Forecasting Australia's domestic low cost carrier passenger demand using a genetic algorithm approach

Panarat Srissaeng, Steven Richardson, Glenn Baxter & Graham Wild

To cite this article: Panarat Srissaeng, Steven Richardson, Glenn Baxter & Graham Wild (2016) Forecasting Australia’s domestic low cost carrier passenger demand using a genetic algorithm approach, Aviation, 20:2, 39-47, DOI: 10.3846/16487788.2016.1171798

To link to this article: http://dx.doi.org/10.3846/16487788.2016.1171798

Published online: 16 Jun 2016.

Submit your article to this journal

Article views: 17

View related articles

View Crossmark data
FORECASTING AUSTRALIA'S DOMESTIC LOW COST CARRIER PASSenger DEMAND USING A GENETIC ALGORITHM APPROACH

Panarat SRIASAENG1, Steven RICHARDSON2, Glenn BAXTER3, Graham WILD4

1, 3, 4 School of Aerospace, Mechanical and Manufacturing Engineering, RMIT University, Melbourne, Australia 3001
2 School of Engineering, Edith Cowan University, Joondalup, Western Australia, Australia 6027
E-mail: s3125221@student.rmit.edu.au4 (corresponding author)

Received 23 October 2014; accepted 24 March 2016

Panarat SRIASAENG

Steven RICHARDSON, PhD
Education: Bachelor of Science, The University of Western Australia, Perth, Western Australia, Australia, 2008. PhD, The University of Western Australia, Perth, Western Australia, Australia, 2008. Affiliations and functions: Senior Lecturer, School of Science, Edith Cowan University. Research interests: numerical methods/analysis, optimisation simulation modelling (applied to iron ore mining), simulation of tyre usage in iron ore mining, simulation of repair shop in iron ore mining.

Glenn S. BAXTER, PhD
Education: Bachelor of Aviation Studies, University of Western Sydney, Australia, 2000. Master of Aviation Studies, University of Western Sydney, Australia, 2002. PhD, School of Aviation, Griffith University, Brisbane, Australia, 2011. Affiliations and functions: Lecturer in Aviation Management and Deputy Manager of Undergraduate Aviation Programs, RMIT University, School of Engineering. Research interests: air cargo handling and operations, airport operations and sustainability, supply chain management.

Graham WILD, PhD
Education: 2001–2004, Bachelor of Science (Physics and Mathematics), Edith Cowan University. 2004–2005, Bachelor of Science Honours (Physics), Edith Cowan University. 2008, Graduate Certificate (Research Commercialisation), Queensland University of Technology. 2006–2008, Master of Science and Technology (Photronics and Optoelectronics), the University of New South Wales. 2006–2010, PhD (Engineering), Edith Cowan University. Affiliations and functions: 2013, Aviation Program Manager, RMIT University, School of Engineering. 2010, Postdoctoral research
1. Introduction

Australia’s airline industry was born on connecting regional communities to the country’s major cities (Baker, Donnet 2012). Due to the vast distances across the country as well as between urban centres, Australia is heavily reliant upon its air transport industry (Nolan 1996). Australia’s air transport industry was historically tightly controlled by the government. However, following the deregulation of Australia’s domestic airline market in 1990, which permitted other airlines to compete with the established carriers (Forsyth 2003; Nolan 1996), a number of low cost carriers (LCCs) have entered the market. The low cost carriers now have around 31 per cent market share, with the two major incumbent LCCs being Jetstar and Tiger Airways.

Reliable forecasts of air transport activity play a vital role in the planning processes of States, airports, airlines, engine and airframe manufacturers, suppliers, air navigation service providers and other relevant bodies. In addition to assisting States in facilitating the orderly development of civil aviation and to aid all levels of government in the planning of air space and airport infrastructure, for example, air traffic control (ATC), airport air side and landside facilities, reliable forecasts also assist aircraft manufacturers in planning future aircraft types (in terms of size and range) and when to develop them (International Civil Aviation Organization 2006).

Despite the significance of Australia’s low cost carrier domestic airline market sector, there has been no previously reported study that has developed and empirically examined genetic algorithm-based models for forecasting Australia’s domestic low cost carrier passenger demand. The primary objective of this study is therefore to develop new genetic algorithm-based models to forecast Australia’s LCCs passenger demand and also to identify whether the GA approach is a useful tool for this application. Therefore, various forms of the mathematical expressions were proposed and tested. Genetic algorithm enplaned passengers (GAPAXDE) and genetic algorithm revenue passenger kilometres performed (GARPKSDE) are proposed to forecast Australia’s LCC quarterly enplaned passengers and revenue passenger kilometres performed, respectively.

2. Traditional air travel demand forecasting approaches

Forecasting passenger transport demand is of critical importance for airlines as well as for investors, since investment efficiency is greatly influenced by the accuracy and adequacy of the estimation performed (Blinova 2007). Air traffic forecasts are therefore one of the key inputs into an airline’s fleet planning, route network development, and are also used in the preparation of the airline’s annual operating plan (Ba-Fail et al. 2000; Doganis 2009). Furthermore, analysing and forecasting air travel demand may also assist an airline in reducing its risk through an objective evaluation of the demand side of the airline business (Ba-Fail et al. 2000). In addition, forecasts assist airlines in their decision-making regarding the development of infrastructure facilities, thereby enhancing services provided to passengers (Abed et al. 2001).

In the air transport industry, many service providers and government regulatory agencies follow the International Civil Aviation Organization’s (ICAO) Manual on Air Traffic Forecasting. This manual was originally developed in 1985 using traditional modelling techniques...