

Determinants Influencing the Demand for International Tourism in Thailand

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Abstract

An anticipated result of trade liberalisation is a rise in the influx of international tourists. The aforementioned outcome stems from the prevalent phenomenon of trading entities engaging in cross-border activities to partake in various commercial endeavours, including the establishment of complex business networks, the formation of collaborative business ventures, and the actual implementation of business transactions. The primary aim of this study is to investigate the factors that influenced international tourism in Thailand from 2010 to 2019, spanning a duration of ten years. The research has utilised economic growth, exchange rate, trade liberalisation, air pollution, and tourism infrastructure as crucial factors influencing international tourism in Thailand. The dataset consists of data collected from 20 prominent tourist economies that have visited Thailand during the period from 2010 to 2019. The justification for utilising data up until the year 2019 stems from the notable influence of the COVID-19 pandemic on the tourism sector during the latter portion of that year. Hence, the data obtained during this specific timeframe may not be suitable for conducting a comprehensive analysis of tourism demand. The analysis utilises a vector error correction model. The expansion of the tourism industry is influenced by economic growth, trade liberalisation, and the presence of tourist-friendly infrastructure, as indicated by this study. The discovery of positive coefficients in the analysis lends support to the previously mentioned conclusion. However, the correlation between air pollution and the expansion of tourism is a subject of great interest that necessitates additional research in order to comprehend the intricate mechanisms involved. This study represents a pioneering contribution to the examination of issues pertaining to international tourism in Thailand.

Keywords: Economic Growth, Air pollution, Tourism, Exchange rate, Thailand

Background

The significant expansion of this industry can be attributed to the heightened interchange of political, economic, scientific, and cultural elements, which is a salient feature of the phenomenon of globalisation (Efremov & Vladimirova, 2019). Fundamentally, tourism serves as a vital mechanism for individuals to gain knowledge regarding the historical and cultural elements of foreign countries. This platform offers individuals the chance to acquire knowledge and develop an appreciation for the cultural customs and traditions of diverse communities. Therefore, it can be argued that vacations and travel are commonly associated with concepts such as relaxation, enjoyment, and the discovery of new destinations and diverse cultures (Fu, 2023). Nevertheless, it is imperative to acknowledge that tourism is an industry undergoing substantial growth and presents considerable opportunities for future advancement (Goh & King, 2020). The tourism industry exerts a substantial influence on multiple sectors of the economy, encompassing the production of consumer goods, the establishment of transportation and communication networks, and the expansion of the agricultural sector.

Therefore, it can be inferred that this resource plays a substantial role in the economic advancement of a nation or locality (Surya, Saleh, Idris, & Ahmad, 2021). This phenomenon can be primarily attributed to its ability to increase the Gross Domestic Product (GDP), boost the inflow of foreign currency into the country, and create new employment opportunities in the food and beverage service industries, transportation sector, and related sectors. Moreover, the proliferation of interdependent industries not only fosters the general fortification of the economy but also serves to augment governmental income. The study conducted by Cheng, Li, and Liu (2020) provides empirical evidence that substantiates the advantages mentioned.

Governments are increasingly utilising exchange rates as a primary economic policy tool to facilitate international trade and manage the trade balance (Liu & Lee, 2022). The Marshall-Lerner condition, a widely acknowledged concept, can be traced back to Marshall's influential paper published in 1923. In the present study, Marshall expounds upon the core principle of his theoretical framework pertaining to the concept of price elasticity of demand (Valdes et al., 2019). According to the theoretical

framework presented, it is argued that a deliberate strategy of currency devaluation can potentially enable a nation to improve its trade balance over a prolonged period of time. This concept has been thoroughly examined and supported by a number of prominent scholars, such as [Alexander \(1952\)](#), [Bahmani-Oskooee \(1985\)](#), and [Branson \(1972\)](#). The depreciation of a currency has the impact of altering the relative prices of different products, leading to a reduction in the demand for imported goods and an increase in the demand for exported products. The observed phenomenon can be attributed to the inverse relationship existing between exchange rates and export prices.

When a country's currency undergoes depreciation, there is a concomitant reduction in the expenses linked to the exportation of goods. However, [Saushini \(2020\)](#) put forth the concept that following a currency devaluation, there is a period of transition in which different economic actors, such as consumers, importers, and exporters, go through an adaptation process. There is a robust correlation between currency devaluation and a substantial rise in the trade deficit. The lack of flexibility in import and export contracts has been well documented in scholarly research, as demonstrated by the studies conducted by [Urias and Ramani \(2020\)](#). Typically, these contracts establish predetermined prices and quantities well in advance. The purpose of this measure is to mitigate the negative consequences of currency devaluation on aggregate demand within the economy. The observation of price disparities over a specified duration suggests that subsequent to a devaluation of a currency, there is a probability of import prices rising in relation to domestic currency values, while export prices are anticipated to remain unaltered.

According to the findings of [Mesagan, Alimi, and Vo \(2022\)](#), it was observed that a devaluation of the domestic currency is associated with a detrimental effect on a country's trade surplus. Both parties engaged in trade possess a substantial incentive to initiate the renegotiation of their agreements as a result of the escalating consumer demand for both imports and exports. There is a widely held consensus that the adoption of these novel agreements will lead to a rise in prices associated with product imports, thereby resulting in a decrease in demand. The reduction in expenses associated with exporting will result in a corresponding rise in the level of demand. A

comprehensive examination has been undertaken by scholars to explore the principles of the J-curve theory in various groups of countries, utilising a wide range of empirical research methods. Nevertheless, a lack of agreement persists with regards to the conclusions drawn from the research. Numerous researchers, such as [Kock \(2021\)](#), [Ahmed, Mohsen, Anwar, and Ullah \(2021\)](#), and [Arthur, Selase Afenya, Asiedu, and Aduku \(2022\)](#), have conducted comprehensive investigations on the J-curve phenomenon, devoting substantial scholarly endeavours and resources to their respective inquiries. The combination of these influential works and subsequent inquiries provides significant empirical evidence in favour of the existence of the J-curve phenomenon. The J-curve hypothesis, which has gained widespread acceptance, has been the subject of critical examination in several academic studies, such as those conducted by [Ahmed et al. \(2021\)](#) and [Kock \(2021\)](#). The empirical evidence presented has cast doubt on the validity of the J-curve hypothesis.

This phenomenon can be attributed to the prevalent trend of multinational corporations engaging in cross-border transactions to partake in diverse commercial endeavours. Several scholarly investigations, such as the research conducted by [Kirillova, Wang, Fu, and Lehto \(2020\)](#) and other relevant studies, have provided insights into the relationship between a country's level of economic openness and its capacity to attract tourists. The relationship between trade liberalisation and GDP growth has garnered substantial scholarly interest, whereas the association between trade liberalisation and tourism growth has received relatively less scholarly attention.

[Dwyer \(2022\)](#) has recently conducted a study that asserts that the presence of tourism infrastructure has a favourable impact on the overall welfare of indigenous inhabitants. The impact can be observed in two distinct manners: firstly, through the direct influence of promoting the expansion of sustainable tourism, and secondly, through the indirect consequences stemming from the aforementioned promotion. Research conducted in this particular domain has explored various aspects, including the realm of tourism infrastructure. However, it is important to note that this subject has not been the exclusive focal point of their investigations. The scope of these studies encompasses various aspects, such as examining the impact of infrastructure on the

promotion of tourism, the influence of infrastructure on the industry's growth, the interrelationship between the two, the effects of transport infrastructure on the expansion of tourism, the correlation between tourism infrastructure and the rise in international visitors, and other relevant subjects and concerns (Dwyer, 2022).

A plethora of studies provide compelling evidence supporting the crucial role of infrastructure, in its various manifestations, in fostering the advancement and expansion of the tourism sector. While numerous studies have examined various aspects of tourism infrastructure, such as transportation, social amenities, and environmental provisions, there has been a notable lack of attention given to the collective impact of these elements on the attractiveness of a destination. This study utilises existing scholarly literature and empirical data from Thailand to examine the complex relationship between monetary investments and the growth of the tourism industry (Sou & Vinnicombe, 2023). The main aim of this study is to examine the effectiveness of these investments in attracting international tourists to the country, with the intention of capitalising on the various tourist attractions available within the country.

Despite garnering considerable scholarly attention, the correlation between air pollution and the expansion of tourism has regrettably received insufficient examination within the domain of tourism literature. The phenomenon under examination can be ascribed to the intricate interplay between air pollution in popular tourist destinations and the consumption patterns exhibited by these tourists, thereby resulting in an adverse effect on the overall air quality in these urban regions (Chin & P Hampton, 2020). One of the primary obstacles encountered in contemporary research pertains to the restricted accessibility of data of superior quality, a critical prerequisite for undertaking a comprehensive examination of this intricate interplay. This particular quandary has served as the impetus for our involvement in this research endeavour. The objective of our research is to enhance comprehension regarding the correlation between atmospheric pollution and the expansion of the tourism industry.

The tourism industry has also emerged as a pivotal sector within the Thai economy. Between the years 2017 and 2019, the tourism industry in Thailand exhibited a consistent average contribution of 18.13% to the nation's gross domestic

product (GDP). Furthermore, it facilitated job opportunities for an estimated 4,359,328 individuals, constituting approximately 11.58% of the overall labour force. Based on the data provided by the Ministry of Tourism and Sports in 2020, the total revenue generated by international or inbound tourists was estimated to be around 91,362 million USD. Furthermore, the increased presence of international tourists in Thailand can be attributed to a wide range of natural and cultural resources, such as Thai cuisine, Thai festivals, and Thai spas, as well as the well-known hospitality exhibited by the Thai population. The increase in visitor numbers can be observed through statistical data, as the figures rose from 22.4 million in 2012 to a maximum of 39.9 million in 2019 (see Figure 1). As a result, Thailand has emerged as the eighth most favoured destination for international tourists, positioning itself as the second most popular choice in Asia, following China (Figure 2).

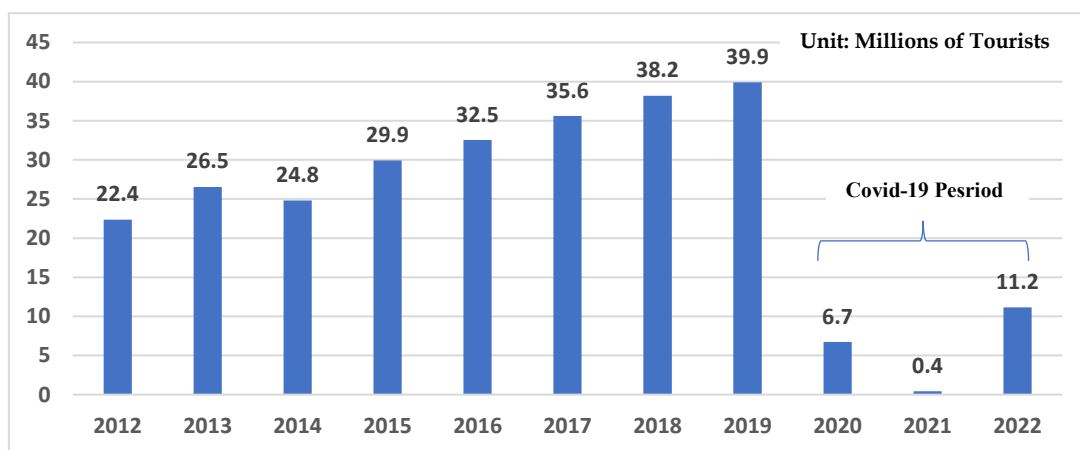


Figure 1: The Number of Foreign Tourists Visiting Thailand 2012 - 2022

Source: The UN's World Tourism Organization

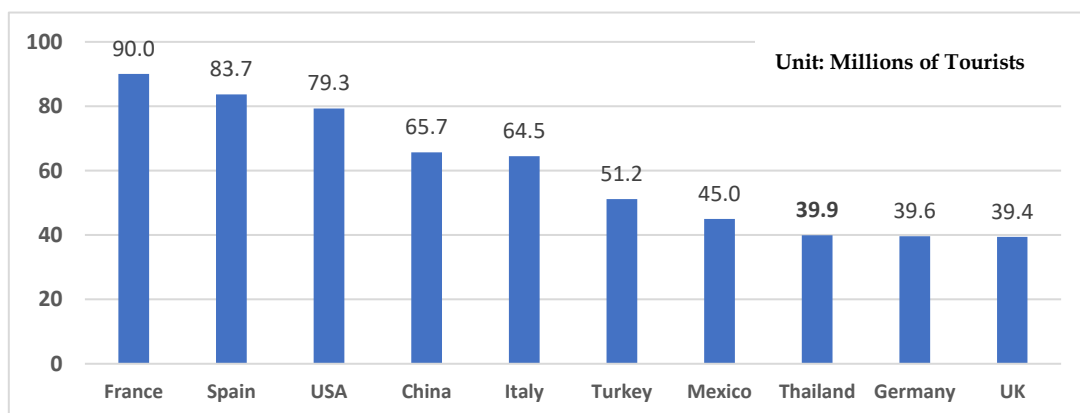


Figure 2: Top 10 Countries Most Popular with Tourists (by number of 2019 visitor arrivals)

Source: The UN's World Tourism Organization

The Thai government has recognised the tourism sector as possessing substantial potential and, as a result, has designated high-value and medical tourism as priority national target industries. Various travel regulations have been strengthened with the aim of improving the overall tourist experience. These measures include the introduction of a six-month multiple entry visa and the reduction of fees associated with visa-on-arrival. As stated on the official website of the Tourism Authority of Thailand (www.tourismthailand.org), individuals who enter Thailand via an international airport are granted a maximum stay of 30 days in the country. The attractiveness of Thailand as a tourist destination is further augmented by its suitability for both long-term tourism and short-term visits. Furthermore, it is important to note that there are various infrastructural components that play a significant role in supporting the development of tourism. These elements encompass logistics and transportation systems, including airports, seaports, and railways. Additionally, there is a wide range of hotels and lodging options available to cater to the diverse needs of tourists (Edirisinghe, Silva, & Siriwardena, 2021). The contemporary healthcare system, which is characterised by skilled medical professionals, affordable costs, and well-equipped wellness facilities, plays a significant role in attracting a larger influx of tourists seeking medical services and contributing to the local economy.

Literature Review

The scholarly attention given to the intricate connection between exchange rates and bilateral trade balances in the context of tourism has been insufficient, despite the notable influence of exchange rates on international tourism. Drawing upon a substantial corpus of scholarly work in the domain of tourism economics, encompassing notable contributions by researchers such as Dogru, Isik, and Sirakaya-Turk (2019) and Akadiri and Akadiri (2021), it becomes evident that the examination of the influence of exchange rates on the demand for tourism has yielded inconclusive findings thus far. In their study, Dogru, Isik, and Sirakaya-Turk (2019) undertook a comprehensive examination aimed at assessing the impact of currency exchange rates on trade balances in the international tourism sector. In order to gain a deeper

comprehension of the complex dynamics at play within this domain, the principal objective of this research endeavour was to conduct a comparative analysis between the United States and other nations. Although the data did not reveal a distinct "J-curve" pattern, the results suggest that outbound tourism exhibits greater sensitivity to fluctuations in currency value compared to inbound tourism. [Nguyen \(2020\)](#) conducted a scholarly investigation on the complex correlation between the valuation of the dollar and the magnitude of the tourism trade deficit or surplus in the United States.

The research employed an alternative empirical approach, utilising quarterly data as the basis for its findings. In a recent empirical study conducted by [Dogru \(2019\)](#), the researcher employed the cointegration methodology to investigate the J-curve theory, with a specific focus on the trade balance of tourism in the United States. The research conducted by [Dogru, Isik, and Sirakaya-Turk \(2019\)](#) did not yield adequate evidence to substantiate the validity of the J-curve theory. However, the study provides empirical evidence that lends support to the notion that a depreciation of the US dollar confers advantages upon the United States, particularly in terms of augmenting its trade surplus within the tourism sector. This critical and timely analysis highlights the presence of notable gaps in our comprehension of the intricate relationship between bilateral exchange rates and the equilibrium of tourism balances. The existing condition of the worldwide tourism sector amplifies the distressing aspect of these disparities. [Chaudhry et al. \(2022\)](#) conducted a notable empirical investigation utilising a static methodology to analyse the intricate relationship between the exchange rate and the trade balance within the domain of tourism. However, it is imperative to acknowledge that the majority of economic datasets display inherent dynamism, thereby rendering static models inadequate for capturing this fundamental aspect.

Consequently, the utilisation of these models has the capacity to generate results that possess the possibility of being deceptive. Furthermore, prior academic research in the field of tourism has undertaken empirical investigations to evaluate the predictive accuracy of the J-curve theory by analysing data at an aggregate level. The analysis of the relationship between exchange rates and trade balances

at the aggregate level does not provide a comprehensive comprehension of the precise extent to which depreciation affects bilateral trade balances (Neumann & Tabrizy, 2021). Additionally, it is plausible that certain clusters of nations might not encounter suitable policy ramifications arising from the ambiguous findings derived from analyses conducted at the aggregate level. The impact of currency devaluation in a particular nation can have diverse ramifications on the valuation of currencies in other nations, contingent upon the intricate interplay of their political and economic interdependencies. While the impact of currency depreciation on bilateral trade balances may vary in comparison to other sectors, it is important to acknowledge that these fluctuations can indeed have consequences for the tourism industry. In addition, Ozcelebi and Yildirim (2016) have offered elucidation on the potential inaccuracies that may arise from the synchronisation of the exchange rate and the trade surplus/deficit estimations. The provided explanation posits that the observed phenomenon can be attributed to the differentiation between the impacts of an upward and a downward shift in value on the trade balance. Prior to employing linear empirical methodologies, it is imperative to establish a more comprehensive understanding of the intricate dynamics that dictate the relationship between currency exchange rates and trade surpluses or deficits. The primary objective of this study is to address existing knowledge gaps by utilising a nonlinear empirical methodology to investigate the intricate relationship between exchange rates and trade deficits within the tourism sector.

It has been established that tourism infrastructure constitutes a component of overall infrastructure (Tien, Trang, Diem, & Ngoc, 2021). Tourism infrastructure development refers to the deliberate and systematic planning and implementation of a range of facilities and services within a particular region, aimed at satisfying the demands of both the local community and visitors. This process is centred on addressing the specific requirements associated with tourism-related endeavours. The concept under consideration pertains to a tangible entity that is meticulously constructed and assembled with the primary intention of providing accommodation and care for its users (Jovanovic and Ilic, 2016, p. 288). The inclusion of tourism

infrastructure has the capacity to enhance the competitiveness of the tourism sector. It is widely acknowledged that the provision of such infrastructure plays a pivotal role in enhancing tourism, as it facilitates the seamless provision of essential amenities and services to travellers (Shadieva, Baratovna, & Muminovich, 2022). Based on scholarly research, the concept of "tourism infrastructure" encompasses a diverse array of elements that contribute to the facilitation and promotion of a destination's tourism industry (Tijiang, 2022).

According to Nguyen (2021) study, the concept of "tourism infrastructure" encompasses a diverse array of resources and amenities that facilitate the seamless transportation of tourists from their places of residence to their intended destinations, as well as their return journeys upon completion of their trips. The significance of constructing tourist infrastructure has been widely recognised within the tourism industry as a crucial element in the process of attracting and captivating vacationers. Based on the findings of Tijiang (2022), it is crucial to acknowledge the significance of service infrastructure in shaping the product experience and subsequently influencing tourists' perceptions of a destination holistically. The framework facilitating the viability of tourism can be regarded as a pivotal component contributing to the expansion of the tourism sector. In order to attract a larger number of visitors to a specific location, it is imperative to allocate financial resources towards the development and enhancement of tourism-related infrastructure. Furthermore, these investments play a crucial role in enhancing tourist satisfaction and increasing their likelihood of repeat visits. Tourism infrastructure plays a crucial role in fostering consistent growth within the tourism industry and facilitating the overall development of tourist destinations, thereby serving as a significant component of regional tourism. This is accomplished by providing tourists with fundamental services that cater to their diverse needs. This assertion is grounded in the premise that the development of tourism-related infrastructure plays a pivotal role in shaping and enhancing the overall tourism encounter within a given area. The notion that enhancing tourism and developing infrastructure are interconnected has garnered substantial support from numerous scholarly investigations and the collective wisdom of renowned scholars.

After a thorough and extensive review of the academic literature, only a few empirical studies were found to be relevant to the complex relationship between air pollution and the field of tourism management. These empirical studies initiate three distinct lines of inquiry. Based on the findings derived from the initial line of inquiry, it can be concluded that there is no discernible correlation between tourism and the adverse impacts of air pollution. The study involved the collection of opinions from 1,304 international travellers through a comprehensive survey. The findings of the study indicate that regardless of their country of origin, foreign tourists visiting Hong Kong consistently rated the city's weather in a similar manner. In essence, the air quality did not constitute the primary determinant influencing tourists' decision-making and behaviour. Based on a fixed effect panel model and a comparative analysis, [Sun et al. \(2019\)](#) arrived at the finding that there is no statistically significant impact of haze concentration on domestic travel within 28 prominent cities in China. The findings of an additional research line indicate a significant correlation between weather conditions and the decision-making process of travellers, subsequently influencing the growth trajectory of the tourism sector. In another educational study, recruitment of a sample size consisting of 600 individuals from both the United States and Australia was selected ([Becken, Jin, Zhang, & Gao, 2017](#)).

Utilising the sophisticated technique of structural equation modelling, the astute researchers postulated that the subjective perception of air quality in China and the individual's attitude towards risk-taking exerted a detrimental influence on their propensity to engage in travel to said destination. A gravity model and conducted a case study centred in Beijing to examine their dataset. Based on their meticulous investigation, they arrived at the inference that the detrimental air quality in China significantly impacted the nation's tourism sector ([Zhou, Santana Jiménez, Pérez Rodríguez, & Hernández, 2019](#)). The academic research conducted by [Fan et al. \(2022\)](#) yielded significant findings. The investigation conducted an in-depth analysis of the time period spanning from 2009 to 2012. This was achieved through the utilisation of an extensive dataset comprising 274 cities within the geographical boundaries of China. The intelligent analysis revealed a robust correlation between the level of air pollution and a significant decline in the influx of international tourists to China.

Another aspect of the research examines the impact of the rise in tourism on the atmospheric conditions. Numerous academic investigations have revealed that air pollution constitutes an external cost associated with the tourism sector. Tourists' behaviour is identified as a significant contributing factor to the occurrence of this negative phenomenon. [Nguyen \(2021\)](#) conducted research indicating that the tourism industry contributes approximately 8% of the overall greenhouse gas emissions within the Earth's vulnerable ecosystem. It has been determined that a marginal increment of 1% in tourist influx is associated with a corresponding increase of 0.45% in PM10 concentrations ([Fan et al., 2022](#)). It is intriguing to observe the divergence of perspectives among various scholars within this corpus of research.

Based on an examination of their research conducted within the European Union, Singapore, and China, the aforementioned scholars posited that tourism exerted an adverse impact on carbon dioxide emissions. The utilisation of various proxies and empirical methodologies to investigate the intricate correlation between air pollution and the expansion of the tourism industry has been evident in the findings presented in [Table 1](#). However, it is crucial to acknowledge that the aforementioned studies did not consider the endogeneity arising from the reciprocal causation between tourism growth and air pollution. This limitation arises from the unidirectional nature of these studies, which exclusively examined the impact of air pollution on tourism growth or the influence of tourism growth on air pollution. In our empirical approach, the speed of wind serves as an instrumental variable (IV) to ascertain the factors influencing air pollution and the expansion of the tourism sector. Drawing upon our empirical research, this discourse will delve into the intricate nexus between air pollution and individuals who engage in recreational travel. Before drawing any definitive conclusions regarding the extent of the correlation, it is essential to conduct an initial evaluation comprising three fundamental assessments. Various unit root tests, such as the Alexander-Darvas Function (ADF) unit root test and the Phillips Perron (PP) unit root test, are commonly used to assess the stationarity of a time series ([Waqas, 2021](#)). In the subsequent section of this analysis, we shall employ a methodology devised by [Johansen and Juselius \(1990\)](#) to ascertain the presence or absence of cointegration among the variables being examined.

Data and Methodology

The dataset utilised in this study comprises information pertaining to the visitation patterns of 20 prominent tourist economies in Thailand over the period spanning from 2010 to 2019. The primary rationale for utilising data up until 2019 is attributed to the substantial decline in tourism precipitated by the outbreak of COVID-19 towards the conclusion of that year. Hence, the utilisation of data from this particular period may not be deemed suitable for the examination of tourism demand.

Table 1: Variables and Data source

Variables	Expected Signs from Previous Literature	Data Source
Tourist Arrivals		The Ministry of Tourism and Sports, Thailand and Bank of Thailand
Real GDP per capita	+	IMF and World Bank
Real Effective Exchange Rate	+	World Bank
Trade	+	The Ministry of Commerce, Thailand
Air Pollution	-	Air quality index
Tourism infrastructure	+	IMF and World Bank

The Johansen cointegration method was chosen as the analytical approach to comprehensively investigate the interrelationship among the variables. In the year 1960, [Coe and Moghadam \(1993\)](#) created and first used the method in question. This approach obviates the necessity of calculating both long-term and short-term associations among variables for the purpose of solving multivariable equations. Historically, this method was deemed essential. One of the key advantages of utilising this method for identifying cointegration is its ability to facilitate the identification and enumeration of cointegrating vectors. One possible solution to the issue of exogeneity involves utilising the methodology developed by [Coe and Moghadam \(1993\)](#), which is based on the assumption that all variables are latent variables that are endogenous in nature. The utilisation of the Coe and Moghadam's (1993) model in conjunction with the Vector Error Correction Model (VECM) enables the derivation of estimates pertaining to the interaction among variables, owing to the causality estimator

inherent in the model. Based on these approximations, it is feasible to derive specific conclusions. In conclusion, the maximum eigenvalue and trace statistics are utilised in order to estimate the overall quantity of cointegrating relationships. By utilising both of these methodologies, one can ascertain the anticipated alignment of the coefficients. The Engle and Granger method is employed to ascertain the presence of cointegration in an equation by assessing the hypothesis that the residual demonstrates stationarity. The Johansen cointegration method possesses the ability to convert a univariate equation into a multivariate equation within the framework of an error correction model. Suppose that the Tourism growth is represented by V_t , economic growth is proxied by W_t , trade liberalization by X_t by tourism infrastructure by Y_t , and air pollution by Z_t take the form as

$$V_t = [Y_t, X_t, W_t, Z_t,] \tag{1}$$

The AR model of equation can be

$$V_t = A_1V_{t-1} + A_2V_{t-2} \dots A_kV_{t-k} + \varepsilon_t \tag{2}$$

Equation (2) may be altered to VECM as given in equation (3)

$$\Delta V_t = \Gamma_1 \Delta V_{t-1} + \Gamma_2 \Delta V_{t-2} \dots \Gamma_{k-1} \Delta V_{t-k-1} + \Pi V_{t-k} + \varepsilon_t \tag{4}$$

Where, $\Gamma_1 = [I - A_1 - A_2 - \dots A_k]$, $i=1,2, 3,..k-1$, and $\Pi = -(I - A_1 - A_2 - \dots A_k)$

As a result of this, Π is a four-by-four matrix because there are three variables assumed. This can be simplified to $\Pi = \alpha\beta$, where α is the rate at which the system adjusts to reach equilibrium. whereas the represents the long run coefficient, and the βV_{t-1} term is an error correction term. To illustrate this, point by taking $k=2$ in the most basic way possible, consider the equation (4):

$$\begin{bmatrix} \Delta Y_t \\ \Delta X_t \\ \Delta W_t \\ \Delta Z_t \end{bmatrix} = \Gamma_t \begin{bmatrix} \Delta Y_{t-1} \\ \Delta X_{t-1} \\ \Delta W_{t-1} \\ \Delta Z_{t-1} \end{bmatrix} + \begin{bmatrix} \alpha_{11} & \alpha_{12} \\ \alpha_{21} & \alpha_{22} \\ \alpha_{31} & \alpha_{32} \end{bmatrix} \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} \\ \beta_{21} & \beta_{22} & \beta_{23} \end{bmatrix} \begin{bmatrix} \Delta Y_{t-1} \\ \Delta X_{t-1} \\ \Delta W_{t-1} \\ \Delta Z_{t-1} \end{bmatrix} + \varepsilon_t \tag{5}$$

The equation (2) can be written as

$$\Pi_1 V_t = [\alpha_{11}\beta_{11} + \alpha_{21}\beta_{21}][\alpha_{21}\beta_{12} + \alpha_{22}\beta_{22}][\alpha_{31}\beta_{13} + \alpha_{32}\beta_{23}] \begin{bmatrix} \Delta Y_{t-1} \\ \Delta X_{t-1} \\ \Delta W_{t-1} \\ \Delta Z_{t-1} \end{bmatrix} \tag{6}$$

The equation can be transformed into yield equation as

$$\Pi_i V_{t-1} = \alpha_{11}(\beta_{11}Y_{t-1} + \beta_{21}X_{t-1} + \beta_{31}W_{t-1} + \beta_{31}Z_{t-1}) + \alpha_{12}(\beta_{12}Y_{t-1} + \beta_{22}X_{t-1} + \beta_{32}W_{t-1} + \beta_{32}Z_{t-1}) \quad (7)$$

According To Enders (2004) α_{11} and α_{12} are speed of adjustment terms.

Results

The correlational analysis of the variables is shown in the [Table 2](#). The correlation value indicates that the all the variables used in the current study are highly correlated. 2

Table 2: Correlation

		1	2	3	4	5
TOURG	1	1				
ECNG	2	-0.1320	1			
AP	3	-0.4247	0.4433	1		
TLB	4	-0.6810	0.5148	0.7929	1	
TINF	5	0.6786	-0.6373	0.7129	0.6579	1

Note: TOURG=tourism growth, TLB= trade liberalization, TINF= tourism infrastructure, AIP= air pollution, ECNG= economic growth

The Johansen cointegration test necessitates the identification of a statistically significant lag length, which serves as its foundational element. The optimal approach involves employing a temporal interval that closely exhibits the characteristics of white noise. The Vector Autoregressive Model can be utilised to ascertain the most suitable lag duration for attaining Johansen cointegration within the given dataset ([Shen, 2023](#)). Following this, we proceed to organise the delays based on the criteria derived from the data as explained by [Sharma and Sehwat \(2020\)](#). The data presented in [Table 2](#) reveals that the optimal lag values for cointegration exhibit variations based on the specific informational needs being fulfilled. The model selection procedure of the Akaike Information Criterion (AIC), alternatively referred to as the AIC, has opted to include two lags. On the other hand, the Schwartz Information Criterion, which consists of distinguished individuals, The research study has opted to incorporate only one lag in its approach to selecting the model. The

dual-temporal postponement approach recommended by the AIC has been successfully implemented. The primary aim is to maximise the overall effect while minimising the required level of exertion, as depicted in [Table 3](#).

Table 3: Lag Length Selection Criterion

Lag	LogL	LR	FPE	AIC	SC
0	-470.902	NA	3.07e+12	44.056	45.342
1	-334.701	121.057*	4.23e+10*	43.457	43.560*
2	-536.481	101.417	4.45e+10	42.433*	43.032

Cointegration offers a methodological framework for comprehending the complex interconnections that exist among multiple non-stationary variables, thus capturing the temporal aspect inherent in their relationship. In order to ensure the precision of your cointegration test, it is imperative to maintain consistency in the order of variable integration throughout each iteration. The Johansen test is a statistical technique utilised to ascertain the quantity of cointegrating equations that exist within a provided dataset. The accomplishment of this objective is facilitated through the utilisation of two distinct examinations, specifically the trace test and the maximum eigenvalue test. The results of the cointegration test are summarised in [Table 4](#).

Table 4: VECM

Dependent Variable: TOURG	Model 1
$ECNG_{t-1}$	0.2177*** (0.010)
AP_{t-1}	-0.2168*** (0.007)
TLB_{t-1}	0.1124*** (0.004)
$TINF_{t-1}$	0.0284*** (0.005)

Note: TOURG=tourism growth, TLB= trade liberalization, TINF= tourism infrastructure, AIP= air pollution, ECNG= economic growth

The coefficient for Economic Growth has been calculated to be 0.2177, and its statistical significance has been confirmed. The estimated coefficient of 0.2177 suggests a positive association between the economic expansion in the previous period (t-1) and the current period's tourism growth. A significant statistical correlation exists between economic expansion and the growth of the tourism sector. The coefficient for air pollution was found to be 0.2168, suggesting a statistically significant relationship. This observation indicates a noticeable association between a slight rise in atmospheric pollution in the previous time period (t-1) and an estimated decline of approximately 0.2168 units in the growth of the tourism sector in the current time period. The empirical evidence presented demonstrates a significant inverse correlation between levels of atmospheric pollution and the growth of the tourism sector. The presence of this phenomenon may seem contradictory when considering the prevailing notion that there exists an inverse relationship between increased levels of air pollution and the inclination of prospective tourists to choose a particular location for their visit.

The statistical significance of the coefficient for trade liberalisation is 0.1124. This implies that a single-unit rise in trade liberalisation during the previous period (t-1) is correlated with a 0.1124-unit increase in tourism growth during the current period. This argument posits that the process of trade liberalisation plays a significant role in fostering the growth and development of the tourism industry. The statistical significance of the tourism infrastructure coefficient, which has a value of 0.0284, has been established. The coefficient estimates of 0.0284 suggests a statistically significant positive association between the expansion of tourism infrastructure in the previous period (t-1) and the subsequent growth of tourism in the current period (t). Empirical evidence suggests that the allocation of resources towards the development of tourist infrastructure can significantly contribute to the expansion and prosperity of the industry. This study suggests that the growth of the tourism industry is influenced by economic development, trade liberalisation, and the presence of tourist-friendly infrastructure. The analysis reveals favourable coefficients, which provide support for the aforementioned conclusion. However, the correlation between air pollution and the growth of the tourism industry is a subject of great interest, necessitating

additional research to elucidate the intricate mechanisms involved (Yao, 2022). Furthermore, it is imperative to keep in mind that the conclusions drawn from this research are contingent upon the specific dataset and model employed. It is imperative to acknowledge that the analysis potentially overlooks significant variables and factors that may impact the future trajectory of the tourism industry.

Conclusion

This study comprehensively investigates the intricate interconnections among multiple influential factors and the phenomenon of tourism expansion. To achieve this objective, a sophisticated statistical methodology known as the Vector Error Correction Model (VECM) has been employed. The results of this study offer valuable insights into the intricate dynamics of the tourism sector in Thailand. The presence of a positive and statistically significant correlation between the growth of the economy and the growth of tourism in Thailand highlights the importance of a robust economy in promoting tourism endeavours. The current proposition posits that the implementation of policies designed to foster economic advancement can yield favourable outcomes for the tourism industry. The complex correlation between atmospheric pollution and the expansion of tourism presents stimulating inquiries and necessitates additional scholarly exploration (Awais, 2022).

The aforementioned statement implies the presence of distinct factors that influence tourism patterns in Thailand or underscores the significance of implementing pollution management strategies to mitigate adverse impacts on tourists. The recognition of this contradictory phenomenon implies the existence of intricate dynamics in the interplay between air pollution and the expansion of tourism, necessitating a comprehensive investigation. The adoption of open trade policies in Thailand has undeniably played a significant role in fostering the rapid development of the tourism sector, as evidenced by the positive effects of trade liberalisation on the expansion of tourism growth (Raihan & Tuspekova, 2022). Sustained endeavours to facilitate global trade have the potential to significantly expand the realm of tourism. The considerable significance of enhanced tourism infrastructure underscores the crucial necessity of continuous investments in the

expansion and improvement of facilities and amenities, with the aim of effectively attracting and accommodating tourists. This is consistent with Thailand's renowned status as a highly desirable tourist destination.

Implications

The aforementioned findings have substantial implications for policymakers, businesses, and stakeholders in the Thai tourism industry.

- The primary focus of policymakers in Thailand is to strategically prioritise the maintenance and enhancement of economic growth due to its direct and substantial influence on the thriving tourism sector. Strategic initiatives that prioritise the promotion of employment generation, enhancement of income levels, and improvement of overall economic welfare possess the potential to substantially augment the revenue derived from the tourism sector.
- The intricate relationship between air pollution and the expansion of tourism necessitates a comprehensive evaluation of the efficacy of strategies aimed at the management of air quality. In order to sustain the enduring allure of Thailand as a highly sought-after tourist destination, it is imperative to establish a meticulous equilibrium between the imperatives of economic progress and environmental preservation.
- The importance of Thailand's dedication to trade liberalisation cannot be overstated, as it possesses the capacity to allure global tourists and facilitate the exportation of goods and services linked to the tourism sector. The potential for substantial growth in revenue from tourism and the creation of employment opportunities arises from the removal of trade barriers
- Sustaining a primary focus on resource allocation towards the improvement of tourism infrastructure remains a pivotal goal within the realm of infrastructure development. This encompasses the expansion of transport networks, the provision of accommodation facilities, and the establishment of tourist attractions. Without a doubt, this will significantly improve the overall tourism experience and appeal to a wider spectrum of visitors.

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