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The impact of insurgency in the deep south of Thailand on the arrival of Malaysian tourists to Betong district, Yala province using SARIMA with intervention model

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Abstract

This paper investigated the impacts of the insurgency on the arrival of Malaysian tourists to the Betong district in Yala province by applying the seasonal autoregressive integrated moving average with the intervention model. The results revealed that ten incidents had a significant impact on the number of Malaysian tourist arrivals, such as the bombing of electricity pole that led to the highest decrease in tourist arrivals to approximately 17,413 persons in July 2015. Moreover, the forecasts of the SARIMA $(1,1,1)\,(1,0,1)_{12}$ with intervention model revealed that the number of Malaysians traveling to Betong in the first quarter of 2020 before COVID-19 pandemic were 24,193, 31,659 and 25,309 persons, respectively, which are close to the preliminary number of the international tourist arrivals to Yala.

Introduction

Tourists from Malaysia play an essential role in the tourism market in Thailand. They are the second-largest visitors to Thailand, with a total of 4 million arrivals recorded in the year 2019. Betong district, situated near the Malaysian border in Yala province, is a well-known tourist destination for Malaysians. Between the year 2007–2018, an average of 200,000 Malaysians traveled to Betong, which is nearly 90 percent of the international tourist arrivals in Betong (Ministry of Tourism and Sport, 2019).

Unfortunately, the unrest in the southernmost provinces of Thailand affects the confidence of Malaysian tourists to visit Thailand. An example of such unrest is the attack and gun robbery at the army camp in Narathiwat province on January 4, 2004. This marked the beginning of a new wave of violence in the southernmost provinces of Thailand (Jitpiromsri, Waitoolkiat, & Chambers, 2018). In the same year, 32 people were killed due to the siege and arrest of insurgents in Krue-Se mosque on April 28, 2004. Furthermore, a crackdown on protesters took place near the Tak-Bai police station in Narathiwat province on October 25, 2004. This incident led to the death of 78 arrested protesters due to suffocation on their way to the military camp in Pattani. Consequently, the insurgency in the deep south of Thailand has gone through a period of radical confrontation (Jitpiromsri et al., 2018). The increased unrest incidents between 2007–2016 have negatively affected Thailand's economy (Fareed, Meo, Zulfiqar, Shahzad, & Wang, 2018).

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Hence, this article aimed to analyze the impacts of insurgency incidents in the southernmost provinces of Thailand and the other relevant incidents relating to the arrivals of Malaysian tourists to Betong. The analyses will be carried out using the Seasonal Autoregressive Integrated Moving Average (SARIMA) with the intervention model. The remainder of this paper includes Literature review, methodology, results and discussion, and conclusions and recommendations.

Literature Review

In general, the number of inbound tourists traveling to Thailand is determined by national income per capita, exchange rate, the relative price of tourism services and the size of population (Chinnakum & Boonyasana, 2017). However, some interrupting incident might decrease the number of arrivals. According to one research, insurgency incidents significantly reduced the number of tourist arrivals (Drakos & Kutan, 2003). However, other research found that terrorism did not affect international tourism demand in the long run. Additionally, the short-time effect is quite limited (Liu & Pratt, 2017). When the unrest is controlled, international tourism subsequently grows (Morakabati, 2020).

Usually, seasonal autoregressive integrated moving average or SARIMA model is a standard method used for modeling the number of tourist arrivals in many researches. Recent research using the SARIMA model includes the study by Hwandee and Phumchusri, (2020) and Lip et al. (2020). Nevertheless, to assess the impacts of interrupted incidents or prior known interventions on the number of tourist arrivals, the SARIMA with intervention model is often employed. Wongsathan (2018) employed the SARIMA with intervention model to assess the impact of violent political turmoil on tourist arrivals to Chiang Mai, Thailand, during 2000–2007. Wu and Hayashi (2014) explored the impact of disasters on international tourism arrivals to Japan using the same model. The result of their findings revealed that violent political turmoil and large-scale disasters like great earthquakes negatively impacted tourist arrivals. Likewise, Lee, Suhartono, and Sanugi (2010) studied the impact of the terrorist attacks on the tourism market in Bali. Their study found that the Bali bombing had a temporary negative effect on the number of tourist arrivals.

Methodology

Data Collection

This study employed the monthly data of Malaysian tourist arrivals to Betong and the insurgency incident data in southernmost provinces of Thailand to assess the impact of the insurgency on the arrival of Malaysian tourist in Betong. The data of Malaysian tourist arrivals to Betong from January 2004 to December 2019 were obtained from the Betong immigration bureau office. The insurgency incident data and the relevant events were retrieved from the southern border area news database of the office of academic resources, Prince of Songkla University, Pattani campus. Regarding news reported, a total of 44 incidents were subjectively selected by the criteria where those incidents led to severe loss of life and damage to property and likely affected the confidence in safety of Malaysian tourists as provided in Table 1.

Data Analysis

The SARIMA with intervention model comprises of the intervention model (I_t) and the noise model (N_t) as Equation (1).

$$Y_t = I_t + N_t \tag{1}$$

Y_t is the number of Malaysian tourist arrivals at time t. The functional form of the intervention model (I_t) is based on the characteristics of the intervention. For an intervention that causes a temporary impact, the intervention model is regarded as a pulse function. In this case, I_t is equal to 1 at the time when the invention occurred, otherwise it is zero. For an intervention that causes permanent impact, the functional form of the intervention model becomes the step function, where I_t is equal to zero at the time before the intervention occurred otherwise it is equal to 1.

The noise model (N_t) is parameterized as the SARIMA $(p,d,q)\ (P,D,Q)_s$ model as Equation (2).

$$\phi_p(B)\Phi_P(B^s)(1-B)^d(1-B)^D N_t = \delta + \theta_q(B)\Theta_Q(B^s)\varepsilon_t \tag{2}$$

ε_t is the series of residuals which are normal distributed and identically independent with zero mean and homogeneous variance. δ is the constant value and s is the number indicating seasonal factors. d and D are the order of differencing and seasonal differencing respectively. B is the backshift operator where $\phi_p(B)$,$\Phi_P(B^s)$,$\theta_q(B)$ and

Table 1 The incidents that likely affected the arrivals of Malaysian tourists

No.	Incident Code	Details of the Incident
1	JAN2004	Gun robbery at the army camp in Narathiwat province
2	MAR2004	Establishing the front office of the Internal Security Operation Command
3	APR2004	Siege and arrest of insurgents in Krue-Se mosque
4	OCT2004	The crackdown on the protesters near the Tak-Bai police station
5	DEC2004	Tsunami
6	FEB2005	Bombing in Yala city, Narathiwat and Sungai Kolok municipalities
7	APR2005	Several Bombings in Songkhla including the Hat-Yai international airport
8	DEC2006	Bombing many commercial banks in Yala city municipality
9	FEB2007	Bombing in Betong municipality
10	MAR2007	The public mini-bus attacked on Betong-Hat Yai road
11	AUG2007	Several terrorism events in Betong
12	SEP2007	Bombing in several areas of Pattani, Yala, Narathiwat province
13	FEB2008	Bombing in Betong municipality
14	MAR2008	Bombing in front of C.S. Pattani Hotel, in Pattani
15	AUG2008	Bombing the electricity pole in Betong
16	NOV2008	Bombing at the market in Sukhirin district, Narathiwat
17	DEC2008	Bombing at the department Store in Pattani and at the hotel in Yala
18	SEP2009	Bombing in Yala city municipality
19	OCT2009	Bombing in Sungai Kolok district, Narathiwat
20	DEC2009	Bombing in Bajoh district, Narathiwat and in Banang Star district, Yala
21	FEB2010	Bombing in Banang Star district, Yala
22	APR2010	Bombing at Pattani police station in Pattani
23	FEB2011	Bombing in a parking lot in the Yala City Hall
24	AUG2011	General Election in Thailand after harmful political conflict
25	MAR2012	Bombing in Hat Yai district, Songkhla and in Yala
26	SEP2012	Bombing in Sino-Thais community in Saiburi district, Pattani
27	APR2013	Bombing the deputy Governor car on the road no.410 from Yala to Betong
28	DEC2013	Bombing in Sadao district, Songkhla
29	APR2014	Bombing in Yala city municipality
30	MAY2014	Coup d'é·tat
31	AUG2014	Bombing in front of the Holiday Hill Hotel in Betong on July 25, 2014
32	NOV2014	Murdering ustaz Asan Manatae in Betong
33	FEB2015	Bombing in Narathiwat municipality
34	JUL2015	Bombing electric pole in Tan-To district
35	AUG2016	Bombing in several southern provinces
36	OCT2016	Bombing at Pattani municipality's market in Pattani
37	MAY2017	Bombing in front of Big C Supercenter, Pattani branch
38	AUG2017	Bombing in Tak Bai district, Narathiwat
39	NOV2017	Bombing in Mayor district, Pattani
40	DEC2017	Many insurgency incidents near Betong district, Yala
41	AUG2018	Insurgency incidents in Rueso district, Narathiwat
42	DEC2018	Bombing the statue at Samila beach
43	JUL2019	Death of Abdulloh Esormusor related to criminal inquiry at the army camp
44	NOV2019	Insurgency at Lumphaya sub-district in Yala Province

$\Theta_Q(B^s)$ are the autoregressive operator order p, the seasonal autoregressive operator order P, the moving averages operator order q, and the seasonal moving averages operator order Q, respectively.

To identify SARIMA with intervention model, the first step is to determine the noise model (N_t). This step begins with the unit root testing to check the stationary of the series with the Augmented Dickey-Fuller (ADF) test and Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) test. The autocorrelation and the partial autocorrelation plots were examined to determine the possible orders of the candidate noise models. After estimating the parameters of all the candidate models with the maximum likelihood method, the Akaike information criterion (AIC) and the Bayesian information criterion (BIC) were employed to select the most parsimonious noise model. The second step to identify the functional form of the intervention model (I_t) was by examining the residuals of the noise model with the intervention incidents. Lastly, in the third step, the parameters of the SARIMA with intervention model, which is the combination of the intervention model and the noise model, are estimated with the maximum likelihood method. Based on the estimated model, this study subsequently provided both points and interval forecasts on the arrival of Malaysian tourists.

Results and Discussion

The unit root test with the ADF test and KPSS test showed that the monthly data of Malaysian tourist arrivals is non-stationary and needs to be transformed into the log-differenced term. Consequently, based on the log-difference series, the partial autocorrelation function (PACF) plot in Figure 1 revealed that there are 2 possible orders of the autoregressive term (p) because the 1st and the 2nd lags of PACF are statistically significant. However, after the 2nd lag onwards, the PACF sharply decreased and was not statistically significant.

Likewise, the autocorrelation function (ACF) plot showed that the order of moving average term (q) has only 1 possible value because the 1st lag was statistically significant, and ACF rapidly died off after the 1st lag indicating no statistical significance. Furthermore, as shown in Figure 1, the order of seasonal autoregressive term (P) and the order of seasonal moving average term (Q) were equal to 1 indicated by the 12th lag of ACF and PACF, which are both statistically significant.

Following the order indicated by the ACF and PACF plot, there are six candidate noise models. After parameter estimation of the models using the maximum likelihood method, the AIC and BIC of each candidate model are provided in Table 2. The SARIMA $(1,1,1)\ (1,0,1)_{12}$ is the most parsimonious model with the lowest AIC and BIC among the candidate models.

For the next step, the intervention model (I_t), which is the intervention function of the 44 incidents, was combined with the SARIMA $(1,1,1)\ (1,0,1)_{12}$ noise model (N_t). Since these incidents only resulted in a temporary effect, the pulse function was applied to all the incidents. After estimating the parameters of the SARIMA $(1,1,1)\ (1,0,1)_{12}$ with intervention model and the maximum likelihood method and check model diagnostic test, the AIC and BIC of the model were -66.70813 and -17.92403 respectively, which are much lower than the AIC and BIC of the noise model. Moreover, the estimated model also showed that there are only ten incidents that significantly impacted the number of Malaysian tourist arrivals, as shown in Table 3.

Since the parameters of the intervention are estimated based on data transformation, the parameters of this model could not be interpreted directly (Lee, Suhartono, & Sanugi, 2010). Thus, the impact of the invention on logarithm transformation data was practically obtained by taking the difference between the forecasts of SARIMA with intervention and the SARIMA noise model at the same period of intervention as provided in Table 4.

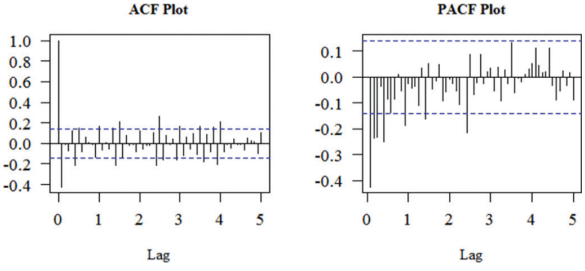

Figure 1 The Autocorrelation function (ACF) and Partial correlation function (PACF) plots of the log-difference of Malaysian tourist arrivals to Betong

Table 2 Information criteria of each candidate SARIMA noise models.

Model	AIC	BIC
SARIMA $(1,1,1)\ (1,0,0)_{12}$	110.5441	123.5532
SARIMA $(2,1,1)\ (1,0,0)_{12}$	111.4971	127.7584
SARIMA $(3,1,1)\ (1,0,0)_{12}$	113.4832	132.9968
SARIMA $(1,1,1)\ (1,0,1)_{12}$	102.3722	118.6336
SARIMA $(2,1,1)\ (1,0,1)_{12}$	103.4858	122.9995
SARIMA $(3,1,1)\ (1,0,1)_{12}$	105.4833	128.2492

Table 3 The parameters of SARIMA (1,1,1) $(1,0,1)_{12}$ with intervention model

Variables	Coefficient	Standard error	*p*
AR1	0.644078	0.077936	.000 ***
MA1	-0.952908	0.034482	.000 ***
SAR1	0.992565	0.011915	.000 ***
SMA1	-0.886633	0.090514	.000 ***
APR2004	-0.265112	0.149674	.076 *
DEC2004	-0.334209	0.150235	.026 **
DEC2006	-0.981270	0.147354	.000 ***
MAR2007	0.396576	0.146125	.011 ***
SEP2007	-0.444421	0.146655	.002 ***
FEB2010	-0.575365	0.145874	.000 ***
FEB2011	-0.457031	0.146428	.001 ***
AUG2011	0.319698	0.145351	.027 **
AUG2014	0.356091	0.145939	.014 **
JUL2015	-2.548594	0.145372	.000 ***

Note: * $p < 0.5$, ** $p < .01$, and *** $p < .001$.

Table 4 The impacts of each intervention incident

Incident	The SARIMA noise model	The SARIMA with Intervention	Impacts
APR2004	6,512	4,559	-1,953
DEC2004	9,639	9,001	-638
DEC2006	10,472	4,698	-5,774
MAR2007	12,838	20,655	7,817
SEP2007	14,853	10,951	-3,903
FEB2010	18,314	11,192	-7,122
FEB2011	17,292	14,398	-2,894
AUG2011	16,936	25,410	8,474
AUG2014	18,449	27,485	9,036
JUL2015	18,892	1,479	-17,413

Following Chambers, Jitpiromsri, and Waitoolkiat (2019), incidents in the Deep South of Thailand can be divided into four periods: elected government (2004–2006), Military-established government (2006–2008), elected government (2008–2014) and the post–2014 military regime (2014–present).

In 2004–2008, the government during that period adopted an aggressive counter-insurgency policy, but the insurgency incidents still occurred. Three incidents relating to the insurgency that negatively impacted the arrivals of Malaysian tourists included the suppression at Krue Se mosque – APR2004, the bombing of many commercial banks in Yala – DEC2006, and the bombing in many areas of Pattani, Yala, Narathiwat– SEP2007. These three incidents caused reductions in the number of Malaysian tourist arrivals of approximately 1,953 persons, 5,774 persons, and 3,903 persons, respectively. Additionally, another negative-effect incident, Tsunami (DEC2004), caused the arrivals to decrease to 638 persons. In contrast, the bus attacked by insurgents on

Betong-Hat Yai road – MAR2007 was an insurgency incident that had positive impact on the number of arrivals because there are immigration checkpoints in the three provinces, Yala, Songkhla and Narathiwat, that Malaysian tourists usually pass through into Thailand (Askew, 2008). Consequently, this incident induced the Malaysian tourists to change their traveling route and alternatively choose Betong immigration checkpoints for travel into Thailand. The number of arrivals therefore increased to 7,817 persons in March, 2007.

For the initial period of the elected government (2008–2014), the policy to resolve conflict mainly employed military measures, but the insurgency still occurred continuously. Two incidents, which were the bombing in Banang Star near road no.410 – FEB2010 and the bombing in a parking lot in the Yala City Hall – FEB2011, caused reductions in the number of arrivals of approximately 7,122 persons and 2,894 persons, respectively. However, during the election campaign in July 2011, Yingluck Shinawatra, the leader of Puea Thai party, pledged to employ pro-Muslim policy as a critical priority for solving the conflict in the southern border of Thailand once, the Puea Thai party won a general election (Jitpiromsri, et.al, 2018). Such news brought new hope for changes in southern policy, as well as created a peaceful atmosphere in deep-south communities (Zhihao, 2011). The general election in Thailand after harmful political conflict – AUG2011 consequently lead to an increase in the number of arrivals, 8,474 persons in August 2001. Furthermore, the government policy became less aggressive and implemented more political measures such as peace dialogue to resolve the conflict (Chambers, Jitpiromsri, & Waitoolkiat, 2019).

Although, the bombing in front of the Holiday Hill Hotel on July 25, 2014 – AUG2014 caused losses and especially affected tourism in Betong Municipality, its impact was temporary. Apart from traveling as family groups, male Malaysian tourists are other tourist groups that mainly traveled to enjoy nightlife in Betong Municipality (Askew, 2008). When more measures to prevent the insurgency were implemented and the unrest was under control, Malaysian tourists had more confidence and increased in number of arrivals to 8,474 persons in August 2014.

In post–2014 military regime period (2014–present), the peace dialogue has been delayed indefinitely. This has created an uncertainty and affected the confidence of safety for both locals and international tourists in the Deep South (Chambers et al., 2019). The bombing of high voltage electricity poles in the area of Than To– JUL2015 caused a blackout in Betong district for several hours and led to the reduction in the number of Malaysian tourists arriving, approximately 17,413 persons.

The estimates and the forecasts for the number of Malaysian tourist arrivals to Betong from January 2004 to December 2020 are provided in Figure 2. The estimates of arrivals (blue line) fits quite well with the original series (black line). The mean squared residuals and the sum squared residuals of the SARIMA with intervention model are 0.0318 and 6.1114, respectively, which are lower than the mean squared residuals and the sum squared residuals of the noise model found to be 0.0902 and 17.3374, respectively. The forecasted number of Malaysian tourist arrivals to Betong in 2020 (red line) and the 95 percent confidence interval (grey area) from the SARIMA $(1,1,1)\ (1,0,1)_{12}$ with intervention model are presented in Figure 2.

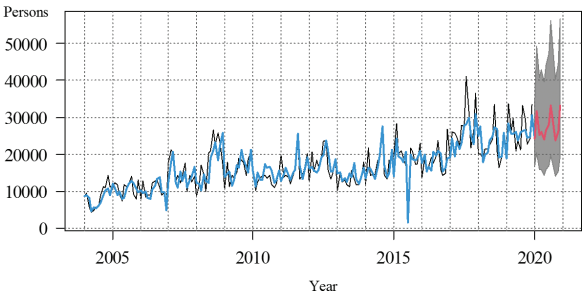

Figure 2 The estimates and forecasts of the number of Malaysian tourist arrivals to Betong from the SARIMA $(1,1,1)\ (1,0,1)_{12}$ with intervention model

The pattern of forecasts in 2020 is quite similar to the pattern in 2019, which has two peaks. The first peak occurred between December and January while the second peak took place in August. This arrivals pattern should be used for planning and arranging the marketing campaign in order to promote tourism in Betong.

Conclusion and Recommendation

This study provided more estimated number of Malaysian tourist arrivals that were impacted by insurgency incidents. The findings of the study showed that the insurgency incidents had temporary impacts on the number of Malaysian tourist arrivals. Most of the incidents caused a sudden drop in the number of arrivals, especially the incident that affects infrastructure, such as electricity. However, some incidents surprisingly had positive impacts due to the decrease in tourists' anxieties

after the incidents occurred, controlled unrest, and the political stability, which signal a peaceful atmosphere. If the government can control the unrest in southernmost provinces, the Malaysian tourism market in Thailand will revive and continue to boom. This study only applied univariate time-series analysis and focused on the insurgency incidents that might affect the number of arrivals. It did not include the tourists' behavior as well as other socio-economic factors as endogenous factors of the model. Consequently, this is a limitation of this study.

The forecasts in this study were based on the situation before the occurrence of the COVID-19 pandemic. The forecasts in the first quarter in 2020 are proportionally similar to the preliminary number of the international tourist arrivals to Yala, reported by the ministry of tourism and sports, which were 41,038 19,989 and 21,931 persons, respectively (Ministry of Tourism and Sport, 2019). However, the number of international tourist arrivals to Yala sharply dropped to 56 persons in April 2020 due to the closure of point of entry into the kingdom of Thailand under the regulation issued under section 9 of the emergency decree on public administration in emergency situations 2005 on March 26, 2020 (Royal Thai Government, 2020).

Conflict of Interest

There is no conflict of interest.

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