Industry Analysis by PESTEL-AHP: A Case Study of Thailand Public Airports

Thanavutd Chutiphongdech* and Rugphong Vongsaroj**

Received: 29 December 2021 *Revised: July 6, 2022* *Accepted: August 1, 2022*

Abstract

This article aims at applying the Analytical Hierarchy Process (AHP) with PESTEL Analysis to quantitatively conduct an industry analysis in order to provide policy implications. The public airports, under operations of the Department of Airports, located in the local and regional parts of Thailand is employed as a case study. By weighting the importance factors from airport expert panels under the PESTEL-AHP framework, the results reveal that Air Navigation Act BE (No.14) 2562, which is a legislation element of PESTEL, plays the most crucial component and has the biggest impacts on Thailand public airports with an estimated weighted at 28% when comparing to other PESTEL elements. While the National Strategy and trend toward airport digitalization approximately impact the overall industry with 22% and 21%, respectively. The policy implications for public airport development deriving from the airport industry analysis are presented at the end of the article.

Keywords: Analytical Hierarchy Process, Industry Analysis, PESTEL Analysis, Public Airports, Thailand

* Lecturer, Sports Management Program, Faculty of Sports Science, Chulalongkorn University (Corresponding author*) 254, Pathum Wan, Bangkok, 10330, THAILAND.
E-mail: Thanavutd.C@chula.ac.th

**Assistant Professor, Graduate School of Tourism Management, National Institute of Development Administration, (NIDA).
148 Serithai Road, Klong-Chan, Bangkapi, Bangkok 10240 THAILAND.
E-mail: rugphong.v@nida.ac.th

การวิเคราะห์อุตสาหกรรมด้วย PESTEL-AHP: กรณีศึกษาสนามบินของรัฐในประเทศไทย

ฐณวุฒ ชุติพงศ์เดช* และรักษ์พงศ์ วงศาโรจน์**

รับวันที่ 29 ธันวาคม 2564 *ส่งแก้ไขวันที่ 26 กรกฎคม 2565* *ตอบรับตีพิมพ์วันที่ 1 สิงหาคม 2566*

บทคัดย่อ

บทความวิจัยนี้มีวัตถุประสงค์ในการประยุกต์ใช้ Analytical Hierarchy Process (AHP) ควบคู่กับการวิเคราะห์ด้วย PESTEL เพื่อวิเคราะห์อุตสาหกรรมในเชิงปริมาณและนำเสนอข้อเสนอแนะเชิงนโยบาย การศึกษาในครั้งนี้อาศัยสนามบินของรัฐซึ่งเป็นสนามบินท้องถิ่นและสนามบินภูมิภาคภายใต้การดูแลของกรมท่าอากาศยานเป็นกรณีศึกษา ผลการศึกษาพบว่า การถ่วงน้ำหนักค่าความสำคัญของตัวแปร PESTEL ด้วยค่าคะแนนที่เก็บจากกลุ่มผู้เชี่ยวชาญด้านสนามบินด้วยวิธี PESTEL-AHP ทำให้ พระราชบัญญัติการเดินอากาศ (ฉบับที่ 14) พ.ศ. 2562 เป็นตัวแปรด้านกฎหมายที่มีอิทธิพลต่อการดำเนินงานของสนามบินของรัฐมากที่สุด หรือคิดเป็นร้อยละ 28 เมื่อเปรียบเทียบกับตัวแปร PESTEL อื่น ๆ ในขณะที่ตัวแปรนโยบายยุทธศาสตร์ชาติ และตัวแปรแนวโน้มด้านการเปลี่ยนแปลงทางดิจิตัลในสนามบินมีบทบาทในการส่งผลกระทบต่ออุตสาหกรรมคิดเป็นร้อยละ 22 และ 21 ตามลำดับ ข้อเสนอแนะเชิงนโยบายสำหรับการพัฒนาสนามบินของรัฐซึ่งได้มาจากการวิเคราะห์อุตสาหกรรมอยู่ในส่วนสุดท้ายของบทความ

คำสำคัญ: การวิเคราะห์อุตสาหกรรม การวิเคราะห์ด้วย PESTEL สนามบินของรัฐ ประเทศไทย

* อาจารย์ แขนงวิชาการจัดการการกีฬา คณะวิทยาศาสตร์การกีฬา จุฬาลงกรณ์มหาวิทยาลัย (ผู้ประพันธ์บรรณกิจ*)
254 เขตปทุมวัน กรุงเทพฯ 10330
E-mail: Thanavutd.C@chula.ac.th

** ผู้ช่วยศาสตราจารย์ คณะการจัดการการท่องเที่ยว สถาบันบัณฑิตพัฒนบริหารศาสตร์
148 ถนนเสรีไทย แขวงคลองจั่น เขตบางกะปิ กรุงเทพฯ 10240
E-mail: rugphong.v@nida.ac.th

INTRODUCTION

Industry analysis has played an important role in business administration since it is a part of the strategic management and performance improvement process (Davis & Duhaime, 1992; Görener, Toker, & Uluçay, 2012; Kampanje, 2014). From past to present, several industry-analysis approaches have been introduced; for example, the PEST Model (Aguilar, 1967) and its extensions such as the PESTEL Analysis, the STEER Analysis, the Porter-five Forces Model (Porter, 2001), or even the OT Analysis (Helms & Nixon, 2010; Hill & Westbrook, 1997) have been a part in industry analysis literature. However, the general tool used by practitioners, scholars, and market researchers to investigate the situation and the overall factors affecting the industry is the PESTEL Analysis (Oey & Nitihardjo, 2016; Pan et al., 2019; Tsangas et al., 2019). Still, the PESTEL analysis lacks quantitative properties (Srdjevic et al., 2012) and does not systematically highlight and prioritize factors gathered from the analysis (Thakur, 2021; Yüksel, 2012). Therefore, the Analytical Hierarchy Process (AHP) is introduced to conduct an industry analysis hybrid model or the PESTEL-AHP.

This case study research makes an academic contribution and sheds light on airport industry analysis literature. Firstly, it illustrates external business environments affecting the situation of Thailand public airports located in local and regional areas, which is rarely found in the airport industry, especially in the small airport context (Adler et al., 2013; Button et al., 2010; Chutiphongdech, 2020; Chutiphongdech, 2021; Merkert et al., 2012). Secondly, it prioritizes those business environments under PESTEL elements by integrating AHP, which is the quantitative method that is scarcely available in relating literature. By collecting the estimation of factor importance from the airport expert panels, the PESTEL elements are ranked to summarize the overall industry analysis.

To address the research question on how to analyze the industry, this paper aims to apply the PESTEL-AHP Model to investigate Thailand airport industry. Operated by the Department of Airports (DOA), the public airports located in local and regional areas of Thailand are used as a case study. The information gathered from the PESTEL Analysis

is quantitatively weighted by AHP to discover the magnitude of each PESTEL element affecting the industry. To illustrate the results of the study, each part of the case study article is organized as follows. The second part reviews the theoretical framework used to analyze the public airport industry. The third part presents the PESTEL-AHP Model construction while the fourth part shows the findings and discussion on the issue. Lastly, the conclusion is presented together with policy implications for airport management are suggested.

REVIEW OF LITERATURE

Industry Analysis and PESTEL-AHP

To analyze the industry situation, the common theoretical framework in economic theory refers to the Industrial Organization (IO). The theoretical framework initiated by Mason (1939, 1949) was later developed by Bain (1959), intending to describe the real phenomenon of the overall market leading to policy recommendations. Although the theory has been utilized since 1939, the application of IO has various approaches such as empirical studies and Game Theory. By analyzing the relationships among the structure, conduct, and performance of an industry (the SCP Paradigm), which is the core analysis of Industrial Economics, researchers can understand the realistic settlements, compositions, interactions and ultimately the situation of the industry since interactions between market structure, conduct and performance, the structure, conduct, and performance provide the descriptive analysis framework on how an industry is organized. As it sheds light on the situation of the market (Carlton & Perloff, 2015; Nikomborirak, 2004).

PESTEL Analysis

To analyze an industry under the SCP Paradigm (Figure 1), the PESTEL is used to frame the industry analysis. According to Song et al. (2017) and Bell and Rochford (2016), the PESTEL Analysis was developed from the PEST Model by Aguilar (1967). The acronym stands for Politics, Economic, Social, Technology, Environment, and Legal factors (Table 1). The purpose of the PESTEL Analysis is to retain the effectiveness and efficiency of the industry in responding to changes, analyze the business environments in

a systematic approach, and be a tool to support practitioners as an approach providing fundamental connections among macroeconomic factors (Kampanje, 2014; Thakur, 2021; Tsangas et al., 2019). Moreover, the PESTEL Analysis can deliver valuable information for strategy and policy formulation (Srdjevic et al., 2012).

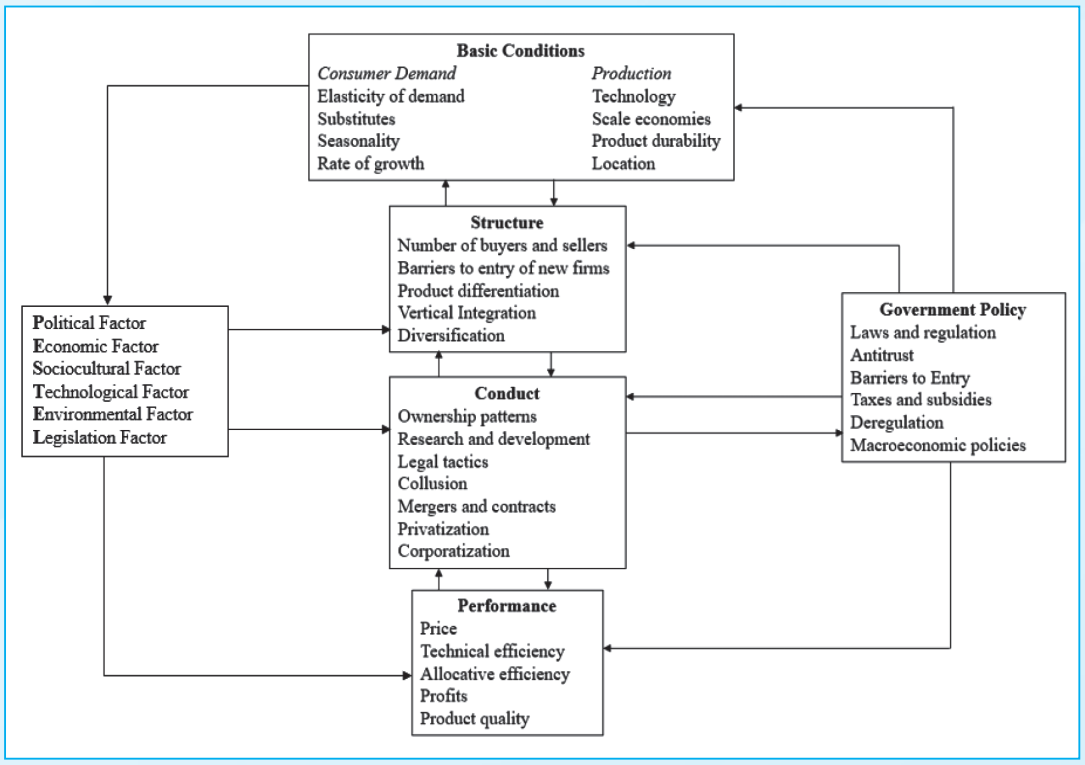


Figure 1 Situation analysis basing on PESTEL under Structure-conduct-performance Paradigm Source: Chutiphongdech (2020)

Table 1 the PESTEL components

Components	Descriptions
P – Political factors	*P* relates to political policies affecting industry policies. Such variables include deregulation policy, inter-state community, tax policy, political environments, federal monetary system, fiscal budgeting, tariff-related policy, institutional strengths and so on.
E – Economic factors	*E* relates general economic condition, inflation rates, policy interest rate, exchange rate, GDP, income per capita, consumer confidence toward economic environments etc.
S – Sociocultural factors	*S* refers to values, attitudes, behaviors of people in society. Other societal factors involve population size, cultural factors, lifestyles, demographic changes, growth rate and so on.
T – Technological factors	*T* is inferred as changes in technological advancement or technical development such as digital disruption, nanotechnology, blockchain, big data, cashless society, Internet of Things (IoT), technological incubators, etc.
E – Environmental factors	*E* is relevant to environmental and ecological variables such as waste management, global warming, water shortage, weather, climate changes etc.
L – Legal and legislation factors	*L* relates to law and legislation issues. For instance, corporatization and privatization laws, laws on consumers, producers and labor protection, antitrust regulation, safety standard practice by international agencies.

Source: Thompson et al. (2014)

However, the PESTEL Analysis does not systematically prioritize PESTEL elements derived from the analysis (Srdjevic et al., 2012; Thakur, 2021). Moreover, it excludes a means of indicating the importance of each factor in relation to the affect among other factors and decision alternatives. Consequently, AHP is introduced to enhance the ability of PESTEL Analysis (Song et al., 2017; Yüksel, 2012).

PESTEL-AHP Analysis

As mentioned, PESTEL Analysis can be incorporated with a multicriteria decision-making technique called AHP. According to Saaty (1990), the pioneer of this method, AHP is a multicriteria decision-making approach where factors are organized in an ordered structure. It can help represent general operational decisions by decomposing

and removing complex problems into a multilevel hierarchical objective, criteria, and choices (Görener, Toker, & Ulucay, 2012; Helms & Nixon, 2010). The advantages of AHP are to measure the importance of factors, reflect the logical considerations of factors relevant to decision making circumstances, and quantify those intangible factors into numerical values by weighing selected factors from expert opinions through a series of pairwise comparisons (Saaty, 1990, 2008). Consequently, AHP approach achieves pairwise comparisons among factors or criteria for prioritizing them by using the eigenvalue calculation.

To illustrate the pairwise comparison on n criteria and eigenvalue computation, the algebraic matrix of pairwise comparison are as follows:

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{a22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix}$$

where a_{ij} is the relative importance for i to j, $a_{ij} = 1/ a_{ji}$ and $a_{ij} = 1 \text{ if } i = j$ and the importance vector value, $\hat{w}$ is calculated by this formula:

$$\hat{A} \cdot \hat{W} = \Lambda_{max} \cdot \hat{W}$$

where Λ_{max} is the largest eigenvalue of $\hat{A}$.

To the boundary of this approach, literature review using the PESTEL analysis together with AHP especially in the airport industry is highly scarce (Chutiphongdech, 2020; Chutiphongdech, 2021). Since the traditional industry analysis is conducted without quantifying; thus, the weightiness of the factor importance is not common. Therefore, to bridge the research gap in the literature, applying the PESTEL-AHP to analyze the public airport industry by converting the framework into a hierarchic structure together with the eigenvalue computing method would supplement the richness of the industry-level analytical tool.

RESEARCH METHODOLOGY

PESTEL-AHP Model Construction

To specify the PESTEL-AHP Model under the SCP Paradigm, the first stage PESTEL Analysis was conducted (Figure 2). The secondary data from the Office of the National Economic and Social Development Council, the Ministry of Transport (MOT) Strategic Plan BE 2560 - 2564, the Department of Airports (DOA) Strategic Plan BE 2560-2564, the information from the DOA Information Center and Library, Thailand Aviation Industry Report from the Civil Aviation Authority of Thailand (CAAT), some economic reports from Airport Council International (ACI) and academic journals relating to airport industry analysis were acquired to analyze the industry of public airports in Thailand.

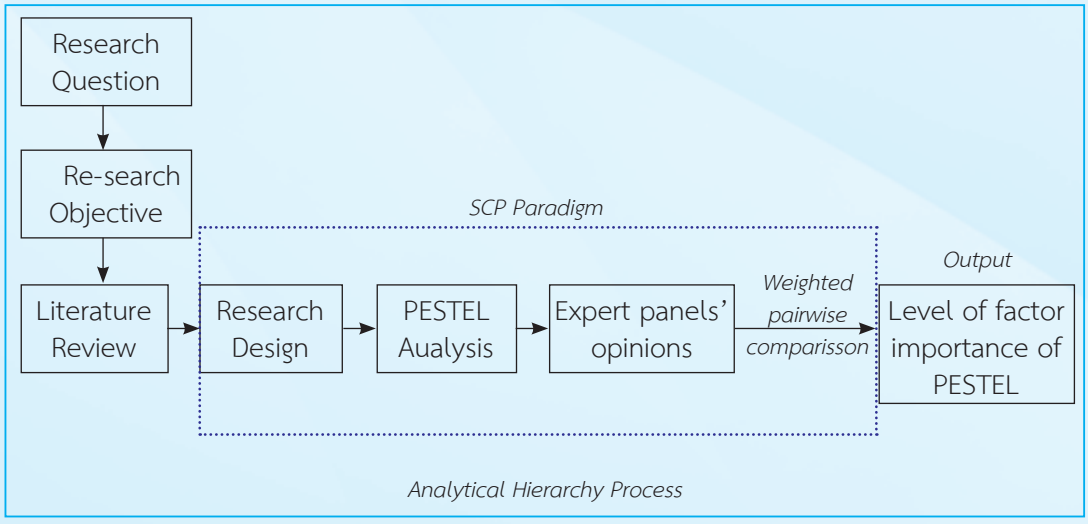


Figure 2 Research procedure

Further, the results from the first stage PESTEL Analysis were distributed to the expert panels. In order to select the airport expert panels, the inclusion criterions were set. Firstly, the panel must consist of airport management and aviation researchers. Secondly, the airport management must work in the top managerial position where they have experiences on formulating the public airport development strategic plan. Therefore, an expert was chosen from the central unit of Department of Airport (DOA) while 4 experts were selected from the directors of DOA public airports located in the local and regional areas. Thirdly, 2 airport scholars having experiences at least one aviation national project were invited to give opinions on weighting scale regarding Saaty (1990) (Table 2).

Table 2 Level of factor importance for weighting PESTEL elements

Intensity of importance	Definition
1	Equal importance
3	Somewhat more importance
5	Much more importance
7	Very much more importance
9	Absolutely more importance
2,4,6,8	Intermediate values

Source: Saaty (1990)

To construct the PESTEL-AHP Model (Figure 3), the pairwise comparison was performed. The PESTEL elements were decomposed, and the hierarchy was conducted. The prioritization procedure was started to determine the relative importance of each element.

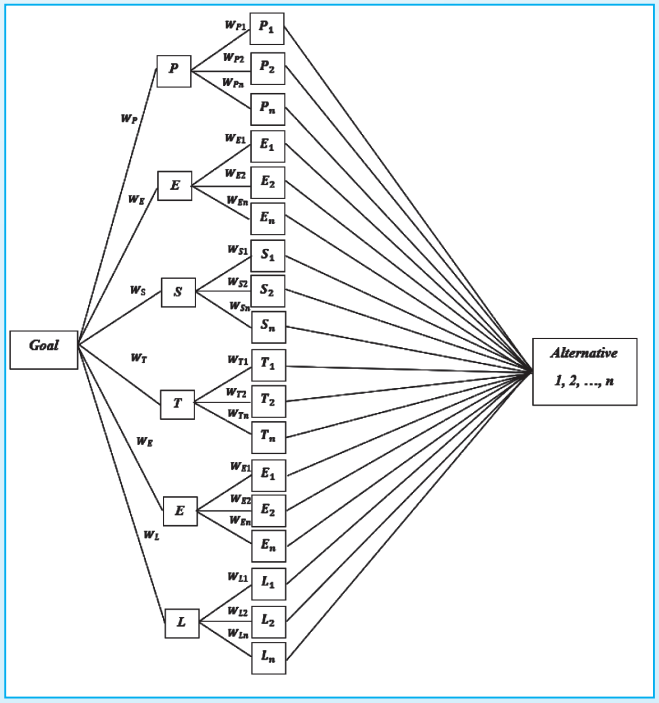


Figure 3 PESTEL-AHP construction

Source: Chutiphongdech (2020)

RESULTS AND DISCUSSION

By framing the PESTEL-AHP with the SCP Paradigm, the situation of public airports located in the local and regional areas of Thailand could be illustrated. Each element of PESTEL is drawn to describe the interactions among the structure, conduct, and performance of the DOA public airports to reflect the situation of the industry. The National Strategy (2018-2037) initiated by Thailand Prime Minister, General Prayut Chan-o-cha, is regarded as a political factor (P) affecting the structure of the industry. The New S-Curve Policy drawn from Thailand 4.0 Industry Development Strategy Plan (2017-2036) is an economic factor (E) while the Second-tier City Tourism Policy is chosen to present a sociocultural factor (S). The trend toward airport digitalization is considered as a technological factor (T) and climate change according to the study from the International Civil Aviation Organization (ICAO) is viewed as an environmental factor (E). Lastly, the revision of the Air Navigation Act (No.14) BE 2562 is selected to reflect the legal and legislation factor (L). The results of PESTEL Analysis are as follows:

Political Factor (P)

As mentioned, the National Strategy (2018-2037) is a political factor influencing the public airport performance since the National Strategy's vision - Thailand is to become a developed country with security, prosperity, and sustainability under Sufficient Economy Philosophy – not only shapes the government policies (Figure 4), but frames every aspect of national developments, planning and air transport infrastructure (Office of the National Economic and Social Development Council, 2018). Under the National Strategy (2018-2037), its purposes are to achieve 6 strategic goals which are

1. well-being of Thai society
2. national competitiveness, economic growth, and income distribution
3. human capital development
4. social equality and equity
5. sustainability of national biodiversity, environmental quality and natural resources
6. government efficiency and better access to public services

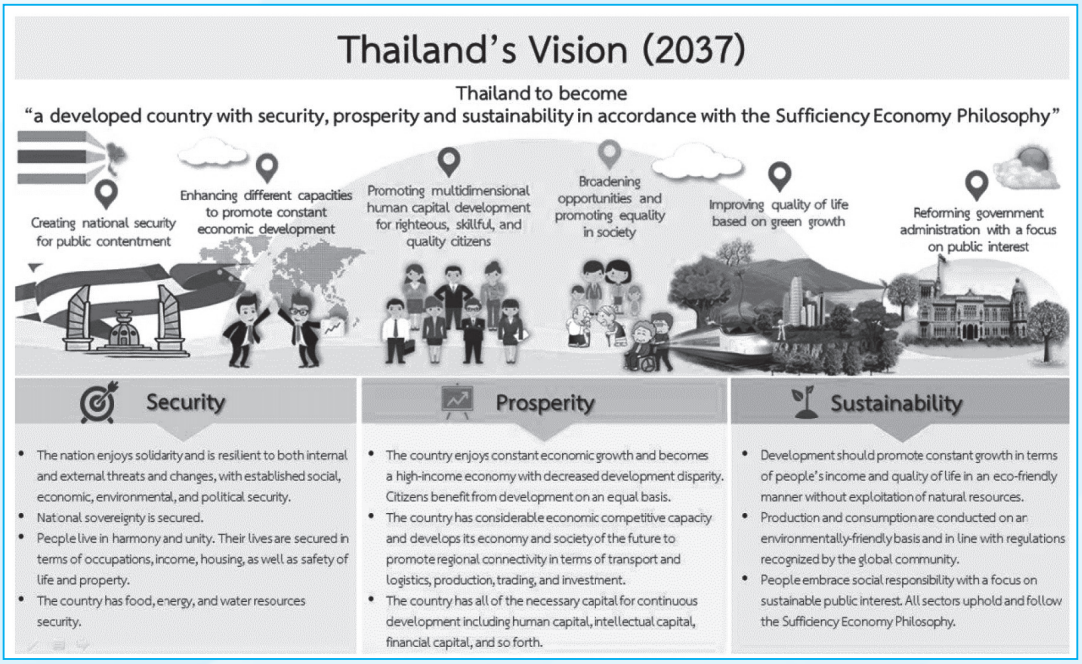


Figure 4 The National Strategy (2018-2037)

Source: Office of the National Economic and Social Development Council (2018)

To achieve the goals regarding the competitiveness of the nation, 2 of the 23 master plans that are most relevant to the airport industry are the 4th Master Plan for Future Industry and Services and the 7th Master Plan for Basic Infrastructure, Logistic and Digital System. Due to the global growth of technology and innovation advancements, the 4th Master Plan for Future Industry and Services and the 7th Master Plan for Basic Infrastructure, Logistic and Digital System have been prepared to serve the national development. The engagement of these two master plans with the 12th National Economic and Social Development Plan (2017-2021) further develops the aviation industry, which includes airlines, airports, MRO (Maintenance Repair and Overhaul) sector, and other basic infrastructures that supporting the logistic system in the country.

Moreover, the plan intentions are to increase and fully utilize the capacity of airport systems and improve the management and technical efficiency of the system to ensure the service quality of passenger and transportation product under international

standards. Also, the plans focus on preparing the basic infrastructure to support the potential demand for air transport to avoid traffic delays and facilitate all stakeholders in the industry. Ultimately, the competitiveness of the nation, according to the National Strategy, will be increased.

In summary, the National Strategy (2018 - 2037) has an impact on the public airports since the National Strategy influences the government transport policies which affect the overall performance of Thailand DOA airports as explained by the SCP Paradigm.

Economic Factors (E)

The New S-curve Policy, according to the Thailand 4.0 Industry Development Strategy Plan (2017-2036), has an impact on the structure of the airport industry since the plan shapes the guidelines for the industry development and plays an important role as a new engine of growth and economic development mechanism in the country. The new S-curve industry refers to the industry that uses intensive technology and innovation and potentially has high growth rates in the future. It includes the robotics industry, biofuels and biochemicals industry, digital industry, medical industry, aviation, and logistics industry.

Aviation and logistics that follow the New S-curve Policy are readily preparing the infrastructure for servicing transportation, aircraft maintenance, repair and overhaul (MRO), time-sensitive products, drones, software, and aviation-relating institutions. The new S-curve policy framework allows plenty of integrations among various sectors in the industry. Consequently, the integration of the framework affects the market structure and performance of Thailand public airport system.

In summary, this macroeconomic policy impacts the structure of the industry as it integrates in various dimensions such as vertical, horizontal or even the helix collaboration among various sectors in the aviation industry, which finally have an impact on the performance of the public airports.

Sociocultural Factors (S)

With the intentions of equal income distribution in the suburban areas, local economy stimulation and, congestion decrement in main tourism cities, the Second-tier City Tourism Policy has been implemented since 2016. In reference of the TAT Interlligence Center (2018), the second-tier city is defined as a province that has less than 4 million visiting tourists per year. From the aforementioned criteria, 55 provinces are considered as the second-tier tourism city (Table 3). The largest areas of second-tier cities are located in the northeastern and northern part of Thailand (18 and 16 provinces respectively) while the smallest areas are assigned to the eastern cities.

Table 3 Second-tier cities according to Tourism Authority of Thailand criterion

Regions	Second-tier provinces	Total
Northern part	Lampang, Chiang Rai, Lamphun, Mae Hong Son, Nan, Phayao, Uttrradit, Phrae, Kamphaeng Phet, Phichit, Nakhon Sawan, Tak, Phitsanulok, Phetchabun, Uthai Thani, Sukhothai	16
Central part	Chai Nat, Lopburi, Samut Songkhram, Sing Buri, Supphan Buri, Ang Thong, Ratchaburi	7
Northeastern part	Kalasin, Chaiyaphum, Nakhon Phanom, Bueng Kan, Buriram, Maha Sarakham, Mukdahan, Yasothon, Roiet, Loei, Ubon Ratchathani, Sakon Nakhon, Sisaket, Surin, Nong Khai, Nong Bua Lamphu, Amnat Charoen	18
Eastern part	Sa Kaeo, Chanthaburi, Trat, Prachinburi, Nakhon Nayok	5
Southern part	Chumphon, Trang, Nakhon Si Thammarat, Narathiwat, Pattani, Phatthalung, Yala, Ranong, Satun	9
	Total	**55**

Source: TAT Interlligence Center (2018)

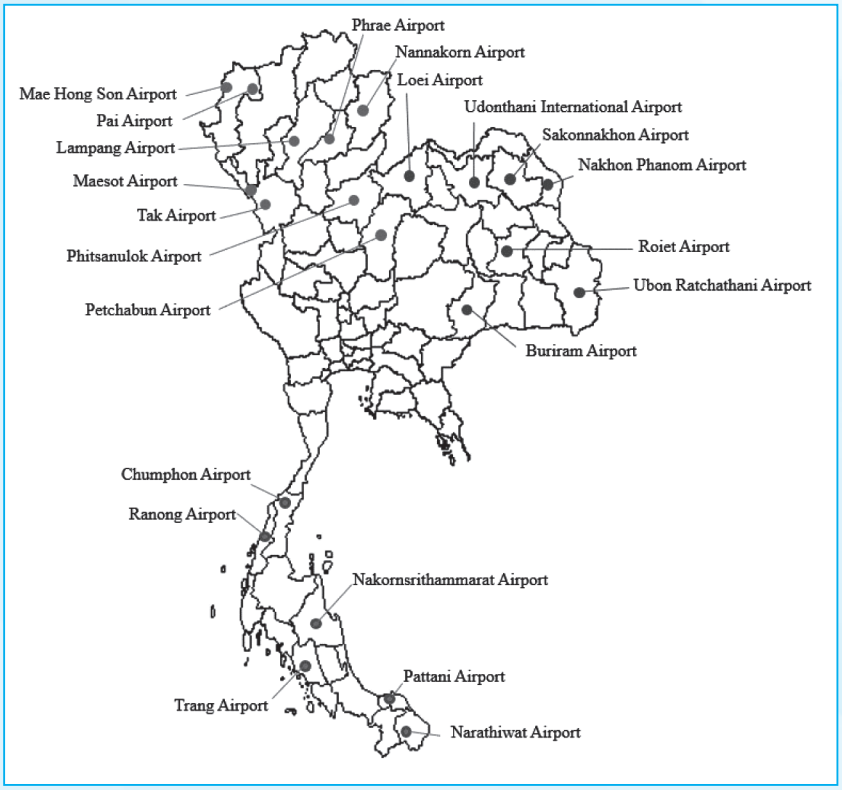


Figure 1 Public airports serving secondary-tier provinces in Thailand

Source: Chutiphongdech (2020)

This formulated tourism policy attempts to transfer tourists from the main tourism cities to second-tier tourism provinces by providing attractive tax deduction packages. Furthermore, megaprojects linking those destinations are invested in to facilitate tourist accessibility. Therefore, the Second-tier City Tourism Policy has an effect on demand for travel while simultaneously impacting the demand for air transport. As Thailand's public airports are the part of tourism supply chain (Figure 5), the Second-tier City Tourism Policy clearly has an impact on their performance since it is possible the policy would stimulate the demand for air transport and tourism in the mentioned provinces.

Technological Factors (T)

Technological adaptation in an airport can be classified in two ways. Firstly, technology can help airport operators reduces the cost of production; for example,

technology could replace some job functions such as using lesser manpower in the security process. Not only improving the processing time of safety and security, but the use of technology can also develop the overall operational efficiency of an airport. Hence, it effects on passengers' satisfaction.

Airport technology plays an important part in creating passengers' experiences as many passengers tend to spend more time in airports and regard them as a destination (Bogicevic et al., 2017; Chutiphongdech & Vongsaroj, 2022b; Wattanacharoensil et al., 2016). Since the digital transformation is about using technologies in the process of automation, customer comfort facilitation and airport client experience enhancement (Airport Council International, 2017; Zaharia & Pietreanu, 2018), this technological factor inevitably has an impact on demand for air transport and tourism as it influences passenger and airline satisfaction. According to Bogicevic et al. (2017), the technologies used in an airport can be clustered into self-service technology and the supporting technologies.

The self-service technology includes check-in kiosks, touch screen information kiosks and self-service baggage dropping while the supporting technologies in an airport consist of a business center, a tour guide application, and USB chargers. Additionally, Airport Council International (2017) presented the airport technological features and current trend toward becoming a digital airport beyond Bogicevic et al. (2017) classification. It is suggested that airport operators provide basic technology infrastructure starting from IT security and WIFI to the advanced components like digitalized touchpoints or biometric screening, as the integration of technology and streamlined facilities would enhance the customer experience.

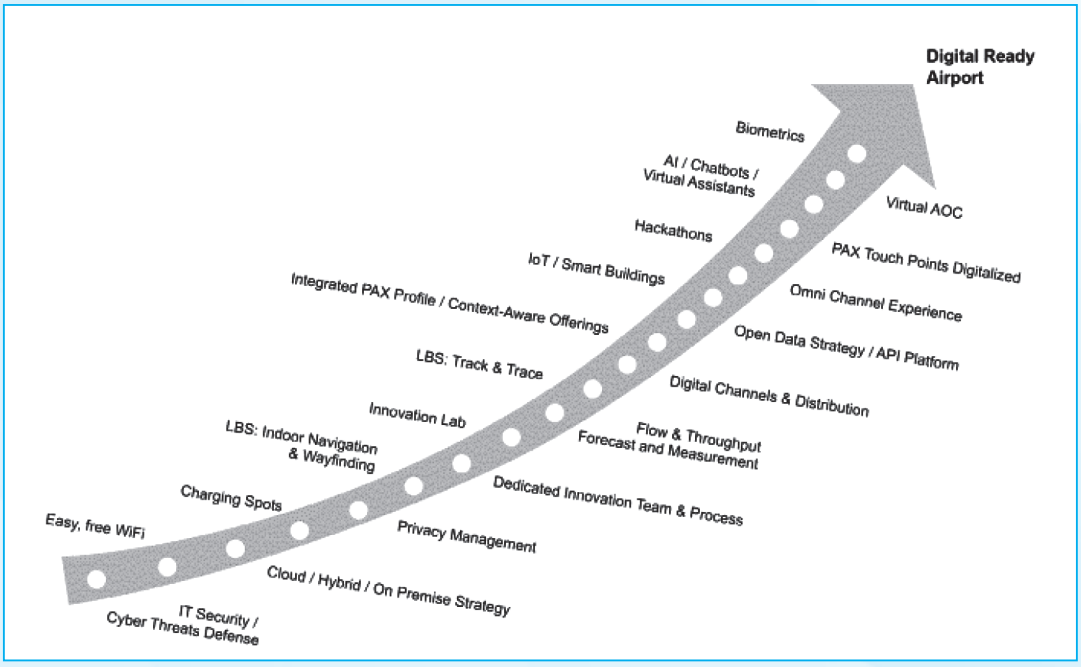


Figure 2 Pathways for digital airport transformation

Source: Airport Council International (2017)

In conclusion, the technological factor affects the basic conditions according to the SCP Paradigm, as the demand for tourism, air transport and production are impacted by technologies given at the airport. Hence, this factor shows the relationship among structure, conduct, and performance of Thailand public airports.

Environmental Factors (E)

While there is a scientific sound connection between the impacts of environmental factors like climate change on airport performance, it is also clear these impacts simultaneously affect airport operations. As suggested and explained by research from international airport-relating organizations, Baglin (2012), Puempel and Williams (2016), and International Air Transport Association (2019), the possible risks that happen from climate changes on airports cause additional risks in operations. Their works indicated that airports are facing risks from physical risks, business risks, security risks, and financial risks. The physical risks refer to the damage from natural devastations such as storm surges,

runway and taxiway flooding, wind pattern shifting, and sea level rising (Figure 7). The business risks mean flight disruption and delays, route network changes, legal compliance, supply of utilities, loss of airport capacity, and airport closures while the security risks are regarded as threatening to life and safety. Lastly, climate change can cause unplanned expenditure and decease demand for air transport and tourism.

In summary, the environmental factor plays a part in airport performance. Referring to Structure-conduct and Performance Approach, the climate change factor influences the consumer demand for tourism and air transportation; thus, it affects the numbers of sellers (market structure) and public airport operations (conduct) eventually.

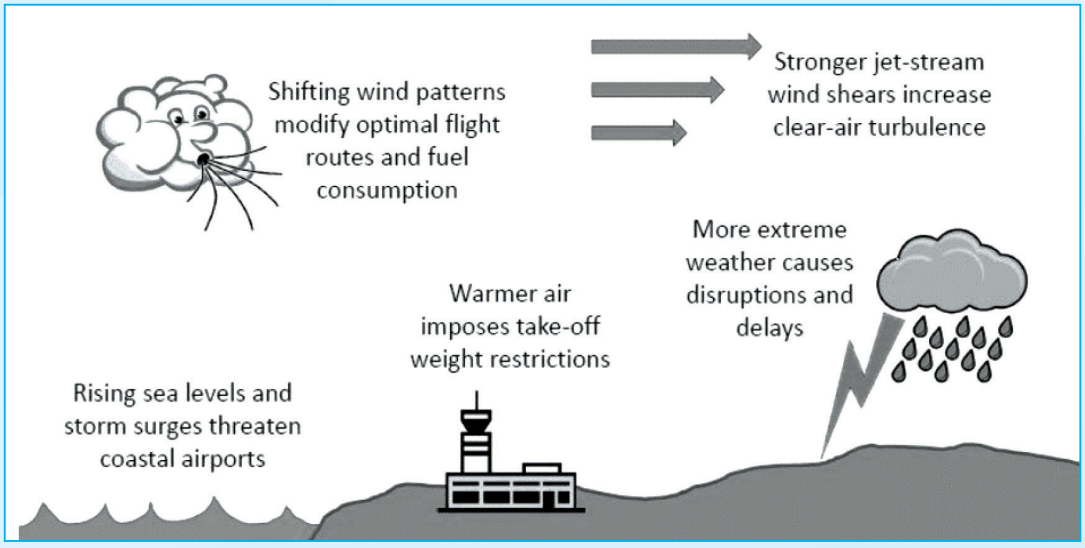


Figure 3 Impact of climate change on airport performance

Source: Puempel and Williams (2016)

Legal and Legislation Factors (L)

The revision of Air Navigation Act (No.14) BE 2562 and Ministerial Regulation on the Department of Airports Division BE 2558 issued by the Ministry of Transport seems to be the most crucial factor for Thailand public airport operations since it legally indicated the Department of Airports' mission. Samples of such obligations include how operations

are financed, sources of working capital, department spending on airport investment, Thailand public airport network development, airport business administration, and so on.

In essence to the SCP Paradigm, the legal and legislation factor has an impact on aviation-relating laws and regulations, and macroeconomics policies. Consequently, any policies launched from the department must comply with the Air Navigation Act BE (No.14) 2562, which ultimately affects public airport industry.

Results from Pairwise Comparison

To illustrate the industry situation of public airports in quantitative analysis, the AHP construct reconfirms the factors and prioritizes the virtual effects. By collecting the primary data using the scoring approach from the 7 expert panels (Table 4), the weightings of factor importance according to Saaty (1990) scale can be applied to the pairwise comparison among PESTEL elements. Table 5 reflects the level of importance toward the public airport industry.

Table 4 Level of factor importance scoring from 7 airport expert panels

Expert no.	Scorer groups	Level of factor importance					
		P	E	S	T	E	L
1	Aviation Scholars	9	4	5	7	4	9
2		7	1	5	8	5	5
3		7	5	4	9	5	8
4	DOA Managements	8	2	4	2	5	9
5		8	5	7	9	6	9
6		9	9	9	6	7	8
7		9	5	5	8	8	9

Table 5 Level of factor importance weighted and scored by airport expert panels

	Expert panel weighting estimations								
PESTEL Analysis	P	E	S	T	E	L	SUM	Weighted	Ranking
P	0.07850	0.14866	0.19616	0.26740	0.22681	0.40749	1.32502	0.22084	2
E	0.12728	0.03357	0.10779	0.15820	0.09465	0.00906	0.53055	0.08842	6
S	0.16869	0.16904	0.04015	0.07378	0.12772	0.13742	0.71681	0.11947	4
T	0.21374	0.21648	0.23899	0.05995	0.18793	0.31747	1.23455	0.20576	3
E	0.01440	0.15893	0.13513	0.13717	0.03969	0.05767	0.54300	0.09050	5
L	0.39739	0.27333	0.28177	0.30349	0.32320	0.07089	1.65008	0.27501	1
Summation	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	6.00000	1.00000	

The ideas formulated by the expert panels (Table 4 and 5) show that the revision of the Air Navigation Act (No.14) BE 2562 plays the most crucial part in Thailand public airport environments. Normalizing each PESTEL element by AHP prioritization illustrates how the revision of the Air Navigation Act (No.14) BE 2562 affects the public airport performance 27.5%; while the National Strategy (2018-2037) and the trend toward airport digitalization is estimated to have an impact on public airport industry of 22.08% and 20.58%, respectively. The logic behind these numbers is based on the orientation law of DOA. Since the Department of Airports (DOA) is a government agency, the missions are governed and directed by national legislations. The Air Navigation Act (No.14) BE 2562 indicates the airport business obligations and implies the managerial limitations for DOA. The revision of the Air Navigation Act (No.14) BE 2562 provides financial flexibility to the department since it allows the establishment of the DOA Working Capital Fund (DOA-WCF), which encourages and facilitates administrations among 28 public airports located in local and regional areas of Thailand. Moreover, the DOA Working Capital Fund provides options for the department to generate revenues, as the DOA is not legally authorized to deliver partial incomes incurred from 28 public airports to the Ministry of Finance and the Treasury Department.

The National Strategy (2018-2037) is the second element of PESTEL analysis that plays an incremental part in public airport situations. In regard to the expert team's opinions, this element has 22.8% effects on the public airports under the control of DOA. The reason behind these considerations is they share the common themes as the revision of the Air Navigation Act (No.14) BE 2562. In other words, as DOA is one of the government agencies, it is required to follow the policy directly derived from the present prime minister and the cabinet. Since some parts of the National Strategy (2018-2037) focus on the competitiveness of the country, they strongly impact the public airport environments.

The trends toward airport digitalization are considered influential for the public airport industry. Based on the opinions of the experts, this PESTEL element can affect both the demand and supply side of the industry. Digitalization in an airport can decrease the cost of operations, improve comfortability among staff, and enhance the accuracy of safety and security, which all considering as the supply side. When creating passengers' experiences, the conveniences and airline facilities are viewed as the demand side derived from digitalized airports.

The effects of the Second-tier City Tourism Policy on public airport industry are approximately weighted as 11.95%. There are some contradictions of the rationale given by expert opinions; some experts said that statistics on some public airports recorded an insignificant increment of passenger traffic after the policy implementation while other airports have significant passenger traffic. This was explained because the main groups of passengers using some DOA airports are business travelers; the tourism policy then does not have an impact on these groups of passengers. Consequently, the scores computed for this PESTEL element are ranked 4th.

The climate changes are another factor influencing the public airport industry. However, as the patterns of climate change in the country are quite common and not extreme, the rating scale for this element is ranked as 5th. Most of the circumstances relating to climate changes are in the forms of airport flooding, PM 2.5, forest fires, and

weather conditions which can cause flight delays and cancellations. This factor may affect tourism demand, which ultimately influences the public airport revenue.

The New S-curve Policy and Eastern Economic Corridor Development Project seem to have had the least effect on the overall airport situation. To quantify this economic policy for public airports under DOA, only 8.84% is scored from the expert panels. There are two main reasons for this value. Firstly, the content in Thailand 4.0 ndustry Development Strategy Plan (BE 2560-2579) by the Ministry of Industry (2017) lacks of policy directions for DOA officials. Although it focuses on aviation and aeronautic development, there is not ample information to guide the DOA. Secondly, the location of the 28 public airports is not in the area of the Eastern Economic Corridor Development Project oversight; hence, it may have caused an indirect impact on the public airport industry instead.

CONCLUSIONS

To analyze the public airport industry in Thailand, PESTEL Analysis under Structure-conduct-performance Approach provides the overall pictures of the industry. The National Strategy (2018-2037), the New S-curve Policy, the Second-tier City Tourism Policy, the trends toward airport digitalization, climate change and the revision of Air Navigation Act (No.14) BE 2562 are carefully considered and selected to represent the factors interacting among structure, conduct and performance of Thailand public airport system.

The PESTEL-AHP is quantitatively constructed to estimate and prioritize each PESTEL element that plays a large part in the public airport industry. The scoring approach from expert panels reveals that the revision of the Air Navigation Act (No.14) BE 2562 has the strongest force on the public airports under the control of the Department of Airports (DOA). While the other top 2 PESTEL elements are given to the National Strategy (2018-2037) and the trend toward airport digitalization, with the weighted score estimation of 28%, 22%, and 21% respectively. The industry analysis from PESTEL-AHP provides policy implications.

To formulate the public airport strategic planning, this study suggests that DOA management is required to carefully look at the revision of the Air Navigation Act (No.14) BE 2562 and the National Strategy (BE 2560-2579) since it frames the budget system and directions of airport development. Flexible legislations in terms of airport financing, and area commercialization would allow each airport to rapidly adapt to changes in business environment regarding its contexts and locations. Moreover, the trend toward airport digitalization allows DOA management to focus on improving technological infrastructure and the digital ecosystem in public airports in Thailand. Not only to offer better passengers' experiences and tourist comfortability, but also to seek more efficient airport business administration. To surmise the importance of a public airport industry analysis for future research, all 28 public airport management across the country should be surveyed in order to gain well-rounded information and in-depth details on how they administer the airport business. Insight data collection from airport users should be observed and articulated in order to perform a proper airport development for all.

REFERENCES

Adler, N., Ülkü, T., & Yazhemsky, E. (2013). Small regional airport sustainability: Lessons from benchmarking. *Journal of Air Transport Management, 33*, 22 - 31.

Aguilar, F. J. (1967). *Scanning the business environment*. Macmillan.

Airport Council International. (2017). *Airport digital transformation best practice*. ACI.

Baglin, C. (2012). *Airport climate adaptation and resilience a synthesis of airport practice.* National Academy of Sciences.

Bain, J. S. (1959). *Industrial organization.* John Wiley and Son.

Bell, G. G., & Rochford, L. (2016). Rediscovering SWOT's integrative nature: A new understanding of an old framework. *The International Journal of Management Education, 14*(3), 310 - 326.

Bogicevic, V., Bujisic, M., Bilgihan, A., Yang, W., & Cobanoglu, C. (2017). The impact of traveler-focused airport technology on traveler satisfaction. *Technological Forecasting and Social Change, 123*, 351 - 361.

Button, K., Doh, S., & Yuan, J. (2010). The role of small airports in economic development. *Journal of Airport Management, 4*(2), 125 - 136.

Carlton, D. W., & Perloff, J. M. (2015). *Modern industrial organization* (4th Ed.). Pearson.

Chutiphongdech, T. (2020). *Airport technical efficiency and business model innovations: A case of local and regional airports in Thailand* [Doctoral disertation, National Institute of Development Administration].

Chutiphongdech, T. (2021). Airport technical efficiency and business model innovations: A case of local and regional airports in Thailand. *European Journal of Tourism Research*, *28*, 1-6.

Chutiphongdech, T., & Vongsaroj, R. (2022a). Critical components of airport business model framework: Evidence from Thailand. *Sustainability, 14*(4), 8347.

Chutiphongdech, T., & Vongsaroj, R. (2022b). The success behind the world's best airport: The rise of Changi. *Asia Social Issues, 15*(1), 1 - 15.

Davis, R., & Duhaime, I. M. (1992). Diversification, vertical integration, and industry analysis: New perspectives and measurement. *Strategic Management Journal, 13*(7), 511 - 524.

De Neufville, R., & Odoni, A. (2013). Airport systems planning, design and management (2nd Ed.). McGraw Hills.

Görener, A., Toker, K., & Ulucay, K. (2012). Application of combined SWOT and AHP: A case study for a manufacturing firm. *Procedia-Social and Behavioral Sciences, 58*, 1525 - 1534.

Graham, A. (2005). Airport benchmarking: A review of the current situation. *Benchmarking: An International Journal, 12*(2), 99 - 111.

Graham, A. (2018). *Managing airports: An international perspective*. Routledge.

Helms, M. M., & Nixon, J. (2010). Exploring SWOT analysis–where are we now? A review of academic research from the last decade. *Journal of Strategy and Management, 3*(3), 215 - 251.

Hill, T., & Westbrook, R. (1997). SWOT analysis: It's time for a product recall. *Long Range Planning, 30*(1), 46 - 52.

International Air Transport Association. (2019). *The impact of climate change on aviation*. Retrieved from https://www.iata.org/contentassets/0772118eec2e40bbba472b862e4f45ec/sfo2019-day3-climate-change.pdf

Kampanje, B. (2014). PESTEL analysis of Malawi's non-life insurance industry. *African Journal of Economic and Management Studies, 5*(1). https://doi.org/10.1108/AJEMS-01-2013-0002

Lee, S., & Walsh, P. (2011). SWOT and AHP hybrid model for sport marketing outsourcing using a case of intercollegiate sport. *Sport Management Review, 14*(4), 361 - 369.

Mason, E. S. (1939). Price and production policies of large-scale enterprise. *The American Economic Review*, 29(1), 6 - 74.

Mason, E. S. (1949). The current status of the monopoly problem in the United States. *Harvard Law Review, 62*(8), 1265 - 1285.

Merkert, R., Odeck, J., Brathen, S., & Pagliari, R. (2012). A review of different benchmarking methods in the context of regional airports. *Transport Reviews, 32*(3), 379 - 395.

Ministry of Industry. (2017). *Thailand 4.0 Industry Development Strategy (BE 2560-2579)*. Ministry of Industry.

Nikomborirak, D. (2004). Industrial economics. *Thammasat Economic Journal, 22*(4), 109 - 126.

Oey, E., & Nitihardjo, E. C. (2016). Selecting regional postponement centre using PESTLE-AHP-TOPSIS methodology: A case study in a pharmaceutical company. *Global Business Review, 17*(5), 1250 - 1265.

Office of the National Economic and Social Development Council. (2018). *The National Strategy (2018 - 2037)*. NESDC.

Pan, W., Chen, L., & Zhan, W. (2019). PESTEL analysis of construction productivity enhancement strategies: A case study of three economies. *Journal of Management in Engineering, 35*(1), 05018013. https://doi.org/doi:10.1061/(ASCE)ME.1943-5479.0000662

Porter, M. E. (2001). Strategy and the Internet. *Harvard Business Review, 79*(2), 63-78.

Puempel, H., & Williams, P.D. (2016). The impacts of climate change on aviation: Scientific challenges and adaptation pathways. In *ICAO Environmental report 2016: On board a sustainable future* (pp. 205 - 207). ICAO.

Saaty, T. L. (1990). How to make a decision: The analytic hierarchy process. *European Journal of Operational Research, 48*(1), 9 - 26.

Saaty, T. L. (2008). Decision making with the analytic hierarchy process. *International Journal of Services Sciences, 1*(1), 83 - 98.

Song, J., Sun, Y., & Jin, L. (2017). PESTEL analysis of the development of the waste-to-energy incineration industry in China. *Renewable Sustainable Energy Reviews, 80*, 276 - 289.

Srdjevic, Z., Bajcetic, R., & Srdjevic, B. (2012). Identifying the criteria set for multicriteria decision making based on SWOT/PESTLE Analysis: A case study of reconstructing a water intake structure. *Water Resources Management, 26*(12), 3379 - 3393. https://doi.org/10.1007/s11269-012-0077-2

TAT Interlligence Center. (2018). *The Compass*. Retrieved from http://marketingdb.tat.or.th/documents/10181/58221/Compass-Q4-2561.pdf/c2b9b2b4-f226-4dc5-aa3c-d804b55ddc1b

Thakur, V. (2021). Framework for PESTEL dimensions of sustainable healthcare waste management: Learnings from COVID-19 outbreak. *Journal of Cleaner Production, 287*, 125562. https://doi.org/https://doi.org/10.1016/j.jclepro.2020.125562

Thompson, A.A., Peteraf, M.A., Gamble, J.E., & Strickland Iii, A.J. (2014). *Crafting and executing strategy : The quest for competitive advantage : Concepts and cases* (19th Ed.). McGraw-Hill Education.

Tsangas, M., Jeguirim, M., Limousy, L., & Zorpas, A. (2019). The application of Analytical Hierarchy Process in combination with PESTEL-SWOT analysis to assess the hydrocarbons sector in Cyprus. *Energies*, *12*(5), 1 - 17.

Wattanacharoensil, W., Schuckert, M., & Graham, A. (2016). An airport experience framework from a tourism perspective. *Transport Reviews, 36*(3), 318 - 340.

Yüksel, I. (2012). Developing a multi-criteria decision making model for PESTEL analysis. *International Journal of Business and Management, 7*(24), 52 - 66.

Zaharia, S.E., & Pietreanu, C. V. (2018). Challenges in airport digital transformation. *Transportation Research Procedia, 35*, 90 - 99. https://doi.org/https://doi.org/10.1016/j.trpro.2018.12.016