Airport technical efficiency and business model innovations: A case of local and regional airports in Thailand

Thanavutd Chutiphongdech [1*]

[1] The Graduate School of Tourism Management (GSTM), National Institute of Development Administration (NIDA), Bangkok 10240, Thailand. E-mail: thanavutd.chut@stu.nida.ac.th

* Corresponding author

Goal and objectives of the dissertation
Goal
The growth in demand for air transport as well as budget constraints have put pressure on airport development. Therefore, airports worldwide need to become financially self-reliant and obtain better managerial tools to improve airport efficiency. Business models and business model innovations have proven to have positive impacts on airport performance (Alfuah, 2019; Zott & Amitt, 2007). However, studies relating to airport business models are scarce and lack scholarly attention, especially in the context of small airports (Adler, Ülkü & Yazhemsky, 2013). Consequently, the goal of this dissertation is to design business models and propose business model innovations using a case study of local and regional airports in Thailand to fill up the paucity of knowledge in the literature.

Objectives
The research objectives are as follows:
- To analyse the situation of local and regional airports in Thailand at both the industry level and firm level
- To determine the factors affecting airport technical efficiency
- To develop a framework for designing local and regional airport business models
- To design airport business models and propose business model innovations for local and regional airports in Thailand

Methodology
The Political, Economic, Social, Technological, Environmental and Legal (PESTEL) Analysis and Analytical Hierarchy Process (AHP) were incorporated under the structure–conduct–performance paradigm to analyse the local and regional airport industry. Simultaneously, the output-oriented data development analysis (DEA) developed by Banker, Charnes and Cooper (1984) or the BCC-DEA model was employed to analyse the firm-level situation, reflecting the technical efficiency scores of 28 local and regional airports under the operations of the Department of Airports (DOA). The computed technical efficiency scores classified the airports into three strategic groups: the average group, below-average group and above-average group. Due to time and budget limitations, 3 of the 28 local and regional airports were selected based on the negative trends of their technical efficiency scores. In other words, Suratthani International Airport, Lampang Airport and Ubon Ratchathani International Airport were chosen to represent each strategic group of DOA airports: the average group, below-average group and above-average group, respectively.

The Panel Least Square method was used to regress the secondary data during the 2014–2018 fiscal years, as this method is purposive for examining airport technical efficiency determinants. The airport ownership forms, service-relating policies and airport revenues acted as regressors, while the dependent variable was from the technical efficiency scores computed from the BCC-model in the first stage.

The exploratory and documentary research were integrated to formulate the framework that would be useful in designing airport business models. Using the semi-structured questionnaire developed under the Business Model Canvas (BMC) of Osterwalder and Pigneur (2010), nine key informants of airport management were identified. For the documentary research, this study investigated the lessons learnt from the world's best airport, Singapore Changi International Airport, and the world's best regional airport, Chubu Centrair International Airport, according to Skytrax. Several related documents, such as annual reports and information from the airport newsroom, were collected.

Qualitative analysis was employed in the final stage. Thirty-six key informants, both local and regional, from several airport stakeholders, including airlines, passengers, ramp operators and airport scholars, were questioned via in-depth interviews using a semi-structured questionnaire. The insightful information gleaned from stakeholders led to suggestions of proposed airport business models from which the innovation development concept was introduced. The discussions surrounding current local and regional airport business models and the lessons learnt from best practice airports provided the gap for innovating the business models.

Results
The PESTEL-AHP model revealed that the Air Navigation Act (No.14) BE 2562 was the strongest component, significantly impacting the overall industry by approximately 28% and shaping how DOA airports ran their businesses as a public agency. The other top 2 PESTEL elements were noted as the (1) National Strategy (2018–2037) and the (2) trend toward airport digitalisation with a pairwise estimate at 22% and 21%, respectively. For the firm-level situation analysis, the BCC-DEA model confirmed that 28 local and regional airports were technically inefficient, showing an average technical efficiency score equal to 0.188.

To understand the source of technical inefficiency of local and regional airports, the econometric model reported that airport ownership patterns were found to be the most significant factors affecting technical efficiency; service-relating policies and total airport revenues also played a significant part in airport efficiency.

The lessons learnt from the world's best airports and the in-depth interviews from airport management suggest that the framework for designing business models should focus on the sustainability of an airport. Although the BMC gave a good depiction of overall airport operations, the issues relevant to sustainability should have greater awareness. Moreover, the lessons learnt revealed that a paradigm shift was undertaken by world airport business administrations to increase revenues, and best practice airports developed themselves as tourist destinations. Several key activities and value propositions were dedicated to various customer segments, not only for airlines and passengers but also for local residents, food lovers, shoppers, athletes and tourists. The study also found that organising more diverse projects and events in world airports was related to stronger, more strategic partnerships among airport stakeholders.

By integrating the results from each research objective, the proposed airport business models for the 3 selected local and regional airports in Thailand were presented. Three models for innovating the current business model components were suggested to increase airport revenues and ultimately improve technical efficiency. The Airport-as-a-Tourism Platform Business Model, the Local Partner-and-Engagement Business Model and the Value Proposition-Oriented Business Model were introduced, as they were the most feasible, practical and appropriate in the context of local and regional airports under DOA operations.

Theoretical conclusions
This study provided several academic contributions. First, it used the PESTEL Analysis together with the AHP to analyse the situation of local and regional airports. Since the application of such a quantitative method is rare in the industry's analysis literature, this study contributed to the guidelines for constructing the PESTEL-AHP model.

Second, the specified econometric model confirmed that ownership forms significantly affected airport performance. This result closed the inconclusive and inconsistent argument in the airport literature regarding ownership patterns. Additionally, the model confirmed that service quality and airport revenues also impacted airport efficiency.

Finally, this study concluded that the BMC framework clearly described the overall airport operations. However, sustainability should be added to the business model components to capture virtual airport business operations.

Practical application of the dissertation

The overall findings provide several policies and managerial implications for DOA as an airport operator. First, DOA could consider the possibility of adopting ownership and control over airport administration since the ownership forms were reported as having the most significant impact on airport technical efficiency, and this result aligned with the lessons learnt from the documentary research. Thus, corporatisation forms or public–private partnerships should be considered to achieve a preferable airport performance. Moreover, airport policies relating to service quality improvement should be implemented as airport users in several groups expect good quality service from DOA. As the local and regional airports aim to commercialise their resources and enhance airport revenues, it can be assumed that improving the quality of services offered to customers should never be neglected.

Second, it seems that lessons learnt from the word's best airport and the world's best regional airport provide several guidelines to DOA, specifically how they connect their partnerships and how they develop airports as a destination. Therefore, customer segments are not only for passengers and airlines but also for the people in the areas. Having a variety of customer segments means more diverse sources of revenue. Once an airport defines the right segments of airport users, other business model components such as resources, channels, value propositions and customer relationships will be delivered and developed in the right direction.

To serve several customer segments, many key airport activities are thus correlated to the amount of support they receive from strategic partnerships. Furthermore, it seems that the most important issue driving airport business operations is how to create and establish a practical mechanism that allows all airport stakeholders to play an integral part in airport development. Such partnerships include airlines, local government agencies, provincial authorities, regional tourism organisations, local entrepreneurs, traders, communities and scholars because the airport is considered 'the multi-sided tourism platform'. Although the scale of those best practice airports is quite different from the local and regional airports in Thailand, the lessons learnt present guidelines and mechanisms for airport development.

Last, results from several research objectives lead to the formation of business model innovations. Such strategic options provide a novel approach for policymakers to further develop airport business administration. The options for customer segmenting in each airport, the choices for elaborating the cooperative network among airport stakeholders and the trends toward airport development as a destination option should be considered for further implementations.

Working together to integrate the synergy among an airport's business resources, tourism products and provincial authenticity and originality, the airport will truly perform as a tool for economic and social development, not only acting as the infrastructure or transportation platform but also acting as a driver for national competitiveness.

Content of the dissertation
Abstract of Chapter 1
This chapter provides an overview of the identifiable research problem leading to the rationale of the study and research objectives. It presents the research gaps, possible research contributions and outcomes from the study for academics, policymakers and airport stakeholders.

Abstract of Chapter 2
This chapter describes a structured and systematic review of previous studies relevant to the research questions. The review of the literature and theoretical frameworks for each research objective is comprehensively described and critiqued.

Abstract of Chapter 3
This chapter illustrates the conceptual research framework derived from the literature review. The research designs, including data collection, data analysis, source of data and implemented research approaches to disclose research questions, are also clarified.

Abstract of Chapter 4
This chapter reveals the key findings obtained from the situation analysis of local and regional airports in Thailand. Using PESTEL-AHP and BCC-DEA to analyse and measure the industry and technical efficiency, the results are presented. The outputs from this chapter give insight into the key trends and forces that impact business model designs.

Abstract of Chapter 5
This chapter offers information relating to airport technical efficiency determinants. The econometric model indicated that airport ownership forms, service quality policies and airport revenues were the key aspects that airport management should pay attention to when designing an airport business model to enhance technical efficiency.

Abstract of Chapter 6
This chapter provides a collective set of insightful information from the documentary research together with the results of in-depth interviews with airport management. By integrating the results from both methods, the outputs of the chapter provide business model components leading to the framework for designing the airport business models in chapter 7.

Abstract of Chapter 7
To design the business models for local and regional airports in Thailand, the outputs from chapters 4, 5 and 6 are unified in this chapter. This chapter also discusses the comparison between the best practice airports and the as-is airport business models to show the process of innovating airport business model components.

Abstract of Chapter 8
This chapter presents an overall summary of the key findings that were gathered. It offers policy implementations, managerial suggestions and future research recommendations. Additionally, the limitations of the study are conveyed in this chapter.

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