

SEASONALITY OF VARIOUS VISITORS VISITING PHITSANULOK PROVINCE THROUGH HOLT WINTERS METHOD

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ABSTRACT

This article examines the seasonality of multiple types of visitors who visited in Phitsanulok by applying Holt Winters exponential smoothing method. The observations were collected quarterly during 2012-2017. The result indicates that seasonality of each tourism group is not exactly the same. Although the seasonal pattern between Thai and foreign visitors were different, the much lower number of international visitors comparing to the domestic one made the impact of international tourists toward overall seasonal effect small. In general, the first quarter, which was the favorite period of Thai visitors, was highest season for tourism of Phitsanulok province.

Keywords: 1) Tourism Demand 2) Phitsanulok 3) Tourism Seasonality 4) Holt Winters Exponential Smoothing

1. Introduction

The growth and impact of tourism toward both national and local economies have brought interest in tourism demand studies for at least thirty years. According to Li, Song and Witt (2005), there were 420 studies about tourism demand modelling published during 1960-2002, and Song and Li (2008) were able to review 119 articles published in the same topic during 2000-2006. Most of these studies focus on providing models to forecast the demand for certain tourist destinations. Although there have been number of tourism studies about tourism demand, there are only few articles that intend to analyze trend and seasonality of tourist destinations in Thailand, especially ones that are not the main tourist destinations such as Phitsanulok.

Phitsanulok is one of Thailand secondary tourist cities. It is located in the lower part of northern Thailand (about 377 kilometers north of Bangkok). The province covers an area of 10,815 square kilometers. It consists of mountains in the east and north part. Two third of the area is the plain region and has the Nan river running through the city. Phitsanulok has a tropical climate, so the weather is usually warm. There are three climate seasons. The winter is during November to February and December mostly has the lowest average temperature of the year. The summer is during March and May. The average temperature during summer is around 30.5 degree Celsius, and April is the warmest month with the maximum temperature is around 37 degree Celsius. Finally, the rainy season is from June to October.

As a tourist destination, Phitsanulok has the variety of attractions, including historical, cultural and natural attractions. Apart from Wat Phra Sri Rattana Mahathat, the famous tourist attraction, there are multiple water falls, forests and caves. Even though

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Phitsanulok was categorized as Thailand secondary tourist cities, tourism still generated around 7,098 Million Baht or around 8.09% of the province's Gross Provincial Product (GPP) in 2015. According to Ministry of Tourism and Sport, there were 1,961,584 tourists and 1,263,022 excursionists, visitors who stay less than a full day and do not stay overnight at the destination, who visited Phitsanulok during 2017. Most of these tourists stay in hotels (71.23%) and resorts (19.38%), and they, in average, stayed in Phitsanulok around 1.41 day per trip. In term of spending, a Thai tourist spent around 1,639 Baht per day in average, while an international one paid around 2,470 Baht per day. Accommodation and foods were first and second rank of the expenditure for both groups. In contrast, an excursionist, both Thai and foreigner, rather spent on souvenirs. Furthermore, the table 1 shows that seasonality might impact how different groups of visitors to come to Phitsanulok differently. To investigate further, the purpose of this paper is therefore to examine seasonality of tourism demand of Phitsanulok. In this article, the tourism demand is represented in term of the number of visitors, which is divided into four groups including Thai tourist, foreign tourist, Thai excursionist and foreign excursionist.

Table 1: Number of visitors, which are classified into four groups, in 2017

	Thai tourist	Foreign tourist	Thai excursionist	Foreign excursionist
First Quarter	506,901	41,175	427,072	19,784
Second Quarter	433,154	28,912	315,123	3,735
Third Quarter	408,147	31,327	205,029	5,134
Fourth Quarter	455,140	56,828	262,015	25,130

Source: Ministry of Tourism and Sport (2018)

2. Literature Review

2.1 Tourism demand

Tourism demand broadly means the willingness and ability to buy certain amount of tourism products at a certain price during any period of time. According to Dwyer, Forsyth and Dwyer (2010), tourism demand can be viewed from two perspectives, which are the demand for travel to a destination and the demand for particular tourism products such as tourist attraction's tickets, train tickets, hotel rooms or souvenirs.

Econometric models and time series (extrapolative) models are two techniques generally used for forecasting tourism demand. While the purpose of the econometric models is to identify relationships between tourism demand and other factors, the time series models are used to provide future information of tourism demand through its current and past behavior (Li, Song and Witt, 2005, Song and Li, 2008).

2.2 Tourism seasonality

Tourism products are different from normal ones, since time plays a crucial role in the production and consumption. Many of tourism products, such as airline seats and hotel rooms, cannot be stocked. Furthermore, seasonality that involves the concentration of tourist flows makes the demand of tourism become fluctuated. Hylleberg (1992, p. 4) has defined seasonality as *“the systematic, although not necessarily regular, intra-year movement caused by changes of the weather, the calendar, and timing of decisions, directly or indirectly through the production and consumption decisions made by the agents of the economy.”*

In short, the seasonality may generate from natural factors, such as climate, and institutional factors, such as academic calendar, holidays as well as special events and festivals. The variation of tourism demand caused by seasonality is an important issue for the industry, since there might be too many visitors at certain times, while at other times, the number of visitors can be very low. Therefore, understanding trend and seasonality as well as forecasting tourism demand is very important for tourism planning.

In general, there are two main concepts that have been used to measure seasonality in tourism. The first concept is inequality. Seasonality is viewed in this concept as the imbalanced distribution of tourism demand during a year. Through this concept, several studies (see, for instance, Baum and Lundtorp, 2001, Þórhallsdóttir and Olafsson, 2017) applied Gini coefficient to detect the seasonality. The second concept is decomposition concept. Based on the idea that a time series consists of four components, namely the trend, cycle, seasonal and irregular components, several researches (see, for instance, Lim et al., 2009, Untong and Kaosa-ard, 2009).

3. Research Methodology

This study evaluated the effect of seasonality toward tourism demand of Phitsanulok province by using time series data from the first quarter of 2012 until the fourth quarter of 2017. This data is provided by the ministry of tourism and sport. In this article, the tourism demand was characterized as the number of arrival of four groups of visitors, including Thai tourist, foreign tourist, Thai excursionist and foreign excursionist (see figure1). Then, the study applied Holt Winters exponential smoothing method to decompose the seasonality from the data. Then, the accuracy of the analysis was measured the root mean squared error (RMSE).

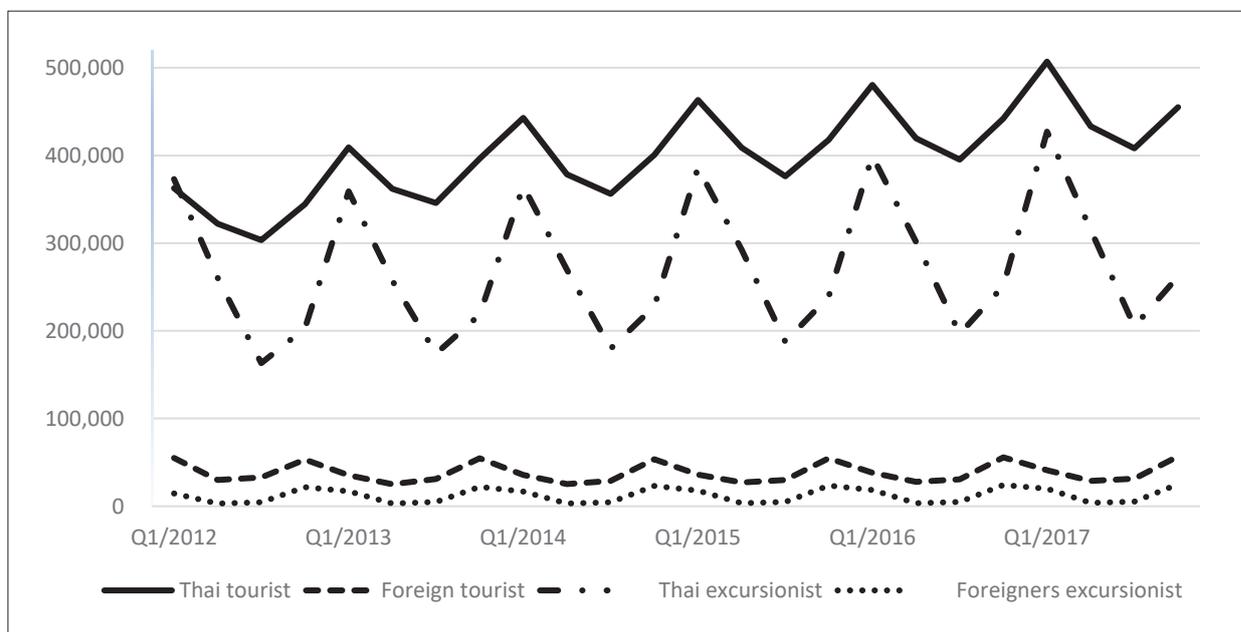


Figure 1: Number of visitors who visited Phitsanulok during 2012-2017

The main reason that this study used Holt Winters exponential smoothing as the method is the limitation of the data. The excursionist information was only available in a form of quarterly data and the data from the ministry of tourism and sport was accessible on from 2012-2017. Therefore, there were only 24 observations per set of data. However, the more complex time series models, such as Box-Jenkins models and neural network, are required at least 50 observations. Furthermore, applying Holt Winters method for tourism analysis is possible for most of practitioners because of its relatively straightforward implementation, and the previous studies (see, for instance, Cho, 2003, Song and Li, 2008 and Turner and Witt, 2001) indicated that the performance of the Holt Winters method was not outperforms by the more complex methods.

Holt Winters exponential smoothing model is generally used for forecasting data that contains both trend and seasonality. The model can be written as

$$F_t = L_{t-1} + T_{t-1} + S_{t-j}$$

$$\text{Based Level: } L_t = \alpha(A_t - S_{t-j}) + (1-\alpha)(L_{t-1} + T_{t-1}); \quad 0 < \alpha < 1,$$

$$\text{Trend: } T_t = \beta(L_t - L_{t-1}) + (1-\beta)(T_{t-1}); \quad 0 < \beta < 1,$$

$$\text{Seasonal: } S_t = \gamma(A_t - L_t) + (1-\gamma)S_{t-j}; \quad 0 < \gamma < 1,$$

where F_t the smoothed value for period t , and α , β and γ are smoothing coefficients

In this study, the smoothing estimates for the based level, trend and seasonal parameters are generated by Excel in which the root mean squared error is minimized.

4. Results

This section discusses two issues of tourism seasonality of Phitsanulok province; the duration of seasonality for each types of visitors and the level of seasonal fluctuation.

The result in table 2 and 3 indicates the seasonal factors as ratio to based level or the average level. The first quarter (Jan – March) and fourth quarter (Oct – Dec) were the high season for Thai tourists. The number of Thai tourists increased around 1%-3% of general level in the first quarter, then increased around 14%-15% in the first quarter. The β parameter of Thai tourists in this study is 0.125, and the tourists number grew between 16,000 -19,000 person per year. For international tourists, their high season of foreign tourist was only the fourth quarter (the number of tourists increased around 30%). This means that foreign mostly visited Phitsanulok during their winter break. According to information from the ministry of sport and tourism, the majority of foreign tourists came from Europe, especially from France. Furthermore, the β parameter of international tourists in this study is 0, which means that there was not significant growth in term of internal tourist number. Since the international tourism market of Phitsanulok was relatively low comparing to the domestic one as show in the table 1, the highest season for tourists to visit Phitsanulok is still the first quarter.

Seasonality of the excursionists who visit Phitsanulok seems have both similar and different issue to the seasonality of tourists. Although, the first quarter was still the highest season for Thai excursionists to visit Phitsanulok (the number of visitors increased between 42.7% - 45.5%), the second quarter can be seen as the high season as well (the number increased between 3.9% – 7.2%). For the international excursionists, their high season were the fourth and first quarter respectively.

Table 2: Seasonal ratio of tourists during 2013-2017

Year	First Quarter			Second Quarter			Third Quarter			Fourth Quarter		
	Thai	Foreign	Total	Thai	Foreign	Total	Thai	Foreign	Total	Thai	Foreign	Total
2013	1.141	0.860	1.129	0.980	0.610	0.948	0.917	0.752	0.900	1.035	1.316	1.059
2014	1.142	0.860	1.125	0.973	0.611	0.945	0.912	0.702	0.898	1.028	1.299	1.057
2015	1.156	0.873	1.132	0.987	0.652	0.954	0.906	0.718	0.893	1.014	1.314	1.049
2016	1.155	0.913	1.135	0.992	0.661	0.958	0.914	0.730	0.895	1.013	1.327	1.046
2017	1.153	0.976	1.136	0.985	0.684	0.956	0.916	0.741	0.897	1.012	1.344	1.043

Table 3: Seasonal ratio of excursionists during 2013-2017

Year	First Quarter			Second Quarter			Third Quarter			Fourth Quarter		
	Thai	Foreign	Total	Thai	Foreign	Total	Thai	Foreign	Total	Thai	Foreign	Total
2013	1.455	1.492	1.458	1.039	0.285	1.007	0.686	0.422	0.673	0.852	1.969	0.897
2014	1.441	1.487	1.443	1.047	0.283	1.014	0.691	0.402	0.677	0.864	1.985	0.909
2015	1.448	1.511	1.449	1.072	0.292	1.037	0.685	0.404	0.673	0.860	1.983	0.905
2016	1.427	1.534	1.431	1.064	0.292	1.030	0.685	0.405	0.672	0.865	1.963	0.908
2017	1.447	1.574	1.448	1.061	0.295	1.028	0.682	0.404	0.670	0.863	1.958	0.906

By comparing the size of seasonal factors as showed in the figure 2, it indicates that the level of seasonal impact to a variety group of visitors is different. Seasonality made the number of foreign excursionist fluctuated most, following by Thai excursionist and foreign tourist respectively. On the other hand, the fluctuation of Thai tourist’s seasonal ratio was low comparing with the other group. This indicates that even there was an obvious seasonal pattern for Thai tourists to visit Phitsanulok, the number of the tourists was not highly different in each season.

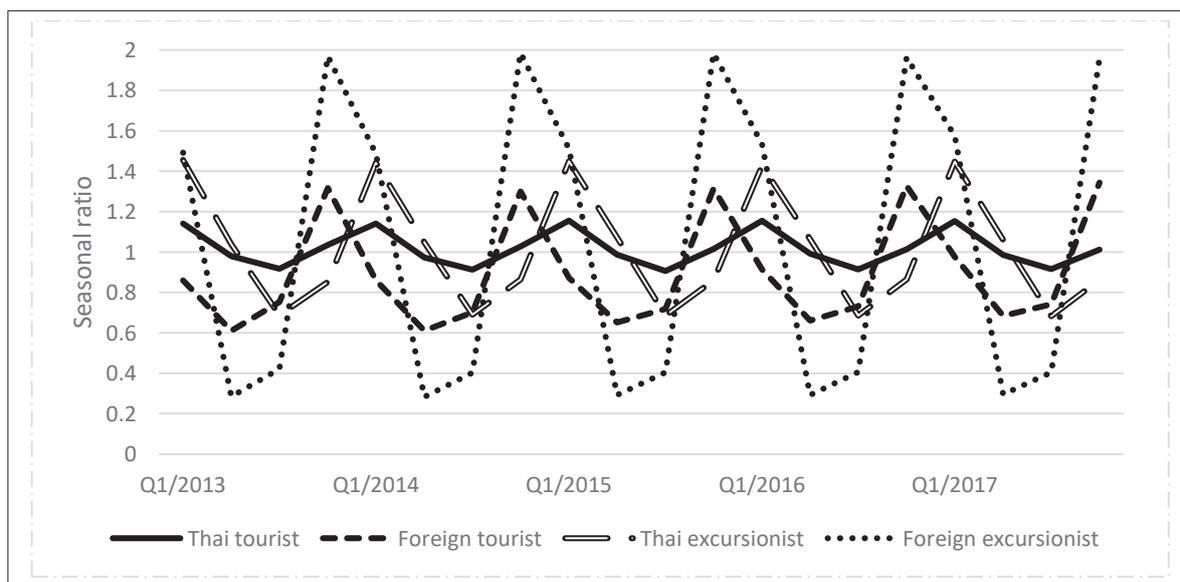


Figure 2: Comparing seasonal ratio of four types of visitors who visited Phitsanulok during 2013-2017

5. Conclusions

This study reveals that seasonality influenced the number of visitors to increase and decrease during certain periods of time. The first quarter was the highest season for tourism in Phitsanulok, then the number of visitor declined during the second and third quarter and enhanced again in the fourth quarter. As a tourist destination, the main market is rather a domestic than international destination. Not only the number of Thai visitor was much larger than the foreigner, the domestic market also performed better in term of growth. This study also shows that the tourism season for each group of visitors were not the same. This might give a clue for tourism planners to promote Phitsanulok to each market segment differently. There are two main limitations in this study. First, the inadequate of data that made the researchers have limited choices of analytical methods. The suggestion for further research is to focus only on tourist, which has more data than excursionist. The second limitation is an explanation for the cause of seasonality. This study only provides the size and time of seasonality. To have more understanding on tourism seasonality requires further survey and qualitative researches.

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