tourism recovery, especially in Phuket. It is because of the high ratio of the hotel and restaurant income among the overall tourism income in Phuket. As a result, the overall market can generate the optimized market situation.

Since this is a pilot study, more data is required in order to understand the pattern and behaviour of the tourists' hotel booking. Next, the scales of each hotel are not exactly similar. This factor should be taken into account for the future study. In addition, it is necessary to take into account that the findings are relied on the construction technologies and the government reconstruction plans at that time; as well as the tourist's attitude which is possible to be the effect of the media and information channels at that time. Lastly, it has to be interpreted that 'tsunami' was the first-time experience of Thai government and Thai people at that time. The future tsunami, if any, may cause the different tourist market recovery pattern as the country has prepared the tsunami warning system following the lesson learned in 2004 [5]. Moreover, is it possible that the hotels can learn from some hotels in Japan in which they were changed to be the temporary shelter after the 2011 Great East Japan tsunami [10].

## 6. References

- [1] World Travel & Tourism Council 2017 *Travel & Tourism Economic Impact 2017 Thailand* Retrieved from: <https://www.wttc.org/-/media/files/reports/economic-impact-research/countries-2017/thailand2017.pdf>
- [2] C9 Hotelworks 2015 *Phuket 2015 Economic Overview* Retrieved from: <https://www.c9hotelworks.com/downloads/phuket-2015-economic-overview-2015-08.pdf>
- [3] Henderson J C 2007 Corporate social responsibility and tourism: Hotel companies in Phuket, Thailand, after the Indian Ocean tsunami *Int. J. Hospitality Manag.* **26**(1) 228-239
- [4] Suppasri A, Koshimura S, Imai K, Mas E, Gokon H, Muhari A and Imamura F 2012 Damage characteristic and field survey of the 2011 Great East Japan Tsunami in Miyagi Prefecture *Coastal Eng. J.* **54**(01)

- [5] Leelawat N, Suppasri A and Imamura F 2015 The tsunami warning system in Thailand: A part of the reconstruction process after the 2004 Indian Ocean tsunami *Post-Tsunami Hazard: Reconstruction and Restoration (Advances in Natural and Technological Hazards Research vol 44)* eds V Santiago-Fandiño, Y A Kontar and Y Kaneda (Cham: Springer International Publishing) chapter 8 pp. 111-119
- [6] Asian Disaster Preparedness Center 2007 *The economic impact of the 26 December 2004 earthquake & Indian Ocean tsunami in Thailand*
- [7] CB Richard Ellis (Thailand) Co., Ltd. 2008 *MarketView Phuket* Retrieved from: [https://www.cbre.co.th/media/research\\_lang\\_file/452/q2\\_08\\_phuket\\_market\\_view.pdf](https://www.cbre.co.th/media/research_lang_file/452/q2_08_phuket_market_view.pdf)
- [8] Karatani Y 2008 Tourism Industry Losses and Recovery Process from the Indian Ocean Tsunami: A Case of the Affected Tourist Destination in Southern Thailand *Proc. of the 14 th World Conf. on Earthquake Engineering*
- [9] Nidhiprabha B 2007 *Adjustment and recovery in Thailand two years after the tsunami (No. 72)*. ADB Institute Discussion Papers
- [10] Leelawat N 2018 Hotel-evacuation-shelter (in Thai) *TPA News vol 259* ed S Kan-uam (Bangkok: Technology Promotion Association (Thailand-Japan)) pp. 43-44

### **Acknowledgments**

This study has been partly supported by the SIIT Young Researcher Award (PI: Dr. Jing Tang) of the Sirindhorn International Institute of Technology; the Ratchadaphiseksomphot Endowment Fund (760003-CC) (PI: Prof. Dr. Suched Likitlersuang) of Chulalongkorn University; and the Japan-ASEAN Science Technology and Innovation Platform Research Network (JASTIP-Net 2017 No. 16) (PI: Dr. Natt Leelawat). Also, the authors would like to thank Mr. Noppawan Chotiwan and Mr. Thanavit Praktachakul for their help in data collection, as well as the support from all the samples.