

A Forecasting Tool for Predicting Australia's Domestic Airline Passenger Demand Using a Genetic Algorithm

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ABSTRACT: This study has proposed and empirically tested for the first time genetic algorithm optimization models for modelling Australia's domestic airline passenger demand, as measured by enplaned passengers (GAPAXDE model) and revenue passenger kilometres performed (GARPKSDE model). Data was divided into training and testing datasets; 74 training datasets were used to estimate the weighting factors of the genetic algorithm models and 13 out-of-sample datasets were used for testing the robustness of the genetic algorithm models. The genetic algorithm parameters used in this study comprised population size (n): 200; the generation number: 1,000; and mutation rate: 0.01. The modelling results have shown that both the quadratic GAPAXDE and GARPKSDE models are more accurate, reliable, and have greater predictive capability as compared to the linear models. The mean absolute percentage error in the out of sample testing dataset for the GAPAXDE and GARPKSDE quadratic models are 2.55 and 2.23%, respectively.

KEYWORDS: Australia, Forecasting method, Genetic algorithm, Domestic airlines, Air transport.

INTRODUCTION

Australia's airline industry was born on connecting regional communities to the country's major cities (Baker and 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 35% market share, with the 2 major incumbent LCCs being Jetstar and Tiger Airways. Qantas and Virgin Australia are the two present incumbent full service network carriers (FSNCs) (Srisaeng *et al.* 2014).

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 assist 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).

Forecasting passenger transport demand is viewed as being of critical importance for airlines as well as for investors since investment efficiency is greatly influenced by the accuracy and

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