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Assessing Suitability as a Tourist Airport Hub in Thailand Using a New Assessment Method

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ASSESSING SUITABILITY AS A TOURIST AIRPORT HUB IN THAILAND USING A NEW ASSESSMENT METHOD

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Abstract

Currently, the evaluation model uses a hierarchical analysis process, where experts tend to score alternative factors. The evaluation results are often based on different experts' experiences. In addition, collecting each person's interview set takes a long time. Therefore, researchers have introduced a new evaluation model that does not require experts to evaluate alternatives as a research project called strategic planning to enhance Thailand to be a passenger airport hub in Southeast Asia by using new assessment model. In this study, 6 airports were evaluated: Don Mueang International Airport, Suvarnabhumi International Airport, Phuket International Airport, Hat Yai International Airport, Chiang Mai International Airport, and Mae Fah Luang Chiang Rai International Airport. The objectives were to study the factors affecting the airport's status as a tourism hub and to evaluate the suitability of alternative airports as a tourism airport hub. The study tool was the E-view program for multiple regression analysis. The prediction results were in the form of coefficients of the regression prediction equation to be used as the importance weight of the variables and to select appropriate airports to be a tourism airport hub.

Key words: *E-view, Tourist Airport Hub, Analytic Hierarchy Process*

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1. Introduction

Thailand is a country that emphasizes tourism promotion policies to attract foreign tourists to visit Thailand. From Figure 1, Thailand has a tendency for foreign tourists to increase every year, but there will be a period of COVID-19 when the number will decrease.

Figure 1: Number of foreign tourists visiting Thailand between 2011-2023

Source: Office of the Permanent Secretary, Ministry of Tourism and Sports, Ministry of Tourism and Sports (2024) [1]

Therefore, this research was conducted to find the most suitable airport to be a tourist airport hub, by selecting from 6 major airports with the most commercial flights in and out. Normally, the method of selecting an airport that is suitable to be a tourist airport hub usually uses the evaluation method by experts to give a score level. The evaluation period is quite long because it must be sent to experts for evaluation. In addition, it may not be accurate because most evaluators use experience to evaluate and select the airport. Therefore, in this research, there are two objectives: 1. to study alternative factors that affect being a tourism hub airport. 2. to find a suitable airport to serve as a tourism airport hub.

2. Literature Review

2.1 Related theories

Multiple regression analysis is a method of data analysis to find the relationship between the dependent variable (Y) or the measured variable (Criterion Variable) and the independent variable (X) or the predictor variable (Predictor Variable) from 2 values or more. [2] In the case of using 1 measurement value and 1 predictor variable, it is called simple regression analysis. In multiple regression analysis, the multiple correlation coefficient must be found to find the relationship between at least 2 independent variables or independent variables and the dependent variable. For multiple regression analysis, it is necessary to find the regression equation to use in forecasting the dependent variable (Y) and find the standard error value, as well as find the multiple correlation value to find the highest possible linear relationship between the independent variable or independent variable and the dependent variable.

The analytic hierarchy process or AHP method was invented in the late 1970s by Thomas L.Saaty of the University of Pennsylvania, USA. This method can change things that cannot be measured in quantitative terms. It will set a scale for consideration to find possible answers that are reasonable. After that, the goals will be set and the structure of the problem to be considered will be determined as a hierarchical chart. This allows the considerer to see the components of the problem as a whole and to compare the problems logically in all factors, making the decision results more accurate and thorough. [3]

Since the AHP method was invented, it has been applied in various decision-making processes such as location selection, operator selection, and air cargo hub suitability assessment. [4]

Due to the disadvantage of the AHP assessment, it uses experts to provide opinions on each alternative factor, which may cause the results to tend to be in line with the ideas or experiences of the experts who are assessing. Therefore, the author tried to find a new method to use. The research results of the article named "Strategic Planning to Enhance Thailand to be Passenger Airport Hub in Southeast Asia by using New Assessment Model" were used to evaluate the tourist airport hubs in Thailand. In this assessment, no experts are used to assess the results, but real data from each alternative factor is used to find the answer. [5]

2.2 Factors related to being a tourism airport hub

2.2.1 Number of tourists (NT) is the number of tourists traveling to the airport.

2.2.2 Gross Provincial Product (GPP) is the national income data classified by area within the province, which indicates the economic situation within the area.

2.2.3 Aircraft Movement (AM) is an aircraft take-off or landing at an airport. For airport traffic purposes one arrival and one departure are counted as two movements.

2.2.4 Number of Airlines in Airport (NAA) is number of airlines based at the airport.

2.2.5 Number of Infrastructures in Connection (NIC) is number of transportation categories including water, land and rail that can connect to the airport.

2.2.6 Number of Tourist Attractions (NTA) means tourist attractions registered with the Ministry of Tourism Thailand within 200 kilometers from the airport.

Table 2: Shown the factors affecting the airport's status as a tourist hub

Factors related to being a tourism airport hub	Previous Study
Number of tourist (NT)	Benítez [6], Redondi, et al [7], Lohmann, et al [8]
Gross Provincial Product (GPP)	Castro & Fontoura [9], Oktal & Ozger [10]
Aircraft Movement (AM)	Zhang, et al [11], Cheung, et al [12]
Number of Airlines in Airport (NAA)	Güner, et al [13]
Number of Infrastructures in Connection (NIC)	Ran, et al [14]
Number of Tourist Attractions (NTA)	Lohmann, et al [15]

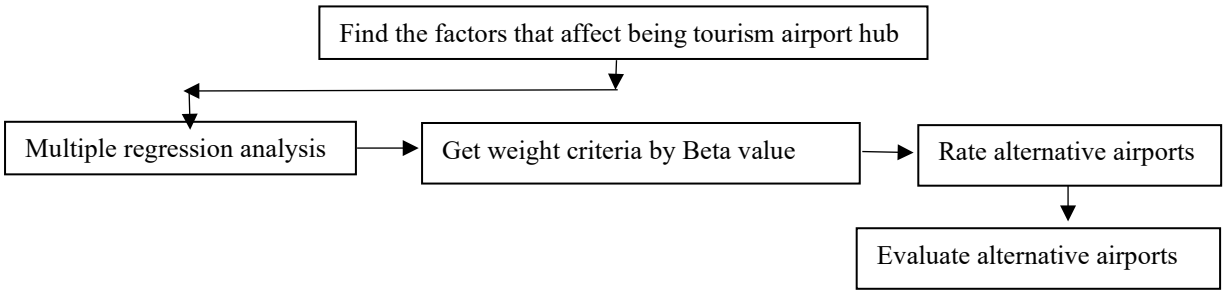
3. Research methods

3.1 Scope of the research

In this study, the results of the research on Strategic Planning to Enhance Thailand to be Passenger Airport Hub in Southeast Asia by using New Assessment Model were used. Which uses a new method of AHP (Analytic Hierarchy Process) that does not require an expert to give weight to alternative factors. Therefore, the researchers will use a new evaluation model to evaluate the alternatives of suitable airports as tourist hubs. Using 6 international airports: Suvarnabhumi International Airport, Don Mueang International Airport, Phuket International Airport, Hat Yai International Airport, Chiang Mai International Airport and Mae Fah Luang Chiang Rai International Airport.

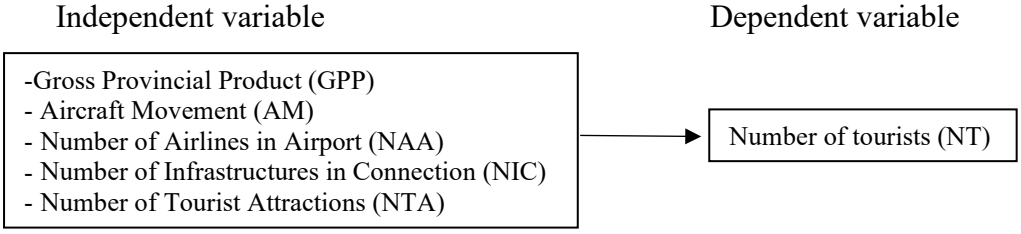
3.2 Research Framework

Figure 2 : Research process



Step1: Find the factors affecting the airport's status as a tourist hub by reviewing the literature.

Figure 3 : Conceptual framework



Step2: Multiple regression analysis was used to find the relationship between independent and dependent variables. Collect historical data between 2004-2023 from alternative factors. The E-views program version 12 was used to find the relationship between variables, which has the following general models:

$$Y = \propto + \beta_1 GPP + \beta_2 AM + \beta_3 NTA + \beta_4 NAA + \beta_5 NIC + \varepsilon$$

Creating a multiple regression equation. It is an analysis of the relationship between two or more variables by creating a forecasting equation to explain the effects of the variables. In this step, the researcher divided the study into coefficient estimation using the fixed effect model and the random effect model to select the model that is most suitable for the data between the fixed effect model or the random effect model. The statistical test can be performed using the Hausman test and redundant fixed effects tests.

Step 3: Get weight criteria by Beta value.

The multiple regression equation will be solved, and the beta value will then be used to determine the weights of the alternative factors.

Step 4: Rate alternative airports. Provides assessment scores for each airport based on historical data from 2004-2023, which is searched from annual documents and data from government agencies. The evaluation method is divided into 5 levels of scores from 9-point evaluation criteria.

Figure 4: Tourist Airport Hub Rating Level

Level	Perference Level	Score
1	very poor	1
2	poor	3
3	fair	5
4	good	7
5	very good	9

Step 5: The consistency of reasons is calculated to make a comparative judgment by giving weight to the importance of the criteria used in the decision in pairs as acceptable completeness by considering the consistency index and the consistency ratio.

Step 6: Calculate alternative airports using the formula: The weight of each alternative factor multiplied by the assessment score.

Table 3: Shown the differences between the AHP and new assessment

Methods	AHP	New assessment
Weight Criteria	Expert	Use beta value
Evaluate alternatives	Expert	Use real data

Table 3, it shows the difference between the old and new evaluation models that emphasize using experts to evaluate the alternatives and give weight to the importance of each alternative factor. However, the new assessment model will focus on calculations and actual data of each alternative factor.

3.3 Population and sample

The dependent variable is number of tourists and the independent variables are gross provincial product (GPP), aircraft movement (AM), number of tourist attractions (NTA), number of airlines in airport (NAA), number of infrastructures in connection (NIC). The data used in this research were secondary data and panel data analysis from 2004 to 2023, a total of 20 years.

3.4 Tools used in research

1. Using E-view program version 12
2. The analytical hierarchy process (AHP)

4. Results and Discussion

4.1 Panel Data Regression Analysis

The results of the panel data correlation estimation using the three methods are as follows: 1. Pooled OLS 2. Fixed Effects Models 3. Random Effects Models as shown in table 4

Table 4: Panel regression analysis results

Variable	Model		
	Pooled OLS	Fixed Effect	Random Effect
C	4.4123	4.5821	4.3557
GPP	0.1129	0.0984	0.1099
AM	0.8515	0.8438	0.8651
NAA	-0.1634	0.0461	-0.1251
NIC	0.5467	0.4471	0.4895
NTA	0.1936	0.0893	0.1601

From table 4, the results of the analysis are used to select the appropriate model for estimation using two methods: Hausman Test and Redundant Fixed Effects Test.

Assumptions for using Redundant Fixed Effects tests to select fixed effects
H0 = Fixed Effects is not appropriate and ineffective (Prob. > 0.05)
H1 = Fixed Effects is appropriate and effective (Prob. < 0.05)

Assumptions for using Hausman test to select random effects
H0 = Random Effects is appropriate and effective (Prob. > 0.05)
H1 = Random Effects is not appropriate and ineffective (Prob. < 0.05)

Table 5: Shown result for redundant fixed effects tests

Redundant Fixed Effects Tests
Test period fixed effects

Effects Test	Statistic	d.f.	Prob.
Period F	2.193865	(19,95)	0.0069
Period Chi-square	43.654877	19	0.0011

From table 5, the value of prob is less than 0.05, indicating that fixed effects are appropriate for estimation.

Table 6: Shown result for Hausman test

Correlated Random Effects - Hausman Test
Test cross-section and period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section and period random	16.125717	3	0.0011

From table 6, the value of prob is less than 0.05, indicating that fixed effects are appropriate for estimation.

Therefore, when the results of data analysis are obtained from both methods, the estimation is done using the fixed effects method.

The equation of multiple regression analysis for fixed effects is

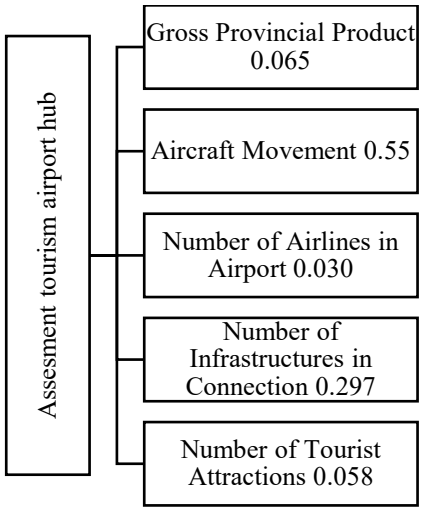
Number of Tourism =4.5821+0.0984GPP+0.8438AM+0.0461NAA+0.4471NIC+0.0893NTA

From the equation above, the beta value of each variable will be used as the weight of each alternative factor. However, the beta value must be adjusted to an integer of one to accommodate the weighting of each alternative factor. Therefore, the following formula will be used: weight = beta/sum beta

Table 7: Shown the weight adjustment of each alternative factor

Factor	GPP	AM	NAA	NIC	NTA
Beta	0.098	0.843	0.046	0.447	0.089
Weight	0.065	0.55	0.030	0.297	0.058

Figure 5: Shown the weight of each alternative factor



From Figure 5, the results of using beta values as weights for each factor are as follows: Gross Provincial Product is equal to 0.065, Aircraft Movement is equal to 0.55, Number of Airlines

in Airport is equal to 0.030, Number of Infrastructures in Connection is equal to 0.297, and Number of Tourist Attractions is equal to 0.058.

To determine the range for evaluating the tourist airports hub of alternative factors data, namely Gross Provincial Product, Aircraft Movement, Number of Airlines in Airport, Number of Infrastructures in Connection and Number of Tourist Attractions of the 6 airports, the researcher divided the data into 5 levels in accordance with the process for (Analytic Hierarchy Process, AHP) in accordance with the research of Deng Yong [16], which has the details of calculation as follows: Range = highest value data – lowest value data, width of the range = range/number of data levels. The results of the evaluation can be seen in Table 8. If the evaluation score is 5, it indicates that the airport is the most suitable in that alternative factor. Conversely, if the evaluation score is 1, it indicates that the evaluation result in that alternative factor is the least suitable.

Table 8: Classify data in 5 level for select Tourist Airport Hub

Factors	Unit	BKK	DMK	CEI	CNX	HKT	HDY
GPP	Baht	5	5	1	1	1	1
AM	Count	5	3	1	1	2	1
NAA	Count	5	5	2	3	4	1
NIC	Count	5	5	1	3	5	5
NTA	Count	3	4	1	5	3	1

From Table 8, the data is used to create a pairwise matrix table to calculate the normalization and obtain the eigenvector. Then, the consistency ratio is checked to obtain the answer in Table 9.

Table 9: Shown the results of eigenvector calculations

Factors	BKK	DMK	CEI	CNX	HKT	HDY
GPP	0.33	0.33	0.085	0.085	0.085	0.085
AM	0.208	0.195	0.147	0.147	0.156	0.147
NAA	0.205	0.205	0.134	0.152	0.182	0.122
NIC	0.225	0.225	0.033	0.067	0.225	0.225
NTA	0.163	0.195	0.137	0.205	0.163	0.137

Table 10: The result of AHP method

Factors	BKK	DMK	CEI	CNX	HKT	HDY
GPP	0.02145	0.02145	0.00553	0.00553	0.00553	0.00553
AM	0.1144	0.10725	0.08085	0.08085	0.0858	0.08085
NAA	0.00615	0.00615	0.00402	0.00456	0.00546	0.00366
NIC	0.06683	0.06683	0.0098	0.0199	0.06683	0.06683
NTA	0.00945	0.01131	0.00795	0.01189	0.00945	0.00795
SUM	0.21828	0.21299	0.10814	0.12272	0.17306	0.16481

From Table 10, the results of the evaluation of alternative tourist airport hubs using the AHP method are obtained by multiplying the results from the factor weights and eigenvector values, which will give the answer that the most suitable airport to be a tourist hub is Suvarnabhumi International Airport, followed by Don Mueang International Airport, Phuket International Airport, Hat Yai International Airport, Chiang Mai International Airport, and Mae Fah Luang Chiang Rai International Airport, respectively.

5. Conclusions

This research has the factors that influence the tourist airport center, namely Gross Provincial Product, Aircraft Movement, Number of Airlines in Airport, Number of Infrastructures in Connection and Number of Tourist Attractions, which are derived from the literature review. These factors will be used to assess the suitability of being a tourist airport center by using 6 potential airports of the country as alternative airports, namely Don Mueang International Airport, Suvarnabhumi International Airport, Phuket International Airport, Hat Yai International Airport, Chiang Mai International Airport, and Mae Fah Luang Chiang Rai International Airport. The new assessment method will be adapted from the analysis hierarchical process that does not use experts to assess alternative factors and assess each airport. The method used is regression analysis. The beta value of the equation will be used instead of the weight of alternative factors. The actual data of each airport will be used to assess the score level from 1-5 to select the appropriate airport as a tourist center.

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