Journal of Air Transport Management 33 (2013) 73–80

Contents lists available at SciVerse ScienceDirect

Journal of Air Transport Management

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

Single European Sky and the functional airspace blocks: Will they improve economic efficiency?

Kenneth Button, Rui Neiva*

School of Public Policy, George Mason University, Arlington, VA, USA

Keywords:
Air traffic control
Single European Sky
Functional airspace blocks

A B S T R A C T

The paper examines the potential economic efficiency of on-going changes in the European air traffic control system. Air navigation services in Europe are undergoing a process of consolidation and technological changes known as the Single European Sky initiative. The ultimate aim is to shift the industry from a paradigm based on national borders, to one where operational efficiency is the goal. One of the key components of the movement toward this is the notion of functional airspace blocks (FABs) whereby blocks of airspace are combined as a precursory to total unification of the system. To study the effects that those changes might have on the economic efficiency of the system, a data envelopment analysis framework is used. Although these FABs are not yet deployed, it is possible to simulate, ceteris paribus, how these different systems would have ranked in terms of economic efficiency by using data for each individual air navigation service provider.

1. Introduction

Air navigation services (ANS) involve a complex network that handles the movement of aircraft at and around airports and in their movement between those airports. Under the 1944 Chicago Convention, governments have sovereignty over their national air space, and thus each country has traditionally dealt with this issue by having its own air navigation service provider (ANSP) that handles ANS and other related matters such as weather information services and flight planning. This has continually posed challenges of ensuring both the internal efficiency of individual monopoly suppliers of ANS and the external efficiency of ensuring optimal coordination of service between a series of network suppliers.

The economies of scale, scope, and density involved in ANS provision, together with the external economies associated with each unit being a supplier in an interactive network makes not only the provision of optimal services difficult, but also the measurement of exactly what efficiency entails. This contrasts somewhat with the other two main elements in the air transportation supply chain; airlines and airports. Airlines have been the subject of economic deregulation, beginning in the US, for some 35 years, albeit it at various rates and forms in different countries. In general this has enhanced the efficiency of airline operations (Barbot et al., 2008). Airports have also seen changes in many countries with moves to remove them from excessive political control, open up new sources of finance, and to tie airport fees more closely with the costs of airport use (Barbot, 2004). This has involved changes in institutional structures of the facilities, ranging from overall ownership and control, to outsourcing particular elements of service (Barbot, 2012). There have also been considerations to link the operations of airlines and airports to enhance efficiency and encourage long-term stability services (Barbot, 2011).

There has been much less activity regarding the provision of ANS. What has been done has largely been to change the institutional structure under which services are provided, moving away, except in the notable case of the US, from provision by a government department to various forms of corporatized structure, and in the case of the UK, public-private company (Button and McDougall, 2006). Reforming air traffic control is, however, inherently more difficult than deregulation of airlines and airports. The infrastructure in long lived and highly integrated making piece-meal reforms difficult. There is the need for, if not complete standardization, at least the use of a common platform to allow aircraft to be passed smoothly and safely from one control area to another. In contrast, aircraft can vary considerably as can airports, and a wide variety of varying technologies infrastructure can be used in both a competitive and cooperative manner.

Some of these factors lead to a questioning of whether ANS are being provided and used efficiently, and if there are issues, how

* Corresponding author.
E-mail addresses: kbutton@gmu.edu (K. Button), rneiva@gmu.edu (R. Neiva).

0969-6997/$ – see front matter © 2013 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.jairtraman.2013.06.012

Table 1
US and European Air Navigation Systems (2010).

	Europe	US	Difference: US vs. Europe
Area (million km^2)	11.5	10.4	−10%
Number of air service navigation providers	38	1	
Number of air traffic controllers	16,700	14,600	−13%
Total staff	57,000	35.200	−38%
Controlled flights (million)	9.5	15.9	+67%
Share of flights to/from top 34 airports	66%	63%	−5%
Share of general air traffic	4%	23%	x 5.5
Flight-hours controlled (million)	13.8	23.4	+70%
Relative density (flight-hours per km^2)	1.2	2.2	x 1.8
Average length of flight (within respective airspace)	557NM	493NM	−11%
Number of en-route centers	63	20	−68%
Number of airports with air traffic control services	>450	~509	+13%
Number slot controlled airports	>90	3	

Note: NM is nautical miles.
Source: EUROCONTROL and US Federal Aviation Administration (2012).

could the system be improved. Aircraft, are mobile and if airlines are unhappy with the local infrastructure or are competitively unsuccessful in any market, they can rapidly be deployed elsewhere. While airports are certainly not mobile, there is considerable competition amongst them for business, with large airlines in particular exercising countervailing power (Button, 2010). ANSPs in contrast are institutional monopolies, and indeed given the scale effects involved also have significant features of natural monopolies.

Here we supplement the work of Barbot and others on the efficient supply of airline and airport services, by considering the efficiency of ANSPs. The focus is on Europe, and in particular on the efforts to unify the ANS of the region. Other studies have pointed to the current levels of inefficiency that exist, and EUROCONTROL has for a number of years collected data and monitored the situation. Here we hone in on a particular aspect of the on-going efforts to improve the European situation, by assessing the role that greater local coordination of ANSPs may play in the longer-term policies of establishing a full Single European Sky (SES).

2. The current institutional situation

Unlike the US, which has just a single ANSP, the Federal Aviation Administration (FAA), Europe has several dozen ANSPs to handle an approximately area similar geographical area. Albeit similar in size, the European system handles fewer flights, using more centers and airports and is more labor intensive than the American system to which it is often compared (Table 1).[1] There are a number of technical reasons that can explain the differences, including geography, but a particular issue is that lack of coordination across the European systems, and that the small scale of many of the national European systems prevents economies of scale from being exploited.

This fragmentation of the airspace, with its boundaries mimicking the national borders on land and frequent handing-over of traffic, is believed to have significant impacts on the overall efficiency of the system and its costs. This resulted in an estimated €4.0 billion in annual delay costs in 2011, significant environmental damage, and flights that are, on average, 49 km longer that they would need to be if the airspace was optimized and more modern technologies were utilized.[2] Specific analysis of the individual European ANSPs indicates that there are considerable disparities in terms of the ways in which they function and are financed (Button and McDougall, 2006), and in terms of their economic efficiencies (NERA, 2006; EUROCONTROL Performance Review Commission, 2011; Button and Neiva, 2013, 2014).

It is against this background that the European Commission created the Single European Sky initiative with the aim of treating European airspace as a single entity, instead of being a patchwork of all the different national systems. Because of the complexity of the systems, their diversity, and the inability to simply carry thorough a "big bang" style reorganization, a phased approach to reform was initiated.

A major transitional component of this program is the notion of functional airspace blocks (FABs), which are intended to aggregate several individual ANSPs into larger entities that would handle air traffic as if they were a single ANSP. Strictly, a FAB is defined in the Single European Sky legislative package, namely Regulation (EC) No. 1070/2009 amending Regulation (EC) No. 549/2004, as an airspace block based on operational requirements and established regardless of State boundaries, where the provision of air navigation services and related functions is performance-driven and optimized through enhanced cooperation among air navigation service providers or, when appropriate, an integrated provider (European Commission, 2012b).

3. Single European Sky and the functional airspace blocks

First muted by the European Commission in 1999, the SES has been put into law in 2004.[3] It made ANSs a responsibility of the European Union, instead of its member states individually, and has the main goal of improving the efficiency and the capacity of ANSs in Europe. A number of stipulations were put in place by legislation in both 2004 and 2009, including the creation of the FABs, the Single European Sky ATM Research (SESAR) technological initiative to modernize the ANS system, and the extension of competencies of the European Aviation Safety Agency (EASA) to include air traffic management and air navigation services (European Commission, 2012b).

One of the fundamental aspects of the SES initiative are the FABs, which have the goal of reducing the inefficiencies – in terms of safety, capacity, and cost – that result from the fragmentation of European airspace.[4] FABs are seen as an explicit bottom-up

[1] Gloaszewaki (2002) outlines the nature of the US air navigation system and gives a comparative analysis of the interactions between air navigation service providers and airport regulations in the US and Europe.

[2] There is also a wide dispersion in the size of ANSPs, with the five largest European ANSPs handling 54% of the traffic and incurring 60% of the costs, with the remaining 46% of the traffic being handled by over 30 providers (EUROCONTROL Performance Review Commission, 2012).

[3] Implementation involves a number of institutions and initiatives involving; the European upper information region (EUIR), functional airspace blocks (FAB), flexible use of airspace (FUA), National Supervisory Authorities (NSA), certification of ANSPs, ait traffic controllers licencing, interoperability, SESAME, and extensions to 3rd party countries.

[4] The criteria for the creation of FABs are strictly to do with:

- safety;
- optimum use of airspace, taking into account air traffic flows;
- overall added value, including optimal use of technical and human resources, on the basis of cost benefit analyses;
- ensuring a fluent and flexible transfer of responsibility for air traffic control;
- ensuring compatibility between upper and lower airspace;
- complying with regional agreements concluded within ICAO;
- respecting regional agreements, in particular those involving European third countries.