UNIVERSITI TEKNOLOGI MARA

AERONAUTICAL REVENUES OPTIMISATION MODEL (AROM) FOR REGIONAL AIRPORTS VIA AIRSIDE OPERATIONS STOCHASTIC BASELINE MATRIX ANALYSIS

WAN MAZLINA WAN MOHAMED

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student	:	Wan Mazlina Wan Mohamed
Student I.D. No.	:	2010819986
Program	:	Doctor of Philosophy (EM999)
Faculty	:	Faculty of Mechanical Engineering
Thesis Title	:	Aeronautical Revenues Optimisation Model (AROM) for Regional Airports via Airside Operations Stochastic Baseline Matrix Analysis
Signature of Student	:	.....
Date	:	January 2016

ABSTRACT

Maximising revenues is one of the greatest challenges of regional airports especially after the introduction of deregulation and privatisation of airports with the increase of aggressive competition in the markets. The calculation of aeronautical revenues generation has always been considered as a straightforward method and airport managers generally overlooked on the importance of daily operational factors such as the different flight services offered at the airports, the type of aircraft airlines utilised, time of the day the flight arrives or departs, and the number of passengers the airlines ferry in and out of their airport, types of destination and how these factors influence the generation of aeronautical revenues for their airport. The first objective of this research is to measure the airside operation factors that influence the generation of aeronautical revenues deterministically. The influential variables were determined through literature reviews and case studies of regional airports in the Netherlands and Malaysia, and were validated with regression analysis. Preliminary model was developed based on the determinants and the model was analysed using Bayesian Network theory. Thus, the research is also geared towards developing a baseline matrix using stochastic approach to analyse the effect of airside operation factors on aeronautical revenues generation as the second objective. The next objective concerns with the formulation of mathematical optimisation algorithm known as Aeronautical Revenue Optimisation Model (AROM) to generate maximum aeronautical revenues for regional airport in line with the objectives of the airport. Finally, the research embarks on developing a graphical user interface (GUI) tool based on the model to estimate the possible potential aeronautical revenues that could be generated which will be useful for airport managers in their decision making. The GUI for AROM is a user friendly tool which allows airport managers to key-in the main input parameters such as mode of operations (arrival or departure), traffic types (Schedule, Business, Charter, etc.), flights details (day or night, weekday or weekend, number of passengers, international or domestic), fleet types (aircraft weight and engine type) and type of flights (domestic or international) in order to determine the composition of flight operations that produces optimum aeronautical revenues that could be achieved. Results obtained show that the maximum revenue achieved is based on flights composition, which is more focused towards certain types of traffic types with higher frequency for each of them in contrast to the current practise of offering small number of all sorts of traffic types. The model developed in this research is flexible; it allows decision makers to set the upper bound of flight constraints. The model can also be extended to include bigger sets of flight details, for example, to have day, evening and night flight instead of just day and night. Aside from that, the parameter can also be generalised such as to consider all international flights instead of domestic and international. The traffic types can also be adjusted to include shorter or longer list of traffic types to suit the airport's services.

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