

**International Academic Multidisciplinary Research Conference 2017**

**Conference Proceedings**

**INTERNATIONAL BUSINESS ECONOMIC TOURISM SCIENCES TECHNOLOGY  
HUMANITIES SOCIAL SCIENCES AND EDUCATION RESEARCH CONFERENCE**

*London, United Kingdom  
5 – 7 April, 2017*

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*The International Education Social Sciences and Humanities Research Conference*

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# Conference Proceedings

INTERNATIONAL BUSINESS ECONOMIC TOURISM SCIENCES TECHNOLOGY  
HUMANITIES SOCIAL SCIENCES AND EDUCATION RESEARCH CONFERENCE

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## THE 2017 ICBTS

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## INTRODUCTION

We would like to welcome our colleagues to the International Business Tourism Transport Technology Social Sciences Humanities Education Research Conference. It is the seven series in 2016 of Conference on Business Tourism and Apply Sciences was held in Amsterdam. As always many members of the ICBTS 2016 community look forward to meeting, sharing and exchanging their research ideas and results in both a formal and informal setting which the conference provides. Likewise, the concept of alternating the international conference every one month on April to November between Europe and the rest of the world is now well established. This year's event in London (UK) Paris (France) Munich (Germany) Amsterdam (Netherlands) Boston (USA) Toronto (Canada) London (United Kingdom) Zurich (Switzerland) Berlin (Germany) Tokyo (Japan) and another continues with the cultural following the very successful and productive event held in London-Zurich in August 2016 in the field of various types for international academic research conference on Business Economics Social Sciences Humanities Education and Apply Sciences. As usual The ICBTS 2016 brings together leading academics, researchers and practitioners to exchange ideas, views and the latest research in the field of Business Tourism and Apply Sciences.

The theme of this event The 2016 ICBTS International Business Tourism Social Sciences Humanities and Education Research Conference is "Opportunities and Development of Global Business Economics Social Sciences Humanities and Education" It is also represents an emerging and highly challenging area of research and practice for both academics and practitioners a like, The current industrial context is characterized by increasing global competition, decreasing product life cycles, Global Business, Tourism Development, Social Sciences Humanities Education Apply Sciences and Technology collaborative networked organizations, higher levels of uncertainties and, above all, and customers. In our view holding this event in Tokyo represents a timely opportunity for academics and researchers to explore pertinent issues surrounding Business Economics Tourism Social Sciences Humanities Education Sciences and Technology.

Potential authors were invited to submit an abstract to the International Conference Session Chairs. All abstracts were reviewed by two experts from the International review committee and final papers were further reviewed by this volume with 30 contributing authors coming from 18 countries. This book of proceedings has been organized according to following categories:

- Business
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# DEA MODEL MEASURING AIRPORT PERFORMANCE IN THAILAND

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## ABSTRACT

Data Envelopment Analysis for Measuring Airport Performance in Thailand focuses on benchmarking techniques. This paper considers the past and the present of airport performance measurement to hypothesize future. Airport performance measurements are important in increasing for today's business and operational management, regulatory bodies, passengers and airline. Measurement systems have been developed in response to the changing organizational and from rapid passenger growth. For this objective focus on benchmarking these scores of all factors. Performance key factors selected measurement are based on four input factor follows; operational cost, number employees, gates and runway. And four output factor revenue, commercial, aviation movement, and total cargo transportation. We use Analytic Hierarchy Process (AHP) to weighting of Airport factor and then use Data Envelopment Analysis (DEA) to measurement Airport performance in Thailand (Don Mueang). As a result, we get performance score of Don Muang Airport.

**Keywords--** Thailand Airport, Airport Performance, Data Envelopment Analysis

## INTRODUCTION

Airport development is required as well as improving the efficiency of aircraft and airlines. Nowadays, the airport has been developed in various aspects in order to provide customers the satisfying conveniences, and also the efficiency cargo transportation, that is to say, airport is considered to be a primarily structure of country. Nowadays, many countries own more than one airport which is a brand new idea to gather all the conveniences for passengers from their departure to destination. Public utilities which are the restaurants, accommodation, and also entertainment are highly required in the airport to increase airport revenue. These followings are non-aeronautical revenue which consisted of concession revenue, office and real property rents and service revenue, except for aeronautical revenue which consisted of landing charge, parking charge, passenger service charge and aircraft service charge. It can be seen from the development plan in every country worldwide to widen constructions continuously in order to efficiently accommodate passengers, goods and enterprises which are future engaged, as well as expanding runways and taxiways to sufficiently support landing charge. Those are considered to be the highlight of the developed countries.

Thailand owns 6 main airports are

- |                                       |  |
|---------------------------------------|--|
| 1. Don Muang International Airport    | 4. Mae Fah Luang International Airport |
| 2. Suvannabhumi International Airport | 5. Phuket International Airport        |
| 3. Chiang Mai International Airport   | 6. Hat Yai International airport       |

Don Mueang International Airport (Thai: ท่าอากาศยานดอนเมือง, IPA: [dɔ̃ːn.mūːaŋ]), or colloquially as Thai: สนามบินดอนเมือง, IPA: [sà.náːm.bīn.dɔ̃ːn.mūːaŋ]) (IATA: DMK, ICAO: VTBD) (or also [old] Bangkok International Airport) is one of two international airports serving Greater Bangkok, the other one being Suvarnabhumi Airport ([New] Bangkok International Airport) (BKK). The airport is considered to be one of the

world's oldest international airports and Asia's oldest operating airport. It was officially opened as a Royal Thai Air Force base on 27 March 1914, although it had been in use earlier. Commercial flights began in 1924, making it one of the world's oldest commercial airports. The first commercial flight was an arrival by KLM Royal Dutch Airlines. Don Mueang Airport closed in 2006 following the opening of Bangkok's new Suvarnabhumi Airport, before reopening on 24 March 2007 after renovations. Since the opening of the new airport, it has become a regional commuter flight hub and the de facto low-cost airline hub. In 2015, it became the world's largest low cost carrier airport.

Don Mueang was an important hub of Asia and the hub of Thai Airways International prior to its closure. At its peak, it served most (clarification needed) air traffic for the entire country, with 80 airlines operating 160,000 flights and handling over 38 million passengers and 700,000 tons of cargo in 2004. It was then the 14th busiest airport in the world and 2nd in Asia by passenger volume. Currently, Don Mueang is the main hub for Nok Air, Thai AirAsia, Thai Lion Air, and Orient Thai Airlines.

### Traffic statistics

Total passenger traffic through Don Mueang jumped 40.7 percent to 30.3 million in 2015, with international numbers rising 53.1 percent to 9.17 million and domestic passengers increasing 35.9 percent to 21.1 million. Aircraft movements rose by 29.8 percent to 224,074, including 158,804 domestic (up 26.2 percent) and 65,270 international (up 39.3 percent)

**Table 1**  
**Traffic statistics**

Calender Year	Passengers	Change from the previous	Movements	Cargo (tons)
<i>Source: Airports of Thailand PLC</i>				
2008	5,043,235	-	-	-
2009	2,466,997	51.1% ↓	-	-
2010	2,999,867	21.6%	-	-
2011	3,424,915	14.2%	51,301	-
2012	5,983,141	74.7%	65,120	7,329
2013	16,479,227	472.70%	154,827	25,657
2014	21,546,568	30.75%	172,681	29,086
2015	30,304,183	29.76%	224,074	45,488

Don is a major hub in Asia and a hub of Thai Airways before closing. So this needs to adjust the performance of the airport and get the performance points.

### LITERATURE

As the results of airport operation are importance to business and management under the operation of the government and those passengers who use service and airlines are affected. Therefore, the airport supervisor and government must evaluate the efficiency of the airport for the purpose of finance, management, competition strategy, investment options, environmental impacts and security checking. A few research showed the airport performance evaluation. While most showed the purpose of the efficiency of the airport as to focus on the consideration of airport performance indicators. Most airport performance evaluations are separated into 2 parts are efficiency and productivity, both are under the same idea to gain productive results. The article about the analysis of airport operational efficiency in USA focused on the airport performance evaluation along with airlines and passengers by evaluating the performance of 44 airports in USA by using Data Envelopment Analysis. The factors which are determined to evaluate appropriately consisted of 4

inputs are Airport Operation Costs, Number of Airport Employees, Gates and Runways. Also, 5 outputs are Operational Revenue, Passenger Flow, Commercial and General Movement, Total Cargo Transportation. Those focused on literature review and effects of outputs that could affect to the airport performance and airport operation. Also, focused on making a comparison of airport performance and factor affected to the departure and arrival in order to get a precise evaluation. The boundary of the study is consisted of 44 airports using the method and equipment called DEA model (Data Envelopment Analysis) including with many equations as following

- Basic (CCR, BCC) is the how to calculate the efficiency by equation.

- Cross-Efficiency (SXEF) is the how to calculate the efficiency of the airport. Consisting of “s” main standard airport having high points on the efficiency within the sample group being compared and the equation CCR is used.

- Aggressive-Cross-Efficiency (AXEF) is the structure being improved by using “s” main standard airport which was designed by Doyle and Green as to calculate the efficiency of points.

- Ranked-Efficiency (RCCR) is a structure to calculate the point of the airport efficiency being improved from CCR model as to rank the airport.

- Radii of Classification Rankings (GTR) is an adapted equation as to suit with the airport classification.

All data has been used for the efficiency of the airport as to scope the factors used in the calculation are input data consisted of finance: airport operational costs, airport employee wage, gate and runway, number of aircraft and landing charge. Also, output data are operational revenue, airline flow total passengers and airlines, and also cargo transportation. All data about 44 airports are from ACI. The conclusion and analysis shown by timetable no.4 are the efficiency of the airport in each year seen that the efficiency has been rising every year, except for 1993 which slightly decreased. As the figure, it could ensure the rising performance that is from the continual development, yet demonstrate the efficient use of the airport resources. The following table shows the factors that affect the performance of each airport. The research paper evaluates the performance of the airport to collect statistics on the use of the Input and Output of each airport. (table1, 2)

**Table 2**  
**Input and Output Valuable**

<i>Input Variables</i>		<i>Output Variables</i>	
<b>Airport service factors</b>		<b>Airport service factor</b>	
<b>Number of employees</b>	<b>23</b>	<b>Number of passengers</b>	<b>41</b>
<b>Size of terminal area</b>	<b>16</b>	<b>Aircraft movement</b>	<b>33</b>
<b>Number of runways</b>	<b>15</b>	<b>Amount of cargo</b>	<b>30</b>
<b>Financial Factors</b>		<b>Financial Factors</b>	
<b>Operational cost</b>	<b>12</b>	<b>Amount of no aeronautical revenue</b>	<b>12</b>
<b>Capital cost</b>	<b>8</b>	<b>Amount of aeronautical revenue</b>	<b>7</b>
<b>Labor cost</b>	<b>6</b>	<b>Amount of operational revenue</b>	<b>4</b>

Suggested several indicators when evaluating airport environmental performance such as waste per passenger and water consumption per passenger. These environmental variables offer significant potential scope for future research directions

## METHODOLOGY

Methodology is the performance evaluation theory with DEA (Data Envelopment Analysis) equation DEA Basic (CCR) Data Envelopment Analysis is one of non-parametric method. It is the calculation by using performance indicators as to find out the highest performance each airport. DEA was developed by Charnes, Cooper and Rhodes in 1978 using linear equation and technical factors to translate into results and each result will show individual area. The advantage of DEA is to calculate the performance from input and output. DEA is the most practical method compared with other ones due to less data use and precise results.

$$E_{ks} = \frac{\sum_y O_{sy} v_{ky}}{\sum_x I_{sx} u_{kx}} \quad (1)$$

$$\begin{aligned} &\text{maximize } E_{kk} = \frac{\sum_y O_{ky} v_{ky}}{\sum_x I_{kx} u_{kx}} \\ &\text{subject to: } E_{ks} \leq 1 \quad \forall \text{ Airports } s \\ &\quad u_{ks}, v_{ks} \geq 0 \end{aligned} \quad (2)$$

$$\begin{aligned} &\text{maximize } E_{kk} = \sum_y O_{ky} v_{ky} \\ &\text{subject to: } E_{ks} \leq 1 \quad \forall \text{ Airports } s \\ &\quad \sum_x I_{kx} u_{kx} = 1 \\ &\quad u_{kx}, v_{ky} \geq 0 \end{aligned} \quad (3)$$

$E_{ks}$  = efficiency or relative productivity measure of airport s

$O_{sy}$  = value of output y for airport s

$I_{sx}$  = value of input x for airport s

$V_{ky}$  = weight assigned to airport k for output y

$U_{kx}$  = weight assigned to airport k for input x

The equation seen no.1-3 showing the variables V and U which are the weight variables of factors indicating the importance of each factor used for indicating the efficiency of the airport. As the theory and reality, the weight variables are required to specific area because of the limitations of area and geographical features. So, it

requires data from experts or those who related to airport operation as to give the accurate data of the efficiency of the airport in Thailand requiring the perfection on equation and creditable results from the evaluation or operation in order to select the factors or indicators that suit the equation that we have as to gather the data clearly and completely.

### 1. Data

**Table 4**  
**Data of Don Mueang International Airport in 2014**

Input	Number	Output	Number
Number of employees	976	Number of passengers	30,304,183
Number of runways	2	Aircraft movement	224,074
Size of terminal area	6209	Amount of cargo	45,488
Operational cost	-	Amount of no aeronautical revenue	-

## RESULT

The calculated value of the Don Mueang International Airport Figure 1 values were calculated by DEA Model increased every year from 2014 to 2015 show that the Don Mueang International Airport has developed respectively. And are ready to serve tourists is increasing every year. Based on indicators that researchers have defined.

## CONCLUSION

This article has investigated the statistical foundation of using DEA in the context of airport efficiency modeling. During the analysis, it became obvious that, while DEA has been widely adopted in the literature on airport efficiency and productivity studies, it has merits as well as limitations. To overcome the latter, the paper has proposed the Simar–Wilson two-stage procedure, and the main focus has been to argue that the discussion raised by Simar and Wilson is relevant to this area of research.

Performance Evaluation of the airport is essential for the effective presentation to the development of the airport in the future. Expected to be the calculation of the efficiency of airports in the UK to be used in the development of comparable competitors. The tool also has the potential. DEA Model to evaluate more than to see in this paper.

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