Case Studies on Transport Policy 4 (2016) 188–197

Contents lists available at ScienceDirect

Case Studies on Transport Policy

journal homepage: www.elsevier.com/locate/cstp

A model to analyse the profitability of long-haul network development involving non-hub airports: The case of the Barcelona–Asian market

Marc Tembleque-Vilalta, Pere Suau-Sanchez *

Centre for Air Transport Management, Martell House, Cranfield University, Bedfordshire MK43 0TR, United Kingdom

ARTICLE INFO

Article history:
Available online 17 January 2015

Keywords:
Secondary airports
Hub-bypassing
Long-haul

ABSTRACT

Intercontinental direct flights are key for securing foreign investment and developing trade, however, traditional dog-bone airline networks exclude secondary airports from this type of traffic and contribute to uneven regional economic development. New aircraft technology and hub-bypassing strategies can allow non-hub secondary airports to connect to intercontinental destinations. By developing an Integrated Model for Forecasting New Routes we analyse two routes of the Barcelona–East Asian market and evaluate if new aircraft technology can be a game changer for European secondary airports. Results show that direct non-stop services from Barcelona to Tokyo could be viable with the Boeing 787-8, but not with the previous technology (i.e., Boeing 777). The Barcelona–Beijing route shows some demand limitations and would only allow for some seasonal services. The findings show important connectivity prospects for secondary European airports.

1. Introduction

The evolution of aircraft technology (Snow, 2011; Leinbach and Bowen, 2004) is constantly changing the geography of air transportation (Bowen, 2010). Every new airliner has provided improved density economics (i.e., lower operating costs per seat-kilometre) compared to previous aircraft generations; some reducing unit costs through an increased size, others by increasing overall efficiency. In this regard, the increasing efficiency of wide-body twinjets, together with increasing air transport deregulation, hub congestion, and economic growth of non-hub regions, has fostered the introduction of hub-bypassing strategies by airlines (Maertens, 2010; Bel and Fageda, 2010). By means of this strategy, airlines, instead of concentrating the intercontinental traffic between their home hub and the hub of their alliance partner on the other continents (“dog-bone” networks), directly serve secondary airports in other continents from their main home hub. This practice has been used for a long time in two specific markets, namely the North-Atlantic and the Middle East markets (O’Connell, 2011a,b; Suau-Sanchez and Burghouwt, 2011; Maertens, 2010).

Our analysis is focused on the newest airliner available: the Boeing 787. It entered into scheduled commercial service on November 1st, 2011, All Nippon Airways (ANA) being the launch customer on domestic services substituting its B767. The B787 was designed to replace the B757, the B767, the first B777 generation, the A300s and the A310s. More importantly, this aircraft was also devised to provide a similar flying range as the jumbo B747, but with a 200–250 seating configuration, half the capacity. This could serve as a route-enabler later giving way to larger aircraft as demand builds up (Mecham, 2003).

Compared to the Airbus A330, the B787 provides a 20% fuel consumption advantage both per trip and per seat. Moreover, Boeing (2013) claims that in addition to reduced maintenance costs, the B787 can achieve a 15% operating cost advantage over the A330 in missions up to 5500 km and up to 18% reduction in sectors above 11,000 km. With a greater range, a smaller cabin and a better efficiency overall, the B787 is an aircraft that was designed for point-to-point intercontinental traffic, and answers to the international traveller’s needs (i.e., more frequent and direct non-stop services). In fact, for its marketing purposes, Boeing has identified 450 potential and unserved city pairs that could be operated efficiently with the B787 (Turner, 2010). In this vein, Mason (2007) is of the opinion that airlines choosing the B787 might eventually adopt a hub-bypassing strategy aimed at capturing higher yielding passengers.

Against this background, this paper attempts to provide three contributions. Firstly, we aim to add to the debate on the availability of intercontinental services from secondary European airports by evaluating if new aircraft technology can be a game

* Corresponding author. Tel.: +44 1234754227.
E-mail addresses: mtembleque@gmail.com (M. Tembleque-Vilalta), p.suausanchez@cranfield.ac.uk (P. Suau-Sanchez).

http://dx.doi.org/10.1016/j.cstp.2014.12.004

changer for European secondary airports. Previous literature (Maertens, 2010) analyses several internal and external determinants influencing the choice of secondary European airports by airlines, but does not take into account any control variable on the aircraft type. Secondly, we develop an Integrated Model for Forecasting New Routes (IMFNR) to determine the profitability of new air services. The model has been developed to fulfil the requirements of the air transport industry in terms of ease of applicability and transferability, but it is grounded in academic knowledge. Finally, the third goal is to add to the analysis and understanding of the particular case of Barcelona Airport, which could be considered the largest non-hub airport in Europe. In 2012, Barcelona Airport ranked as the 8th European airport in terms of traffic and the 1st in terms of traffic generation in Europe (Suau-Sanchez et al., 2015). Although this is a successful airport in terms of traffic numbers, according to OAG data, it has the lowest share of intercontinental seat capacity (6.6%) among other similar-size airports: Munich (15.6%), Rome-Fiumicino (18.5%), London-Gatwick (17.8%) and Paris-Orly (27.5%). This could be explained by past events. In 2004 Iberia dismantled its secondary hub in Barcelona and withdrew 5.6 million seats from the airport, 785,000 of them to intercontinental destinations, representing 69% of its intercontinental seat capacity (Suau-Sanchez and Burghouwt, 2011, 2012). Later on in 2012 Spanair, which was aiming to build a hub operation in Barcelona, went bankrupt. Malighetti et al. (2008) conclude that in terms of connectivity Barcelona is the 4th best European airport connected to European destinations, but falls to the 11th position for worldwide destinations.

Previous research on this case study analysed the impact of Iberia's network rationalisation on the availability of intercontinental services (Suau-Sanchez and Burghouwt, 2011, 2012), showed that the airport is disproportionally unserved when it comes to intercontinental flights (Bel and Fageda, 2008) and developed a model for demand forecasting using the Barcelona–Miami market as an example (Sismanidou et al., 2013). Building on the work by Sismanidou et al. (2013), we do not only forecast the demand side, but also the supply side. Also, we focus on the feasibility of new long-haul routes to two East-Asian hubs, a market that unlike the North Atlantic, is not characterised by hub-bypassing practices.

The remainder of the paper is structured as follows: in Section 2 we review some of the supply and demand forecasting methods; Section 3 presents the dataset, the selected routes for the analysis and our method; Section 4 reports the results; and finally Section 5 develops the discussion and conclusions.

2. Forecasting new routes

In order to determine the economics and profitability of possible new services, the demand and supply dimensions need to be modelled and forecasted.

On the demand side there are several methodological approaches available to forecast traffic between two airports (Vlahogianni et al., 2004; Goedeking, 2010), such as gravity models and regression analysis (e.g., Grosche et al., 2007), fuzzy regression models (e.g., Profillidis, 2000), Quality of Service Index (QSI, e.g., Graham et al., 2013), Neural Networks (e.g., Dougherty, 1995; Zhang et al., 2001; Zhang and Qi, 2005) and the Logit models (e.g., Coldren et al., 2003; Liu et al., 2006).

Given that the aim of this paper is to ascertain the feasibility of new non-stop long-haul routes in unserved markets, linear or logistic models do not guarantee accuracy since a new direct non-stop entrant can trigger unexpected competitive responses and alter the logistic regression parameters. Introducing new non-stop services in a route therefore requires an accurate understanding of the market and the decision drivers of its passengers.

On the other hand, QSI models have been widely used by airlines to forecast their market share (Wei and Hansen, 2006; Coldren et al., 2003). They are based on the principle that passengers decide which alternative to take depending on a series of service quality parameters such as aircraft size, frequency, fares, or whether it is a non-stop or connecting service (Proussaloglou and Koppelman, 1999; Wei and Hansen, 2006). As a result, the core method chosen for forecasting demand is the QSI model. While it can be argued that passenger utility scores used in QSIs are arbitrary rather than statistically calibrated (Wei and Hansen, 2006), QSI methods have become an industry standard (Graham et al., 2013) and deliver real market results for airlines operating in a highly competitive marketplace. In this regard, this paper will attempt to contribute by developing an empirical QSI methodology built upon statistically calibrated variables and market specific supported argumentations.

Meanwhile on the supply side, production costs can be broken down between operating costs (e.g., fuel, crew, maintenance, etc.), standing costs (e.g., lease rates and insurance) and passenger related costs (e.g., terminal charges, ticked distribution, etc.). Although the basic cost performance indicators can be calculated using widely known methods (Morrell, 2013; Holloway, 2008), the main obstacle is that accurate production costs for an individual airline are usually difficult to model since detailed data is seldom available due to data confidentiality restrictions. Nevertheless, there is a wide body of literature dealing with individual supply elements, such as for example, fuel costs (e.g., Morrell and Swan, 2006), environmental costs (e.g., Miyoshi, 2014) or aircraft leasing rates (e.g., Oum et al., 2000).

Although most of air traffic forecasts rely on demand-side data, reliable supply forecasts have also become essential since deregulation given the increasing influence supply has on demand (Graham, 1999). This entails that demand stimulation effects need to be considered when calculating the profitability of a new air service (Fu et al., 2010).

3. Integrated model for forecasting new routes description

We have developed an Integrated Model for Forecasting New Routes (IMFNR) to determine the economics and profitability of new air services. Fig. 1 illustrates the workings of the model, which will be explained in detail below.

3.1. Data

Our main source of information is a MIDT (Market Information Data Tapes) dataset covering the period 2009–2012 on a monthly basis and containing actual demand data that has been extracted from the Global Distribution Systems (GDS). Each record represents an airline one-way booking and indicates the points of origin, destination, connecting airport and the average fare. Since not all bookings are done using GDS, the provider of the data adjusted the reservations using mathematical algorithms based on frequencies and seats per flight sector and historical trends. It is important to note that our dataset did not allow for traffic directionality.[1] As a consequence, the results are based on a full East Asia–Barcelona–East Asia operation (total return demand) and variables are one-way-based (fares, capacity, etc.).

Furthermore, the selected routes are assumed to start on January 1st, 2014[2] and the forecast extends until the end of 2018. The final profitability forecast is presented by route, operator and cabin class (economy and business).

[1] One-way data showed always Barcelona as origin and Asia as destination.

[2] To ease the comparison between alternatives using full financial years.