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Contents

LIST OF ACRONYMS

AESA	Spanish Aviation Safety and Security Agency
AFIS	Aerodrome Flight Information Service
APP	Approach control service
ATC	Air Traffic Control
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
ATS	Air Traffic Services
CAA	Civil Aviation Authority
CNS	Communication, Navigation and Surveillance
CTOT	Calculated Take-Off Time
FIS	Flight Information Services
IFR	Instrument Flight Rules
OJTI	On-the-Job Training Instructor
AMS	Airport Apron Management Service
SES	Single European Sky
STDI	Synthetic Training Device Instructor
TWR	Aerodrome control service
VFR	Visual Flight Rules

EXECUTIVE SUMMARY

Air traffic services (ATS) are necessary for the safe and orderly movement of aircraft in all air space. These services are essential for air transport and for the economic activities that rely on it, such as tourism, which accounts for a significant portion of the Spanish economy. In 2017, almost 82 million international tourists visited Spain. 81.5% of them arrived by plane[1].

ATS include air traffic control (ATC) services[2], flight information services[3] and alerting services[4]. These are, in turn, divided into three types, depending on the flight phase during which they are provided: aerodrome, approach and en route[5]. At each aerodrome, ATS can be provided as one of two types, depending on which is most suitable based on safety criteria: control service or AFIS[6].

Until 2010, aerodrome, approach and en-route ATS were provided under a monopoly regime by Aena (now ENAIRE). However, the lack of efficiency in air navigation services led to the passing of Act 9/2010, which initiated the liberalisation of some ATS, specifically, aerodrome services, as well as the training of professionals. Since then, aerodrome ATS can be provided by any air traffic services provider duly certified by a European Union national supervisory authority. The law expressly excludes the liberalisation of approach and en-route ATS.

Concurrently, Aena began undertaking a restructuring process in 2011. This resulted in it being separated into two entities: one being Aena, S.A., airport management company; and the other, ENAIRE, which is responsible for, among other things, air navigation functions. ENAIRE holds 51% of the capital of Aena, S.A.

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1 Aena, S.A.

2 The purpose of ATC services is to prevent collisions between aircraft and between aircraft and obstacles, as well as to expedite and maintain an orderly flow of air traffic.

3 The purpose of flight information services is to advise and provide useful information for the safe and efficient conduct of flights.

4 The purpose of alerting services is to notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

5 Aerodrome ATS are provided while the aircraft is moving through the aerodrome; approach services, during the take-off and landing phases, until the aircraft enters the airway; en-route services, once the aircraft is established on an airway, during the cruising phase.

6 Control services: provided at aerodromes with complex traffic by air traffic controllers. In addition to control services, they include information and alerting services.
AFIS: provided at less complex aerodromes by AFIS operators. They only include information and alerting services.

In 2011, aerodrome ATC services at 12 Spanish control towers were tendered out[7]. In addition, since 2010, six aerodromes have been designated as AFIS, with these services being put out to tender.[8] This has introduced competition in the market, with the entry of companies other than the incumbent (ENAIRE). However, this process has come to a standstill, with no new aerodromes with ATC service being opened up to competition since 2011, despite positive results in terms of efficiency and quality. ENAIRE is the aerodrome ATC service provider at 21 Spanish airports[9].

Training has also been liberalised in Spain since 2010. Any company certified by the supervisory authority of a Member State can offer training. Despite this, the sector has not been very dynamic due to the absence of hiring rounds in the air traffic controller market until 2016.

Against this backdrop, in October 2017, Spanish ATS providers signed the *Protocol for the proper and orderly movement of air traffic controllers between civil providers of aerodrome air traffic control services, AMS and AFIS* (hereinafter referred to as the Protocol). This included, among other items, transparency commitments between ENAIRE and the other ATS and training providers with regard to their selection processes, as well as the commitment on the part of the signatories not to hire controllers from other operators if they had written communication from the original provider stating that the worker had not been replaced. It also provided for the exchange of information between competing ATS providers. In October 2018, the CNMC was made aware of a new agreement signed by all operators, thus rendering the Protocol void.

At the international level, three liberalisation processes have been undertaken in the ATS sector: in the United Kingdom, Germany and Sweden. These countries have opened up ATS to competition, but with a different scope, as they have also liberalised the approach service. However, in Sweden and Germany, the reform does not include all airports, whereas in Spain and the United Kingdom liberalisation is possible for all civil aerodromes.

After this process began in Spain, aerodrome ATS at the 12 liberalised control towers increased their efficiency by an average of 60% between 2012 and 2017, whereas at non-liberalised control towers comparable to the first group, efficiency

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[7] Sabadell, Madrid-Cuatro Vientos, A Coruña, Alicante-Elche, Ibiza, Jerez, Seville, Valencia, Vigo, La Palma, Lanzarote and Fuerteventura.

[8] La Gomera, El Hierro, Burgos, Huesca, La Seu d'Urgell-Andorra and Córdoba.

[9] Adolfo Suárez Madrid-Barajas, Barcelona-El Prat, Palma de Mallorca, Málaga-Costa del Sol, Gran Canaria, Tenerife Sur, Tenerife Norte, Bilbao, Santiago, Melilla, Menorca, Girona-Costa Brava, Asturias, Almería, Seve Ballesteros Santander, Federico García Lorca Granada-Jaén, Reus, Vitoria, San Sebastián, Pamplona and Logroño-Agoncillo.

increased by 20%. These efficiency gains were achieved at no detriment to the quality of the service provided at Spanish airports, which increased more at the liberalised aerodromes. Additionally, the replacement of ATC service by AFIS at some airports generated cost savings of more than 60%.

The assessment of the 2010 reform and its effects conducted by the CNMC makes it possible to establish the following recommendations for competent entities and government bodies. The aim is to increase the positive impact of the aerodrome ATS liberalisation in Spain, and eliminate the identified restrictions on competition, so as to improve market operation and consumer welfare.

Firstly, introducing competition in the aerodrome ATC and AFIS sector has been highly positive in terms of efficiency, and there is still room to liberalise towers that have not been put out to tender, thus giving rise to additional efficiency gains. There are no reasons that justify halting the liberalisation process for aerodrome ATS. Therefore, the following are recommended:

- Tender out aerodrome ATC services at control towers which have not yet been opened up to competition, thus obtaining additional efficiency gains to those already achieved.
- Designate as AFIS those aerodromes where it is possible based on their characteristics, and select the service providers through competitive processes. This would allow cost savings that could be passed on to consumers in the form of lower prices and greater welfare.

Secondly, considering that the European countries that have opened up the ATS sector have also liberalised approach services, it follows that there are no technical or safety factors that prevent this service from being provided under a free market regime. Therefore:

- It is recommended to liberalise approach ATS. Opening up these services would generate a larger potential market and additional efficiency gains.

Thirdly, in the air traffic controller training sector, there is a noticeable lack of dynamism, as a result of a shortage of demand (due to limited expectations of being hired, the cost and duration of the training, and expiring authorisations) and supply (a shortage of demand disincentivises supply). This was somewhat relieved when ENAIRE resumed hiring in 2016. The lack of dynamism in training affects the operation of ATS, and the opposite is also true. Both activities can mutually benefit from greater competition in the other sector: if competition in ATS increased, competition in professional training would also increase. This would encourage efficiency through lower prices or training grants, and would generate greater incentives for the entry of new training companies. Therefore:

- It is recommended to stimulate greater competition in air traffic controller training services and to make this sector more dynamic by liberalising

more control towers or other ATS (approach control), given the symbiosis between training services and ATS.

Lastly, from the perspective of competition in the ATS sector, the vertical relationship between ENAIRE and Aena, S.A., which gives the former effective control over the airport management company, may disincentivise the continuation of the liberalisation process for air traffic control services. Therefore:

- It is recommended to eliminate the vertical integration of ENAIRE and Aena, S.A.

1. INTRODUCTION

Air traffic services are necessary for the safe and orderly movement of aircraft throughout all air space, and comprise air traffic control services, flight information services and alerting services. They are essential services for air transport, a strategic sector due to its strong links to other economic activities. In the case of Spain, its impact on tourism is significant: in 2017, 81.5% of the almost 82 million international tourists who visited Spain arrived by plane[10].

Proper functioning of air transport is essential to ensure the mobility of people and goods, thus contributing to the development of economic activity and boosting territorial and social cohesion.

Based on the data published annually by EUROCONTROL, efficiency in the provision of air navigation services in Spain has been systematically below the European average in recent decades. This situation gave rise to a reflection process to evaluate possible measures to stimulate efficiency, culminating in the passing of *Act 9/2010, of 14 April, regulating the provision of air traffic services, establishing the obligations of the civil providers of such services and laying down certain working conditions for civil air traffic controllers.*

Act 9/2010 began the liberalisation process of air traffic services in Spain, introducing competition in both the provision of part of these services and the training of industry professionals. Spain thus joined a trend which was already in progress in other countries in the region: the United Kingdom, Germany and Sweden.

This drive for liberalisation in Europe falls within the 2004 Single European Sky initiative (SES) by the European Commission. The aim of this initiative is to reduce the fragmentation of European air space by introducing common regulations in various aeronautical spheres, such as organisation and management of air space, standardisation of requirements for the provision of air navigation services and access to the profession of air traffic controller, as well as mutual recognition of licences issued by Member States.

Especially noteworthy among SES measures is the introduction of a performance evaluation system for air navigation service providers by EUROCONTROL. In the face of the difficulty which some of these providers, especially the largest ones (among which is Spain), have in meeting EUROCONTROL targets, introducing competition in the sector represents an alternative to generate the necessary incentives for operators to provide their services with maximum efficiency, taking into account the strict safety and quality obligations demanded by regulations, both at European and national level.

[10] Aena, S.A.

Air navigation services, particularly air traffic services, have traditionally been provided under a monopoly regime by public operators. Air traffic services are a natural monopoly. The way to introduce competition is therefore through competition for the market via tendering. This achieves ex-ante competition, when firms bid to acquire the right to perform the activity, and the threat of ex-post competition, which maintains competitive intensity, because the winning firm knows that its right is temporary and it will need to compete again if it wishes to continue the activity.

Eight years after the liberalisation of some air traffic services in Spain, the CNMC considers it is time to study how the reform took place and to evaluate its results. After the first push for liberalisation by tendering out the services at 12 control towers in 2011, new operators entered the market. This entry has had an impact on both the efficiency of the services provided by the new players and those provided by the incumbent operator. However, since then, things appear to have come to a standstill.

Additionally, the functioning of the air traffic services market is closely linked to the functioning of the air traffic controller training market, seeing as controllers are an essential input for air traffic services. For this reason, the 2010 reform also liberalised training, and it is necessary to analyse the current situation in that related market.

This study covers all these issues.

Section 2 contains a legal and economic description of the air traffic services and air traffic controller training markets. The section describes the regulatory basis for the 2010 reform and the current market situation.

Section 3 contains a description of the liberalisation processes in other countries and analyses the efficiency indicators for the sector in Spain, with the aim of identifying the outcomes of liberalisation.

Section 4 assesses the current situation from the perspective of competition, analysing the barriers that persist in the air traffic services and training markets, and considers the possibility of expanding the reform to other services, similarly to what has occurred in neighbouring countries.

Lastly, the conclusions of the analysis are presented as well as the main recommendations for improving the functioning of the air traffic services market in Spain.

2. LEGAL AND ECONOMIC DESCRIPTION OF THE ATS SECTOR IN SPAIN

In 2010, there was a reform in Spain which resulted in a reconfiguration of the way in which air traffic services were provided. The reform made it possible to open up to competition certain services which had previously been provided by Aena under a monopoly regime.

This study focuses on the effects of liberalisation at the airports that make up the Aena network. Although Aena, S.A. currently manages 45 airports[11], the scope of this report is confined to those at which civil air traffic services are provided, as it was those which were affected by the 2010 reform. Consequently, the seven aerodromes where air traffic services are provided by the Air Force are excluded from the scope of the analysis[12].

In order to properly understand the extent of the reform and its implications for the market, it is necessary to first understand what air traffic services comprise.

2.1. Description of air traffic services

Air Traffic Services (ATS) are necessary services for the safe and orderly movement of aircraft in all air space. These services include[13]:

- Air Traffic Control (ATC) Services: their purpose is to prevent collisions between aircraft and between aircraft and obstacles, as well as to expedite and maintain an orderly flow of air traffic.
- Flight Information Services (FIS): their purpose is to advise and provide useful information for the safe and efficient conduct of flights.
- Alerting Services: service provided to notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

ATS can, in turn, be broken down into three types, depending on the flight phase during which they are provided: aerodrome services (during the time the aircraft

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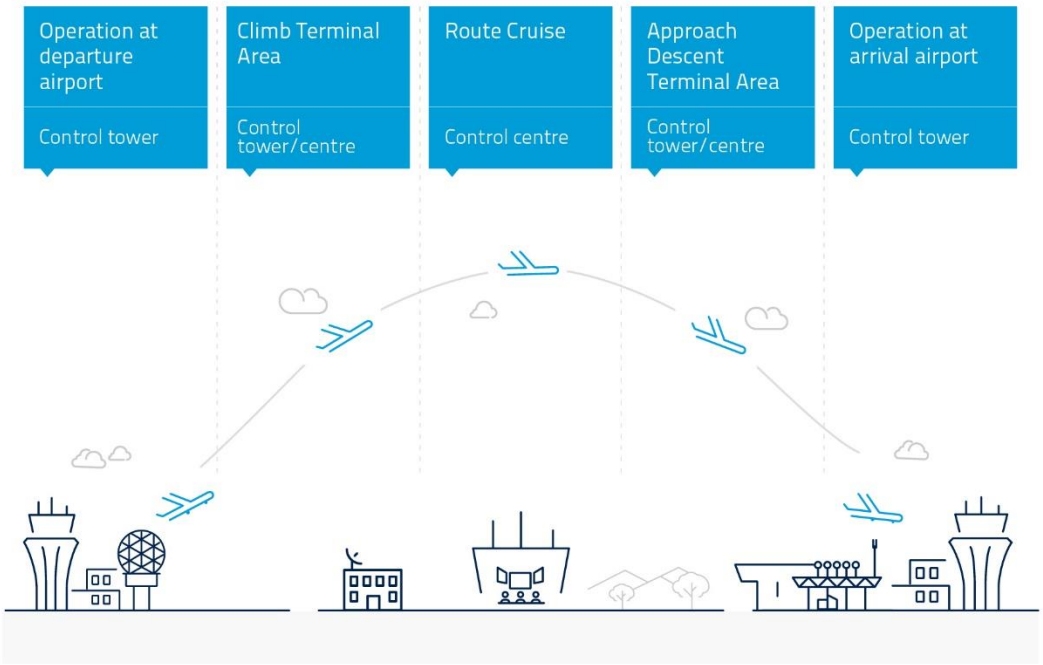
[11] Adolfo Suárez Madrid-Barajas, Barcelona-El Prat, Palma de Mallorca, Málaga-Costa del Sol, Gran Canaria, Alicante-Elche, Ibiza, Tenerife Sur, Valencia, Tenerife Norte, Lanzarote, Seville, Jerez de la Frontera, Fuerteventura, Bilbao, Madrid-Cuatro Vientos, Sabadell, Menorca, Santiago, Girona-Costa Brava, La Palma, A Coruña, Reus, Asturias, Federico García Lorca Granada-Jaén, Vigo, Almería, Seve Ballesteros Santander, Vitoria, Melilla, Huesca-Pirineos, Córdoba, San Sebastián, Pamplona, El Hierro, Burgos, La Gomera, Logroño-Agoncillo, Murcia-San Javier, Zaragoza, Salamanca, Valladolid, León, Badajoz and Albacete.

[12] The Murcia-San Javier, Zaragoza, Salamanca, Valladolid, León, Badajoz and Albacete aerodromes are beyond the scope of the study.

[13] ICAO (2016).

is moving through the aerodrome), approach services (during the take-off and landing phases until the aircraft enters the airway), and en-route services (once the flight is established on the airway, during the cruising phase until it begins its descent into the destination airport).

Graph 1: Phases of ATS



Source: ENAIRE

Therefore, over the course of a flight, a given aeroplane will receive ATS from different people, depending on what phase the flight is in (aerodrome, approach or en route).

Within aerodrome ATS, it is possible to distinguish between two types. At airports which are more complex in terms of traffic, ATC services will be provided by air traffic controllers. In these cases, the controllers provide both control services and information and alerting services. However, at less complex airports in terms of traffic, it will not be necessary to provide ATC services, it being sufficient to provide information and alerting services. In these cases, ATS are known as AFIS (Aerodrome Flight Information Services) and are provided by AFIS operators.

As will be discussed at a later point, air traffic controllers and AFIS operators have different training and skills. The main difference between ATC and AFIS services is that, with AFIS, the pilot is responsible for maintaining the necessary safety

distance based on the information provided by the AFIS operator[14]. In the case of control, the responsibility falls to the air controller.

Aerodrome ATS are always provided from the airport itself, whether at a control tower (ATC services) or an AFIS building (AFIS).

Approach ATS are provided from control centres distributed throughout the country. They may be located inside the aerodrome and share a building with aerodrome services, but this is not necessarily the case. In fact, it is common for a single control centre to provide services to more than one aerodrome. This is the case of the Madrid control centre, in Torrejón de Ardoz, from which approach services are provided for the Madrid-Barajas and Madrid-Cuatro Vientos airports[15].

En-route ATS are always provided from control centres distributed throughout the entire country. In order to manage the volume of traffic in safety conditions, Spanish air space is divided into five different control zones, each of which is served by one control centre. There are currently five control centres in Spain, in Madrid, Barcelona, Seville, Palma de Mallorca and Gran Canaria. Approach and en-route ATS are provided from these.

With regard to the quantitative importance of these services, in 2017, aerodrome traffic services accounted for almost […][16] of Aena's regulated costs[17].

2.2. Liberalisation of air traffic services

Until 2010, these services were provided by Aena under a monopoly regime. In 2010, *Act 9/2010, of 14 April, regulating the provision of air traffic services, establishing the obligations of the civil providers of such services and laying down certain working conditions for civil air traffic controllers* liberalised aerodrome ATS. Specifically, it provides for the possibility that aerodrome ATS may be provided by Aena (the firm providing air traffic services for Spanish airports at the time the law was passed) or by any other air traffic service provider duly certified

[14] ICAO (1998).

[15] Aena, S.A.

[16] Information whose exact content has been deemed confidential is indicated by square brackets.

[17] The cost of aerodrome traffic services totalled […].

by a European Union national supervisory authority[18]. The law expressly excluded liberalisation of approach and en-route ATS[19].

European regulations[20] require all Member States to designate air traffic service providers within the air space under their responsibility, with the aim of facilitating safe handling of air traffic across the borders of Member States. In Spain, it is the Ministry of Public Works which is responsible for designating providers at the proposal of the aerodrome manager[21]. In its proposal, the aerodrome manager must specify what type of ATS are being requested for the aerodrome based on a safety study[22]. It is possible to request the provision of aerodrome ATC services, AFIS or no ATS, depending on the characteristics of the aerodrome. In any case, for the designated air traffic service provider to begin provision of services, this will require prior oversight and a favourable report from the Spanish Aviation Safety and Security Agency (AESA)[23].

Given that prior to the reform there were no airports in Spain where AFIS were provided, Act 9/2010 refers to two matters which must be dealt with during liberalisation:

- Firstly, it requires identifying which airports may be designated as AFIS aerodromes. Once designated as such, the airport manager can put the services out to tender[24].
- Secondly, it requires identifying, by Order of the Ministry of Public Works, those airports in the Aena network at which the ATC services must be put out to tender[25]. In other words, Aena cannot put aerodrome ATC services out to tender without an Order from the Ministry of Public Works.

The reform made it necessary to tackle a number of regulatory issues, such as certification of air traffic service providers, regulation of AFIS and AFIS providers, and training of air traffic controllers and AFIS operators to ensure proper market functioning. This gave rise to the passing of different regulations, most notably:

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18 Additional Provision 2.1 of Act 9/2010.

19 Article 1.1 of Act 9/2010.

20 Article 8 of Regulation (EC) No 550/2004 of the European Parliament and of the Council of 10 March 2004 on the provision of air navigation services in the single European sky.

21 Articles 1.2 and 1.3 of Act 9/2010.

22 Article 1.3 of Act 9/2010.

23 Article 1.3 of Act 9/2010.

24 Additional Provision 2.2 of Act 9/2010.

25 Additional Provision 2.3 of Act 9/2010.

- *Royal Decree 931/2010, of 23 July, regulating the certification procedure for civil air navigation service providers and their regulatory oversight.*
- *Royal Decree 1133/2010, of 10 September, regulating the provision of the aerodrome flight information service (AFIS).*
- *Royal Decree 1238/2011, of 8 September, regulating the airport apron management service*.

Late 2010 brought the approval of *Order FOM/3352/2010, of 22 December, determining the airports managed by the state-owned enterprise Aeropuertos Españoles y Navegación Aérea for the selection of new civil aerodrome air traffic control service providers*, which identifies 13 airports at which Aena was required to put the ATC services out to tender[26].

Lastly, a tendering process was conducted (negotiated procedure with prior call for bids) grouping 12 of the 13 airports into three different blocks for the provision of the ATC service for a period of seven years, extendable for an additional year. The Melilla airport was excluded for reasons relating to the sovereignty of the air space.

As shown in Table 1, the company FerroNATS was the contract awardee for two of the three lots, and as a result, currently provides the tower control service at the Alicante, Valencia, Ibiza, Sabadell, Seville, Jerez, Cuatro Vientos (Madrid), Vigo and A Coruña airports. The contract awardee for the third lot was SAERCO, which provides the service at Lanzarote, Fuerteventura and La Palma.

[26] A Coruña, Alicante, Fuerteventura, Ibiza, Jerez de la Frontera, La Palma, Lanzarote, Madrid-Cuatro Vientos, Melilla, Sabadell, Seville, Valencia and Vigo airports.

Table 1: Summary of the tendering processes for ATC services

TENDERING PROCESSES FOR ATC SERVICES					
Lot	**Aerodrome**	**Bidders**	**Awardee**	**Contract duration**	**Start date**
1	Alicante	- SAERCO - Tower Air Traffic Services - Sacyr/NAV Portugal - Servicios de Control de Tránsito y Navegación Aérea S.L. - FerroNATS - ETRACONTROL	FerroNATS	7 years + 1 (extension)	20/01/2014
	Valencia				06/07/2013
	Ibiza				07/01/2013
	Sabadell				16/11/2012
2	Seville		FerroNATS	7 years + 1 (extension)	13/09/2013
	Jerez de la Frontera				05/03/2013
	Vigo				30/11/2012
	A Coruña				20/03/2013
	Melilla*				-
	Madrid-Cuatro Vientos				27/11/2012
3	Lanzarote		SAERCO	7 years + 1 (extension)	17/07/2013
	Fuerteventura				12/11/2013
	La Palma				10/11/2012

* Melilla was ultimately excluded from the tendering process.

Source: Compiled by author based on data from Aena, S.A.

Since then, ATC services have not been put out to tender at any airport. The air traffic services at the remaining 21 towers in the Aena network with civil control are still provided by ENAIRE, a state-owned enterprise attached to the Ministry of Public Works, with ENAIRE holding 51% of the capital of Aena, S.A., state operator of airports of public interest.

RELATIONSHIP BETWEEN AENA AND ENAIRE

Beginning in 2011, Aena underwent a major restructuring process. The first step was the creation, by the 25 February 2011 resolution of the Council of Ministers, of the trading company Aena Aeropuertos S.A., which began operating in June 2011. It was assigned the functions and obligations exercised by the state-owned enterprise Aena in matters of management and operation of airport services.

In 2014, by means of Royal Decree-Law 8/2014, of 4 July, the name of the trading company Aena Aeropuertos, S.A. was changed, becoming Aena, S.A.

At the same time, and by means of the same legislation, the name of the state-owned enterprise Aeropuertos Españoles y Navegación Aérea, Aena, was changed to ENAIRE.

ENAIRE continues to have the same nature and legal framework set out for the state-owned enterprise Aena, exclusively exercising competences in matters of air navigation and air space, as well as national and international operational coordination of the national air traffic management network.

Additionally, since 2010, the Ministry of Public Works has issued six ministerial orders designating the La Gomera, El Hierro, Burgos, Huesca, La Seu d'Urgell-Andorra[27] and Córdoba airports as AFIS airports.

Given the particular features of the AFIS, it is advisable to analyse its regulation in greater detail.

2.3. Aerodrome flight information service (AFIS)

The legal framework for the AFIS is *Royal Decree 1133/2010, of 10 September, regulating the provision of the aerodrome flight information service (AFIS)*. Among other aspects, the Royal Decree regulates the criteria for determining the need and adequacy of the provision of AFIS and the aeronautical safety studies that support said need and adequacy. The Royal Decree applies to all civil aerodromes for public use.

All public use aerodromes where any of the characteristics listed in the Royal Decree are present (for example, those which exceed a certain number of operations, those where commercial passenger transport operations are carried out, those where IFR operations[28] are conducted) must perform an aeronautical safety study to determine what type of ATS is most suitable for that aerodrome (ATC or AFIS). They must take into account the types of air traffic expected, its density, the weather conditions and any other relevant factor.

Aeronautical safety studies are performed by providers certified to provide ATC service or AFIS. In this regard, none of the operators consulted indicated that performing a safety study represents an advantage. In fact, there have been

[27] The La Seu d'Urgell-Andorra airport is not part of the Aena network. It is a relatively small airport, managed at the Autonomous Community level (the Generalitat de Cataluña is responsible for its management), which was opened to civil commercial traffic in 2015. It will therefore be excluded from the analysis going forward.

[28] It is possible to distinguish two types of flights based on the type of rules under which they are conducted: operations under instrument flight rules (IFR) and operations under visual flight rules (VFR). The difference lies in how the separation between aircraft is achieved. In contrast to aircraft operating under VFR, those operating under IFR are equipped with navigation instruments which, together with ground facilities (such as radar) and satellite navigation equipment, make it possible to fly in any situation, even under zero visibility conditions. On IFR flights, it is air traffic controllers who are responsible for preventing collisions between aircraft. In contrast, on VFR flights, separation methods are based on pilot position reports. Under VFR, it is pilots who are responsible for maintaining the safety distance, assisted by the information provided by air traffic controllers (Arblaster, 2018).

occasions when the company that performed the safety study submitted a bid for the service and was not awarded the contract[29].

If the safety study concludes that the most suitable ATS for that aerodrome is AFIS, the airport manager must request the AFIS aerodrome designation from the Ministry of Public Works (specifically, the Directorate-General for Civil Aviation) and propose designating the AFIS provider.

The Minister of Public Works is responsible for designating the aerodrome as an AFIS aerodrome, on the recommendation of the Directorate-General for Civil Aviation, while the Directorate-General for Civil Aviation is responsible for designating the AFIS provider[30] once the aerodrome has been designated an AFIS aerodrome. In any case, for the designated provider to begin provision of services, this will require prior oversight and a favourable report from AESA[31].

AFIS can only be provided by a provider certified by AESA or another European Union national supervisory authority. For the designation to remain valid, the provider must retain the certificate as AFIS provider, which will have the maximum duration set forth in the resolution, and will not exceed five years. Renewal must be requested at least six months in advance of the date on which the designation expires.

Until October 2018, INECO[32] was the AFIS provider at all AFIS aerodromes in the Aena network, except for the Córdoba airport. In March 2018, Aena, S.A. issued a call for tenders, as a negotiated procedure with prior publication of notice, to contract for AFIS at the La Gomera, Burgos and Huesca airports and for the ATC service/AFIS at the El Hierro airport[33], for which SAERCO was the contract awardee. The established term of this contract is 7 years, plus an additional one-year extension[34]. As regards Córdoba, after having been put out to tender, since April 2018 the service is being provided by FerroNATS for a period of four years.

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29 For example, Ineco performed the safety study at La Seu d'Urgell airport and submitted a bid for the AFIS, which was however awarded to SAERCO.

30 In accordance with the obligation of EU Member States to designate the air traffic service providers within the air space under their responsibility, stipulated in Article 8 of Regulation (EC) No 550/2004 of the European Parliament and of the Council of 10 March 2004 on the provision of air navigation services in the single European sky.

31 Article 1.3 of Act 9/2010.

32 Ineco is a state-owned trading company reporting to the Ministry of Public Works via its shareholders: ENAIRE (45.85% of the capital), Adif (20.69%), Adif Alta Velocidad (20.58%) and Renfe (12.78%) (2015 Annual Report).

33 File DEA 638/17.

34 Official State Gazette (BOE) of 23rd March 2018.

Table 2: AFIS aerodromes in the Aena network and service providers

AFIS AERODROMES IN THE AENA NETWORK			
Aerodrome	**Service provider**	**Start date**	**Contract duration**
La Gomera	SAERCO	03/10/2018	7 years + 1 (extension)
El Hierro	SAERCO	03/10/2018	7 years + 1 (extension)
Burgos	SAERCO	03/10/2018	7 years + 1 (extension)
Huesca	SAERCO	03/10/2018	7 years + 1 (extension)
Córdoba	FerroNATS	26/04/2018	4 years + 2 (extension)

Sources: Ministry of Public Works, Aena, S.A. and Public Sector Procurement Platform.

2.4. Certification of civil air navigation services providers

Certification of civil air navigation services providers is subject to European regulation, within the framework of the single European sky[35]. Specifically, *Regulation (EC) No 550/2004 of the European Parliament and of the Council of 10 March 2004 on the provision of air navigation services in the single European sky (the service provision Regulation)* seeks to establish a common system for certifying air navigation services, which constitutes a means for defining the rights and obligations of air navigation services providers and for regular monitoring of compliance with such requirements, also guaranteeing the continuity of service provision[36].

According to the regulation, the provision of all air navigation services in the European Union is subject to certification by the Member States. Applications must be submitted to the national supervisory authority of the Member State where the applicant has its principal place of operation and, if any, its registered office. National supervisory authorities issue certificates if the air navigation providers comply with the requirements required by the regulation[37].

The Spanish national supervisory authority is AESA[38], a body attached to the Secretariat of Infrastructure, Transport and Housing, part of the Ministry of Public

[35] The single European sky is an initiative of the European Union whose aim is to improve the overall efficiency of the air navigation system in Europe with no loss of safety.

[36] Recital 10 of Regulation (EC) No 550/2004.

[37] Article 7 of Regulation (EC) No 550/2004.

[38] Article 9.1.d) of the Spanish Aviation Safety and Security Agency Statute, passed by Royal Decree 184/2008, of 8 February, passing the Spanish Aviation Safety and Security Agency Statute.

Works through the General Secretariat for Transport. It is responsible for issuing, renewing, amending and revoking the certificate of civil air navigation services provider, as well as ongoing regulatory oversight[39]. In Spain, the certification procedure is regulated in *Royal Decree 931/2010, of 23 July, regulating the certification procedure for civil air navigation services providers and their regulatory oversight.*

As of November 2017, in Spain there are four air traffic services providers certified by the AESA: ENAIRE, INECO, SAERCO and FerroNATS[40]. In addition to these companies, any service provider certified by a European Union national supervisory authority may provide ATS in Spain[41].

2.5. Training and access to the profession

Training and access to the professions of air traffic controller and AFIS operator are heavily regulated, at both the European level and in the Member States. The purpose of the regulation is to ensure the provision of safe and high-quality air traffic services, while at the same time reducing fragmentation in this sphere on a European scale[42].

a) Air traffic controllers

The profession of air traffic controller is currently regulated by *Commission Regulation (EU) 2015/340 of 20 February 2015 laying down technical requirements and administrative procedures relating to air traffic controllers' licences and certificates pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council, amending Commission Implementing Regulation (EU) No 923/2012 and repealing Commission Regulation (EU) No 805/2011*, at the European level, and *Royal Decree 1516/2009, of 2 October, regulating the Community air traffic controller licence*, at the national level.

In order to practise as an air traffic controller, it is necessary to have a licence which demonstrates the holder's ability to provide the service. The licence specifies which particular control functions the controller may perform and in which particular units. Therefore, there is no generic controller's licence, rather

39 Article 4.1 of Royal Decree 931/2010.

40 AESA.

41 Additional Provision 2.1 of Act 9/2010.

42 Recitals 2 and 8 of Regulation (EC) No 2015/340.

each one reflects the specific training received and successfully passed by the holder.

Thus, the licence contains one or more ratings, and rating endorsements, for unit and language proficiency:

- Ratings indicate the type of air traffic service the controller is authorised to provide (aerodrome, approach or en-route)[43].
- Rating endorsements indicate the specific conditions, privileges or limitations pertaining to the relevant rating[44].
- Unit endorsements are authorisations entered or forming part of a licence, indicating the sector[45], group of sectors or working positions where the licence holder is competent to work (for example, at what specific control tower they are rated to provide services)[46].
- Language proficiency endorsements are statements entered on and forming part of a licence, indicating the language proficiency of the holder[47].

The requirements to obtain the licence are as follows[48]:

- To hold a student air traffic controller licence.
- To have completed a unit endorsement course and successfully passed the appropriate examinations and assessments.
- To hold a valid medical certificate.
- To have demonstrated an adequate level of language proficiency. Spanish regulations require proof of level for both English and Spanish. It is only possible to get an exemption from the Spanish language proficiency requirement, for a limited period of time, at those units where air traffic control services are provided to a significant volume of international air traffic operations, and only for holders of Community air traffic controller

43 ATCO.B.010.

44 Article 4.1.21) of Regulation (EU) 2015/340.

45 A sector means part of a control area and/or part of a flight information region or upper region.

46 Article 4.1.30) of Regulation (EU) 2015/340.

47 Article 4.1.13) of Regulation (EU) 2015/340.

48 ATCO.B.005.c).

licences issued by the national supervisory authorities of European Union Member States[49].

- To the preceding, Spanish regulation adds the requirement to be 21 years old, although they also establish that the competent national supervisory authority may, when it is deemed appropriate for objective reasons, issue an air traffic controller licence to applicants under the age of 21 who, fulfilling the rest of the requirements for issue of said licence, have completed the initial training and unit training programme[50].

Obtaining a student air traffic controller licence is therefore a prerequisite. The following are required to obtain said licence[51]:

- To be at least 18 years old. To this, Spanish regulation adds the requirement to hold an upper secondary diploma or qualification allowing access to university, or the equivalent[52].
- To have successfully completed the initial training.
- To hold a valid medical certificate.
- To have demonstrated an adequate level of language proficiency.

Unlike the air traffic controller licence, the student air traffic controller licence does not include any unit endorsement. Student air traffic controllers may provide air traffic control services in accordance with the ratings and rating endorsements forming part of their licence under the supervision of an on-the-job training instructor[53]. Once they have successfully completed the unit training, the students may apply for issue of an air traffic controller licence.

All of the licence ratings and endorsements are valid for a limited amount of time. Therefore, controllers are required to receive continuation training in order to

[49] Articles 16 and 27 of Royal Decree 1516/2009.

[50] Article 7 of Royal Decree 1516/2009.

[51] ATCO.B.001.b).

[52] Article 5 of Royal Decree 1516/2009, of 2 October, regulating the Community air traffic controller licence.

[53] ATCO.B.001.a).

have them revalidated[54]. In addition, endorsements cease to be valid if the controllers do not perform the duties for which they are rated[55].

From the preceding, it may be deduced that there are different types of training which air controllers must complete over the course of their professional career. Three types can distinguished[56]:

- Initial training, leading to the issue of a student air traffic controller licence or to the issue of an additional rating and, if applicable, rating endorsement.
- Unit training, leading to the issue of an air traffic controller licence, the issue of a rating endorsement, the validation of rating(s) or rating endorsement(s) and/or the issue or renewal of a unit endorsement.
- Continuation training, designed to maintain the validity of the endorsements of the licence.
- Other types of training: practical instructor's training, leading to the issue, revalidation or renewal of an on-the-job training instructor (OJTI), or synthetic training device, that is, simulator, instructor (STDI) endorsement; and assessor training, leading to the issue, revalidation or renewal of an assessor endorsement.

Training may only be provided by a training organisation certified by the competent authority[57]. In the case of Spain, this authority is AESA. In addition to certifying training organisations, AESA must approve the initial training plans, unit

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54 In the case of ratings, the holder of a rating who has interrupted exercising the privileges associated with that rating for a period of four or more immediately preceding consecutive years may only start unit training in that rating after assessment of previous competence (ATCO.B.010. b)).

As regards unit endorsements, they are valid for a period defined in the unit competence scheme, which may not exceed three years (ATCO.B.020.e)). In addition, the maximum continuous period when the privileges of a unit endorsement are not exercised during its validity may not exceed 90 calendar days (ATCO.B.025.a) 2)).

The validity of the language proficiency endorsement is three years for the operational level, six years for extended level, and nine years for expert level (ATCO.B.035.a)).

Lastly, medical certificates are valid for a period of 24 months, if the licence holder is under the age of 40, and 12 months, after the age of 40 (ATCO.MED.A.045.a)).

55 The holder of an air traffic controller licence who has not started exercising the privileges of any rating within one year from the date of its issue may only start unit training in that rating after an assessment of his/her previous competence (ATCO.B.005.e)) The same is true in the case of the student air traffic controller licence (ATCO.B.001.d)).

56 ATCO.D.005.

57 Article 2 of Regulation (EU) 2015/340.

training plans and unit competence schemes on which, initial, unit and continuation training are based, respectively[58].

For unit training and continuation training, there is the requirement that certification to provide such training can only be obtained by those training organisations which either hold a certificate for the provision of the air traffic control service, or have concluded a specific agreement with the ATC provider that provides services at that unit[59].

In Spain, as of May 2018, the following companies are certified as training organisations:

Table 3: Certified training companies and type of training provided

COMPANIES CERTIFIED BY AESA AS TRAINING ORGANISATIONS						
Company	**AFIS training**	**Basic initial training**	**Rating initial training**	**Instructor training**	**Assessor training**	**Unit/Continuation training**
SENASA	X	X	X	X	X	
FLIGHT TRAINING EUROPE S.L. (FTE) X–JEREZ	X	X	X	X	X	
INECO				X	X	X
SAERCO	X	X	X	X	X	X
ENAIRE				X	X	X
FerroNATS Air Traffic Services		X	X	X	X	X
INGENAV				X	X	
COMPANIES CERTIFIED BY OTHER MEMBER STATES THAT PROVIDE TRAINING IN SPAIN						
Company	**AFIS training**	**Basic initial training**	**Rating initial training**	**Instructor training**	**Assessor training**	**Unit/Continuation training**
Entry Point North Spain		X	X			

Source: AESA.

As regards the people who provide the training, theoretical instructors do not necessarily have to be air traffic controllers, but practical instructors must be. It is not enough to have a licence; the controller must also hold an instructor endorsement (OJTI or STDI)[60]. In order to obtain the on-the-job training instructor endorsement, minimum experience is required in the rating and unit where training is to be provided[61]. In order to practise as an instructor, part of that experience must have been obtained in the period immediately preceding that in

[58] ATCO.B.025, ATCO.D.015 and ATCO.D.055.

[59] ATCO.OR.B.010.

[60] ATCO.C.001 and 005.

[61] ATCO.C.015.

which training is to be provided[62]. It is possible to issue temporary OJTI authorisations if this last requirement is not met, in order to deal with exceptional situations (the authorisations are issued based on a safety analysis presented by the air navigation services provider)[63].

Additionally, a person may only carry out assessments when they hold an assessor endorsement[64]. Minimum experience requirements similar to those required for the instructor endorsement are required.

b) AFIS operators

Access to the profession of AFIS personnel is regulated in *Royal Decree 1133/2010, of 10 September, regulating the provision of the aerodrome flight information service (AFIS).* The requirements[65] are similar to those described for air traffic controllers, although less strict:

- To be at least 18 years old and hold an upper secondary diploma or a qualification which allows access to university.
- To hold a certificate of psychophysical aptitude.
- To have at least an operational level of English and Spanish.
- To have successfully passed an initial training course taught by an AFIS training provider certified by AESA.
- To have successfully completed instruction at the AFIS building where service is to be provided. In the case of initial provision of AFIS, in place of the specific training, having completed an equivalent number of hours in practical training will be required, according to a plan approved by AESA[66].

The personnel responsible for initial training, theoretical and practical, must be authorised by AESA for a five-year, renewable, period. These personnel must have successfully completed an instruction course approved by AESA, taught by a certified AFIS training provider. In addition, personnel for practical initial training

62 ATCO.C.010.

63 ATCO.C.025.

64 ATCO.C.045.

65 Article 18 of Royal Decree 1133/2010.

66 Article 20.3 of Royal Decree 1133/2010.

must have provided practical training services for a minimum period or have proven instruction experience[67]. Initial training personnel can do assessments[68].

As with ATC services, AFIS personnel must receive continuation training from a designated AFIS provider[69].

2.6. ATS personnel training and Protocol for the proper and orderly movement of air traffic controllers between civil providers of aerodrome air traffic control services, AMS and AFIS

Air traffic controller training requirements are such that, in the event that an air traffic controller decides to leave their company, the latter will have difficulty immediately replacing them with a new controller. The company will have to hire a person with a student air traffic controller or air traffic controller licence and give them the appropriate unit training so that they can obtain the unit endorsement. The duration of unit training depends on what is established in the unit training plan approved by AESA[70].

Additionally, the agility of the hiring process will depend on the number of people who hold student air traffic controller or air traffic controller licences. Air traffic controller and AFIS personnel training has been liberalised in Spain since 2010. Prior to that date, those who successfully made it through the selection processes to join the staff at the former Aena as air traffic controllers received grants from Aena and were trained by SENASA[71], until then the only training provider in Spain. Thus, Aena defrayed the cost of training its own employees and ensured that they obtained their ratings.

Following liberalisation, new initial training and rating training providers emerged and began to compete with SENASA. The first private firm to enter the initial

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67 Article 28 of Royal Decree 1133/2010.

68 Appendix IV of Royal Decree 1133/2010.

69 Articles 20 and 21 of Royal Decree 1133/2010.

70 ATCO.D.055.

71 SENASA, Servicios y Estudios para la Navegación Aérea y la Seguridad Aeronáutica, is a trading company 100% owned by the Spanish State, through the Directorate-General for State Assets, functionally attached to the Ministry of Public Works. Its main activities include the provision of aeronautical services in the areas of consulting, technical support, training (in aeronautical safety and oversight matters), and aircraft maintenance and operations (2016 Annual Report).

training market was FTEJerez, in 2011. There were no additional new entrants until 2015. That year, SAERCO obtained certification, and in 2018, FerroNATS[72].

Despite the liberalisation, the training market has not been very dynamic due to the absence of hiring rounds in the air traffic controller market between 2010 and 2015 (see section 4.5). In other words, virtually no new student air traffic controllers were trained in Spain during that period.

Between 2010 and 2015, Aena/ENAIRE did not issue any vacancy announcements to hire air traffic controllers[73]. Private ATS providers, which represent an employment alternative to ENAIRE for student air traffic controllers, began operating between 2012 and 2014, hiring prior to this date. They did not announce any vacancies between then and 2016.

As a result, the resumption of hiring with ENAIRE's 2016 posting of the first vacancy announcement for controllers since 2010 has begun to produce movement by controllers among ATC service providers. Since then, ENAIRE has announced 236 vacancies and plans to continue this trend[74]. What is new in comparison with previous vacancy announcements is that ENAIRE no longer gives training grants, meaning that candidates must defray the cost themselves.

Movement has been especially common from private ATC service providers to ENAIRE, given the better salary conditions offered by the latter. The departure of these controllers requires SAERCO and FerroNATS to hire new controllers or student air traffic controllers to ensure the continuity of ATS at the control towers where they have the contract. However, the shortage of people holding these licences represents an obstacle, especially for new entrants.

Against this backdrop, in October 2017, ENAIRE, INECO, FerroNATS and SAERCO signed the *Protocol for the proper and orderly movement of air traffic controllers between civil providers of aerodrome control services, AMS and AFIS*[75]. The Protocol sought to 'limit as much as possible the impact of the air traffic controller selection processes announced by the state-owned enterprise ENAIRE on the ordinary course of business of civil providers of air traffic services'. It was valid for three years.

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[72] SAERCO and FerroNATS had been certified as continuation training and unit training providers in 2011.

[73] In 2015, ENAIRE posted a vacancy announcement for controllers, but cancelled it one month later, incorporating the positions it had announced into the 2016 announcement.

[74] ENAIRE press release dated 15th December 2017.

[75] The CNMC was informed of the existence and content of the Protocol by FerroNATS on 23rd October 2017.

The Protocol contained a number of 'coordination' measures among the signatories to ensure that the ATS provider 'that is to lose a professional rated to provide this type of service as a result of the movement of professionals of this type caused by a public announcement of an external selection process will have a reasonable period of time to train a new employee to replace them, with every assurance, without the continuity of provision of the service they provided being affected in the least as a result'. Specifically, it provided for the following:

1) ENAIRE must notify the other service providers and initial training providers, with at least three months' advance notice, when it is going to issue the next vacancy announcement and how many vacancies it will announce.
2) At the start of each year, ENAIRE must notify the other service providers and initial training providers of its hiring forecasts for the following two years.
3) ENAIRE must notify the signatories of the publication of the lists of those accepted and excluded from the processes on its website, as well as the provisional and final results.
4) The signatories have a period of no more than six months from publication of the final lists for the ENAIRE processes to hire the personnel they deem necessary to ensure continuity of service.
5) ENAIRE must include a clause in its public vacancy announcements in which it grants the personnel selected a maximum of 18 months from signing of the job offer to meet all the application requirements.
6) ENAIRE will not take steps to hire away new controller personnel from the providers that are signatories to the Protocol if it has written communication from the original provider stating that the worker has not in effect been replaced in their duties.
7) The requirement for written communication also applies to movements of workers between private ATS providers.
8) It creates an oversight committee made up of representatives of each of the parties, as a 'coordinated communication and information channel between the parties', which is to meet on a biannual basis.

According to information provided to the CNMC by the signatories to the Protocol, in October 2018 they signed an agreement which rendered the Protocol void. Additionally, the signatories to the Protocol have informed the CNMC that the stipulations contained in items 6) to 8) of the Protocol were never applied while it was in force.

2.7. Current situation

The reforms introduced in Spain since the passing of Act 9/2010 have produced major changes in the structure and market situation of ATS.

The Aena network is made up of 38 airports where civil control or AFIS are provided[76]. At 12 of these (Table 4), provision of the aerodrome control service has been put out to tender and it is provided by a private company (SAERCO or FerroNATS).

Another five have been designated AFIS aerodromes. At four of these, the service was provided by INECO until March 2018, when a call for tenders was issued, with the contract being awarded to SAERCO, which has provided the service since October 2018. At the remaining aerodrome, Córdoba, the service was also put out to tender and is provided by FerroNATS.

Table 4: Summary of the aerodromes with liberalised ATS (2017)[77]

AERODROMES WITH LIBERALISED ATS						
Type of ATS	**Airport**	**Service provider**	**Passenger traffic (% of total)**	**% of passenger traffic managed by each company**	**% of operations**	**% of operations managed by each company**
Aerodome ATC	Sabadell	FerroNATS	0,00%	14,74%	1,90%	20,82%
	Madrid-Cuatro Vientos	FerroNATS	0,00%		2,14%	
	A Coruña	FerroNATS	0,46%		0,74%	
	Alicante-Elche	FerroNATS	5,50%		4,38%	
	Ibiza	FerroNATS	3,17%		3,48%	
	Jerez	FerroNATS	0,42%		2,24%	
	Sevilla	FerroNATS	2,05%		2,24%	
	Valencia	FerroNATS	2,71%		3,13%	
	Vigo	FerroNATS	0,43%		0,57%	
	La Palma	SAERCO	0,52%	5,91%	0,82%	5,77%
	Lanzarote	SAERCO	2,96%		2,74%	
	Fuerteventura	SAERCO	2,43%		2,22%	
AFIS	La Gomera	SAERCO	0,02%	0,10%	0,09%	0,74%
	El Hierro	SAERCO	0,08%		0,19%	
	Burgos	SAERCO	0,00%		0,11%	
	Huesca	SAERCO*	0,00%		0,36%	
	Córdoba	FerroNATS	0,00%	0,00%	0,36%	0,36%

Source: Compiled by author based on data from Aena, S.A.

[76] Adolfo Suárez-Madrid-Barajas, Barcelona-El Prat, Palma de Mallorca, Málaga-Costa del Sol, Gran Canaria, Alicante-Elche, Ibiza, Tenerife Sur, Valencia, Tenerife Norte, Lanzarote, Seville, Jerez de la Frontera, Fuerteventura, Bilbao, Madrid-Cuatro Vientos, Sabadell, Menorca, Santiago, Girona-Costa Brava, La Palma, A Coruña, Reus, Asturias, Federico García Lorca Granada-Jaén, Vigo, Almería, Seve Ballesteros-Santander, Vitoria, Melilla, Huesca-Pirineos, Córdoba, San Sebastián, Pamplona, El Hierro, Burgos, La Gomera and Logroño-Agoncillo.

[77] The percentages for passenger traffic and operations in tables 4 and 5 do not total 100% together because the tables do not include the aerodromes managed by Aena, S.A. where ATS are provided by the Air Force (these services have not been liberalised).

Of the 21 aerodromes whose ATS have not been liberalised (Table 5), at 11, aerodrome and approach services are provided together (Act 9/2010 explicitly excludes approach control from the reform). Despite the fact that legally, it would be possible to put the provision of aerodrome ATC services out to tender, this could entail duplication of personnel, and therefore, of costs, given that controllers currently provide approach and aerodrome services together.

This means that in Spain, there are 10 aerodromes where only aerodrome services are provided at the control towers. They may therefore be directly liberalised. These include the Adolfo Suárez Madrid-Barajas, Barcelona-El Prat and Palma de Mallorca airports, which have over 150,000 annual IFR movements and which Aena, S.A. considers to be the network's major airports[78]. In 2017, these three airports accounted for 51% of passenger traffic and 42% of operations.

Table 5: Summary of aerodromes with non-liberalised ATS (2017)[79]

NON-LIBERALISED AERDROMES						
Type of ATS	**Airport**	**Service provider**	**Passenger traffic (% of total)**	**% of passenger traffic managed by ENAIRE**	**% of operations**	**% of operations managed by ENAIRE**
Only aerodrome ATC from the control tower	AS Madrid-Barajas	ENAIRE	21,43%	73,94%	17,83%	63,61%
	Barcelona-El Prat	ENAIRE	18,97%		14,88%	
	Palma de Mallorca	ENAIRE	11,22%		9,60%	
	Málaga-Costa del Sol	ENAIRE	7,47%		6,31%	
	Gran Canaria	ENAIRE	5,25%		5,45%	
	Tenerife Sur	ENAIRE	4,51%		3,21%	
	Tenerife Norte	ENAIRE	1,89%		2,81%	
	Bilbao	ENAIRE	2,00%		2,16%	
	Santiago	ENAIRE	1,06%		0,99%	
	Melilla	ENAIRE	0,13%		0,37%	
Aerodrome and approach ATC together	Menorca	ENAIRE	1,38%	4,50%	1,39%	6,29%
	Girona-Costa Brava	ENAIRE	0,78%		0,89%	
	Asturias	ENAIRE	0,56%		0,60%	
	Almería	ENAIRE	0,40%		0,56%	
	SB Santander	ENAIRE	0,38%		0,51%	
	FGL Granada-Jaén	ENAIRE	0,36%		0,58%	
	Reus	ENAIRE	0,41%		0,74%	
	Vitoria	ENAIRE	0,03%		0,39%	
	San Sebastián	ENAIRE	0,11%		0,32%	
	Pamplona	ENAIRE	0,07%		0,26%	
	Logroño-Agoncillo	ENAIRE	0,01%		0,07%	

Source: Compiled by author based on data from Aena, S.A.

78 Aena, S.A. (2018).

79 The percentages for passenger traffic and operations in tables 4 and 5 do not total 100% together because the tables do not include the aerodromes managed by Aena, S.A. where ATS are provided by the Air Force (these services have not been liberalised).

3. ANALYSIS OF THE EFFICIENCY OF THE LIBERALISATION OF ATS

According to the Preamble of Act 9/2010, the liberalisation process seeks to correct '*the organisational deficiencies and lack of economic efficiency*' in air navigation services.

This section presents an analysis of the efficiency of the liberalisation of ATS carried out in Spain, based on the available efficiency indicators. The available data, which are primarily provided by EUROCONTROL and Aena, make it possible to conduct an analysis based on variation of the indicators over time and comparison with other European countries.

Firstly, other experiences with liberalisation in other European Union countries and third countries are analysed.

Secondly, the air navigation services (not just aerodrome ATS) efficiency results for Aena/ENAIRE are presented and compared to the rest of the major European operators. These results are published by EUROCONTROL and estimated using their cost-effectiveness indicator, for 2010 to 2016.

Thirdly, given that the focus of this study is aerodrome ATS in Spain, and the results of the EUROCONTROL reports refer to a much broader market, this section then shows the variation in the efficiency of aerodrome ATS, using the cost per movement indicator for Spanish airports in the Aena network between 2012 and 2017.

3.1. Liberalisation processes in other countries[80]

From an international perspective, the liberalisation of ATS is relatively recent and is primarily concentrated in Europe. Apart from Spain, the market for these services has been opened up to competition in the United Kingdom, Germany and Sweden. With the exception of the United Kingdom, all of the liberalisation processes have taken place in the past decade.

The main difference between the reforms carried out in Spain and the other European countries is related to the activities liberalised: while in Spain, only the market for aerodrome ATS has been opened up, in the United Kingdom, Sweden and Germany, there is competition in the provision of both aerodrome and approach ATS. It should be noted that en-route ATS have not been liberalised in any country.

[80] For further information about the liberalisation processes carried out in other countries, see the Appendix.

Although the Spanish liberalisation is much more limited than that of its peers in terms of the services concerned, it is broader with regard to the aerodromes included. The Spanish reform includes the possibility of putting the aerodrome services at all civil aerodromes out to tender. In contrast, Sweden and Germany have opted to exclude certain types of airports from the liberalisation.

Among the liberalisations, the case of the United Kingdom is noteworthy. Not only is the country a pioneer in this sphere, but it is where liberalisation has been most extensive, both in the number of aerodromes and the range of service affected. Since the 1980s, private providers of aerodrome and approach ATS have been allowed entry to any civil aerodrome, with the sole exception of approach services for the London Terminal Area. Nonetheless, the British market did not truly become dynamic until the past decade, coinciding with the liberalisations carried out in Spain, Germany and Sweden.

Outside Europe, there have been no liberalisation processes worth mentioning. There is some degree of competition only in the United States. Since the 1980s, the national provider of air traffic services has had the option to subcontract the provision of these services at aerodromes with very low traffic density where only VFR flights operate.

Therefore, with the 2010 reform, Spain joined a pioneering group of countries which have opted to open up to competition as a mechanism for boosting efficiency in the provision of ATS, while also maintaining high quality and safety levels.

3.2. Efficiency in air navigation services

The indicator used by EUROCONTROL to measure the efficiency of air navigation services is cost-effectiveness, which takes in costs per composite flight-hour[81] (en-route as well as approach and aerodrome) for provision of air traffic management (ATM) services[82] – which include ATS – and CNS, together with the costs deriving from delays experienced in air traffic flow management

[81] Composite flight-hour is a measure that combines en-route flight hours and IFR movements controlled at the aerodrome.

[82] *Regulation (EC) No 549/2004 of the European Parliament and of the Council of 10 March 2004 laying down the framework for the creation of the single European sky (the framework Regulation)* defines air traffic management as the aggregation of the airborne and ground-based functions (air traffic services, airspace management and air traffic flow management) required to ensure the safe and efficient movement of aircraft during all phases of operations.

(ATFM)[83]. In Spain, all of these services were provided by Aena/ENAIRE before the liberalisation, and following this, they continue to provide all of them except for aerodrome ATS at the liberalised towers.

$$Cost-effectiveness = \frac{Cost\ of\ ATM/CNS}{Composite\ flight-hour} + \frac{Cost\ of\ ATFM\ delays}{Composite\ flight-hour}$$

The performance data published annually by EUROCONTROL[84] show that the cost-effectiveness ratio for the air navigation services provided by Aena/ENAIRE has been systematically more unfavourable than that of the majority of European countries over the past 15 years.

In 2010, the cost-effectiveness indicator for Aena was €720 per composite flight-hour (approximately 32% higher than the European average), making it the fifth least efficient operator in Europe and the worst among the five largest providers[85]. Since then, there has been a significant improvement in the efficiency of Aena/ENAIRE, with the indicator dropping to €504 per composite flight-hour in 2016 (see Graph 2). In other words, it fell 30% between 2010 and 2016 (last year for which information is available). Although efficiency in Spain is still 2% below the European average, Aena/ENAIRE has improved, becoming the most efficient provider among Europe's five largest.

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[83] *Regulation (EC) No 549/2004* defines air traffic flow management (ATFM) as a function established with the objective of contributing to a safe, orderly and expeditious flow of air traffic by ensuring that ATC capacity is utilised to the maximum extent possible, and that the traffic volume is compatible with the capacities declared by the appropriate air traffic service providers.

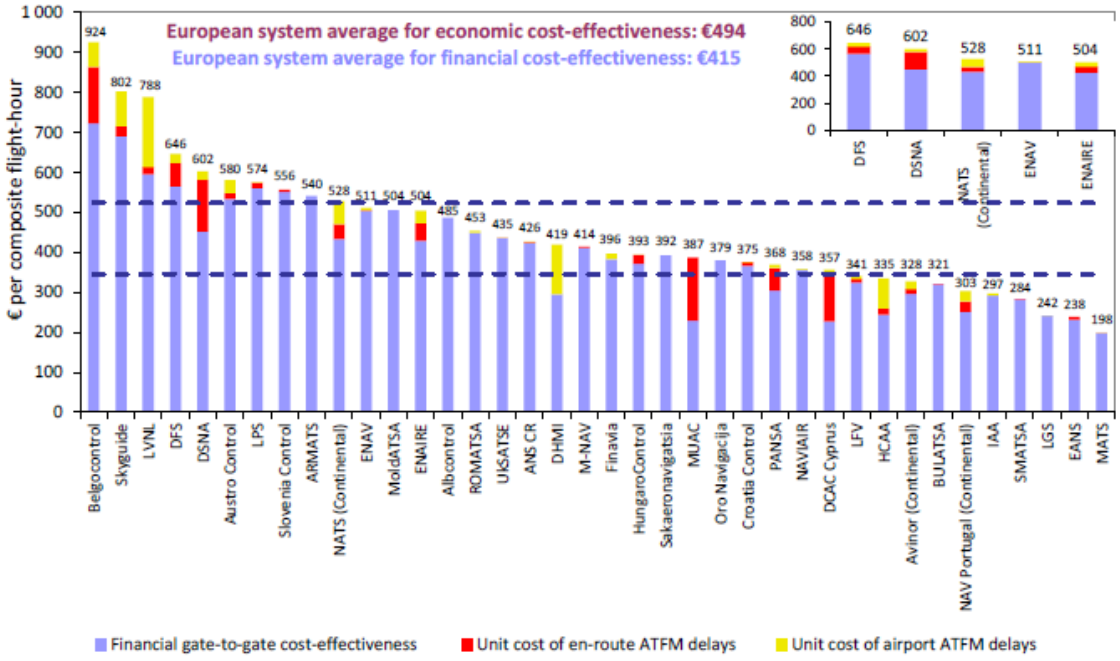
[84] EUROCONTROL publishes the annual 'ATM Cost-Effectiveness (ACE) Benchmarking Report', available at:

http://www.eurocontrol.int/publications?title=ATM%20Cost-Effectiveness%20&field_term_publication_type_tid=All&date_filter%5Bvalue%5D%5Byear%5D=

These reports evaluate and compare the efficiency of more than 30 European air navigation service providers (38 in 2016).

[85] The five largest European providers are ENAIRE (Spain), DFS (Germany), ENAV (Italy), NATS (United Kingdom) and DSNA (France).

Graph 2. Cost-effectiveness indicator (2016)



Source: EUROCONTROL

Going forward, the analysis will focus on the first addend of the cost-effectiveness indicator (cost of ATM/CNS per composite flight-hour) because it encompasses aerodrome ATS, which are the object of this study. Cost of ATM/CNS per composite flight-hour can be broken down into two components:

- Controller costs per composite flight-hour (made up of productivity[86] and cost per air traffic controller hour on duty[87]).
- Support costs per composite flight-hour.

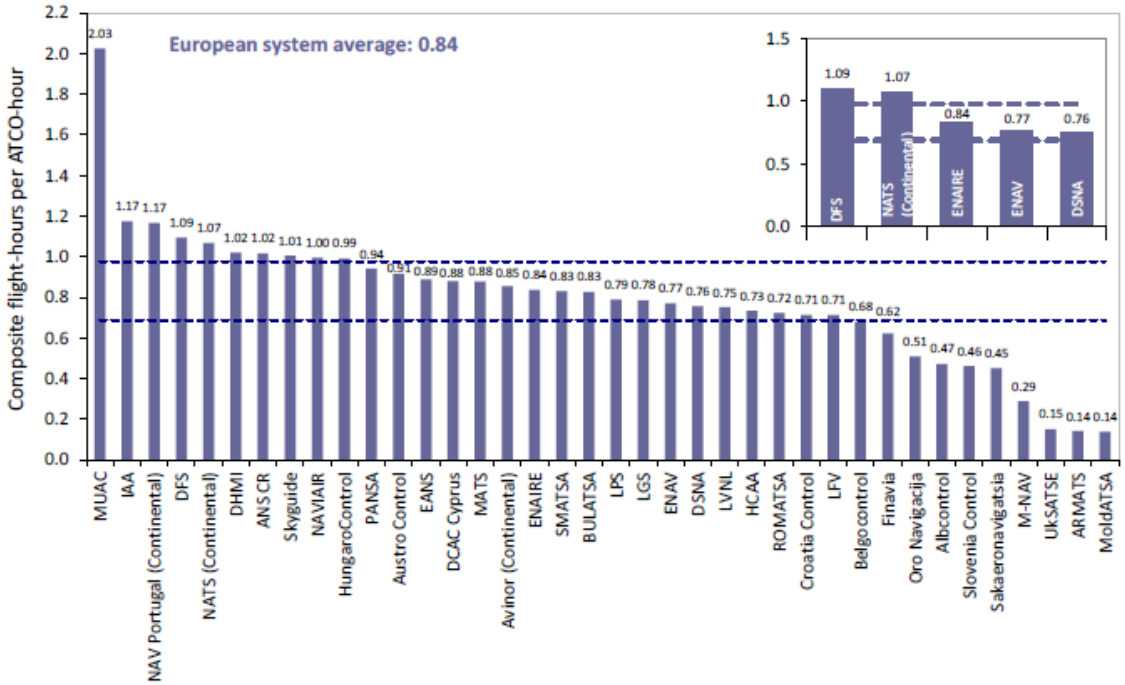
Having studied trends in these elements, it is possible to draw conclusions similar to those discussed earlier.

Controller productivity at Aena/ENAIRE has improved in both absolute terms, increasing 12%, and relative terms, going from 2.6% below the European average in 2010 to equalling it in 2016 (Graph 3).

[86] Productivity is defined as composite flight-hours controlled divided by the air traffic controller's hours on duty, hours on duty being understood as actual control time plus statutory rest periods.

[87] Cost per air traffic controller hour on duty is defined as the employment cost of the controller divided by the controller's hours on duty.

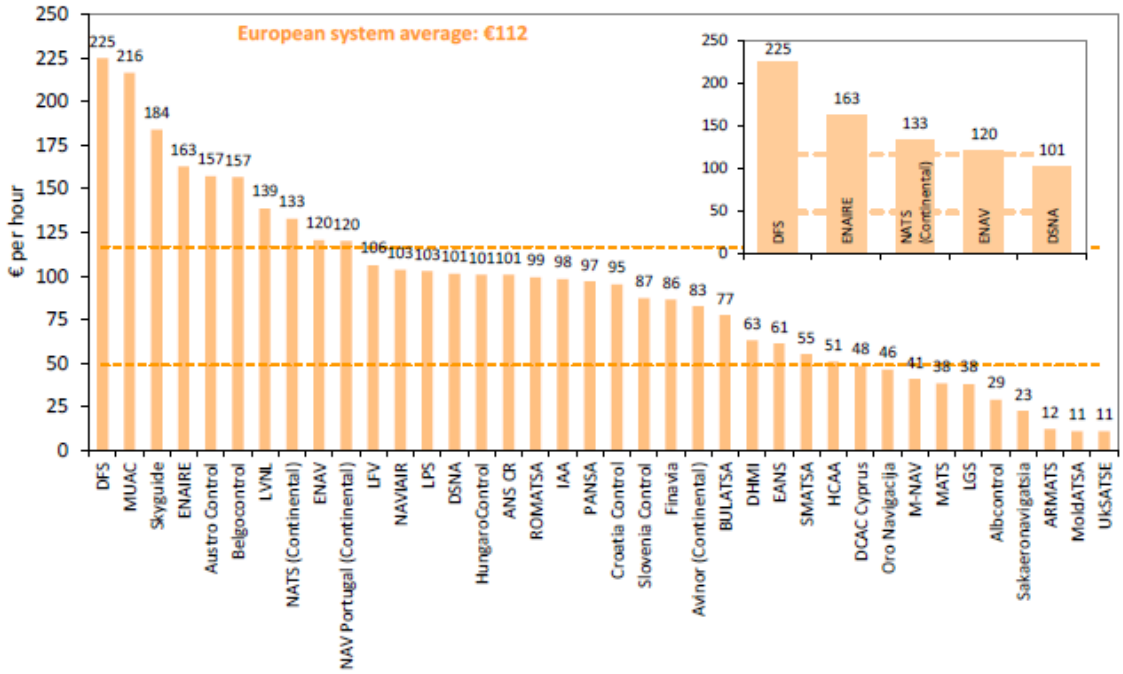
Graph 3. Controller productivity (2016)



Source: EUROCONTROL

As regards controller costs per hour on duty for ENAIRE, in 2010 they were the highest in Europe (€170 compared to €96 on average). Between 2010 and 2016, they saw a 4% decrease. In 2016, they ranked fourth among the highest (Graph 4), still 46% above the European average (€163 in comparison with the European average of €112), a gap which increases if we take into account purchasing power in each country (in terms of purchasing power parity, Spain's costs are 50% higher than the average).

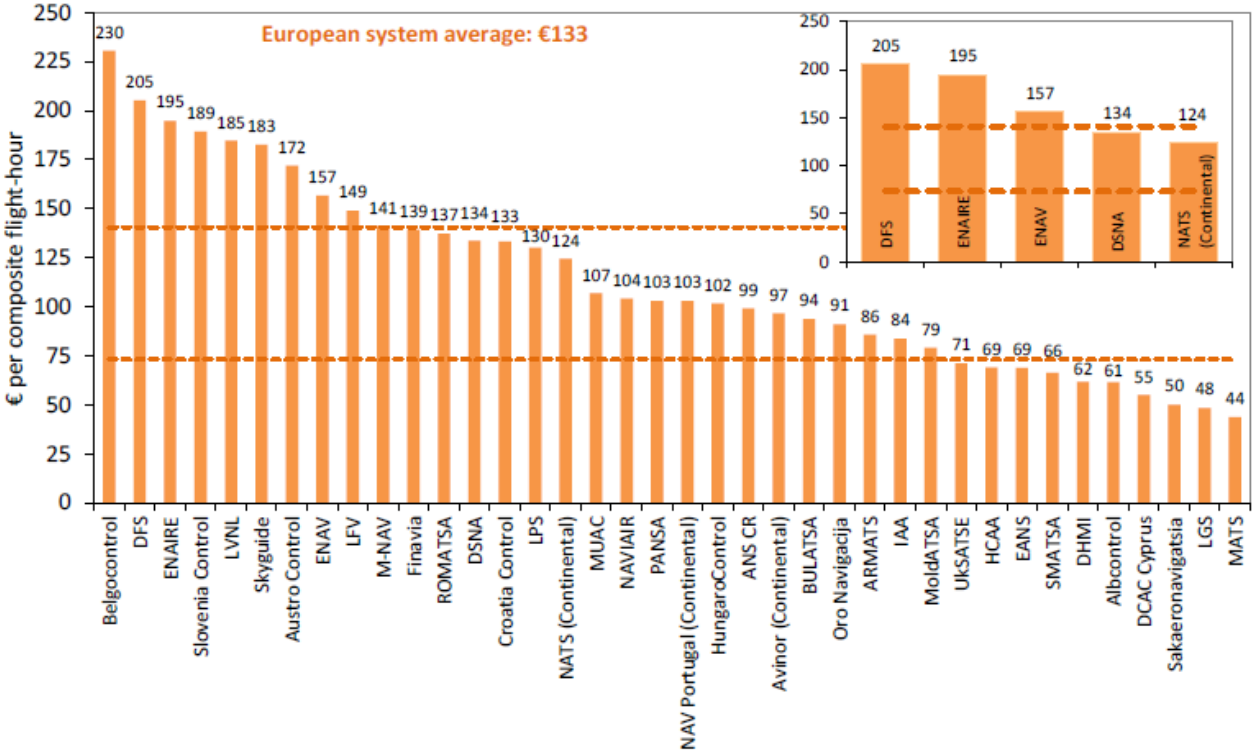
Graph 4. Cost per controller hour on duty (2016)



Source: EUROCONTROL

The following graph compares costs per air traffic controller, weighted by composite flight-hour, for different European air navigation service providers. This indicator also improved between 2010 and 2016 (dropping around 14%), going from representing the highest costs per controller/composite flight-hour in Europe (at €226, 81% higher than the average) to third position (at €195, still 47% above the average).

Graph 5. Cost per controller and composite flight-hour (2016)



Source: EUROCONTROL

From the indicators analysed, it is possible to conclude that ENAIRE, despite having significantly improved its efficiency figures since 2010, continues to be more inefficient than the European average, with much higher costs per controller and hour than our neighbouring countries.

In any event, the indicators presented thus far refer to ATM services as a whole, which encompass services other than ATS, and relate to all phases of flights (aerodrome, approach and en route). Therefore, it is not possible to draw precise conclusions, making a more detailed analysis necessary. For this reason, trends in efficiency in the Spanish case are now analysed.

3.3. Efficiency of aerodrome air traffic services

The indicators presented above, despite not being specific to aerodrome ATS, point to the existence of inefficiencies in the provision of air navigation services at Aena/ENAIRE. Therefore, it is important to study trends in the efficiency of aerodrome ATS in Spain, as well as the possible impact of liberalisation. To this end, specific indicators for aerodrome ATS have been analysed.

A proxy for an ATS efficiency indicator at each aerodrome is the cost of provision[88] in relation to the total movements controlled at the aerodrome (landings and take-offs), which Aena, S.A. calculates for each airport in its network.

$$Aerodrome\ ATS\ efficiency = \frac{Aerodrome\ ATS\ cost\ of\ provision}{No.of\ movements}$$

This analysis only takes into account information for Spanish airports in the Aena network. It omits air bases and aerodromes under military control, as they are excluded from the liberalisation.

As regards the time frame, although it would be particularly interesting to analyse variation in efficiency between periods prior to the passing of Act 9/2010, its entry into force and subsequent periods, the CNMC does not have data prior to 2012. Therefore, it has not been possible to perform these calculations. The actual entry of operators other than Aena/ENAIRE at the 12 towers where air traffic control was liberalised took place almost entirely between late 2012[89] and 2013[90], with the exception of Alicante, where the change of operator did not occur until 2014. As a result, with the available data, it is possible to extract robust evidence about the impact of liberalisation on the provision of aerodrome ATS between the years 2012 and 2017. As discussed below, the data are positive in terms of efficiency. However, it should be noted that it is possible that the estimation of the effect of the entry of competition on efficiency is conservative, as it has not been possible to capture the impact which may have taken place between 2010 and 2012, on opening up the market to potential competition (even though this had not yet taken effect).

The overall results show that **all the airports where the ATS has been liberalised[91] have reported efficiency gains, with an average drop in cost per movement of around 60% between 2012 and 2017**. This is equivalent to an average annual cumulative reduction in excess of 15%, although the most significant drop occurred between 2012 and 2015. In the non-liberalised airports

[88] The cost of provision can be approximated based on the remuneration paid to the ATS operators providing the service by the manager.

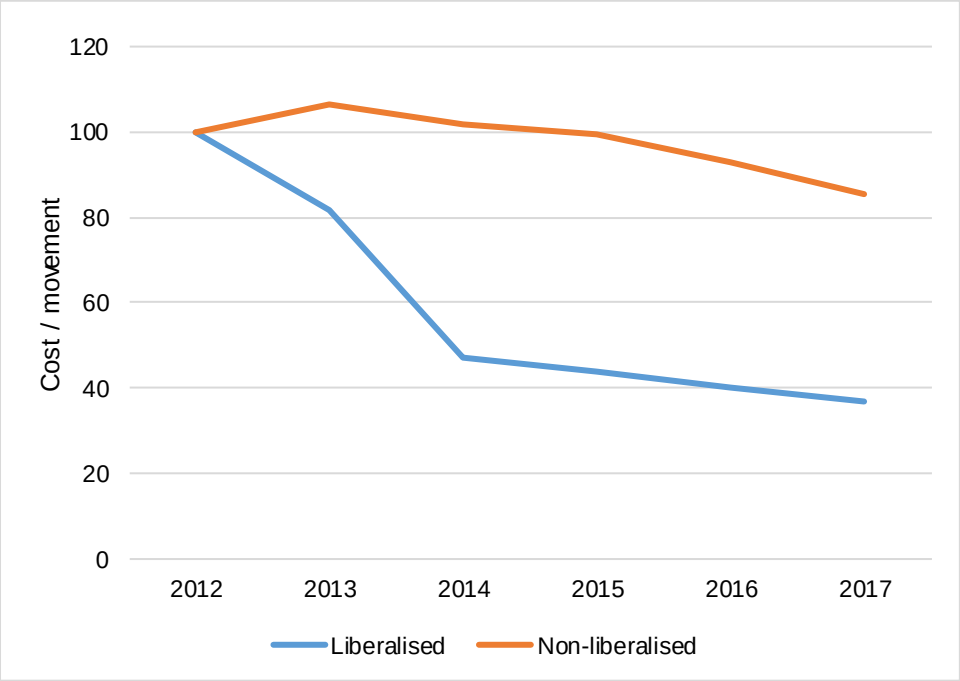
[89] Madrid-Cuatro Vientos, Sabadell, La Palma and Vigo.

[90] Ibiza, Valencia, Lanzarote, Seville, Fuerteventura, Jerez de la Frontera and A Coruña.

[91] The aggregate excludes airports designated as AFIS, as the service provided is different from the service at airports with air traffic control.

group, efficiency gains for the 2012–2017 period were 15%, primarily due to improvement of the indicator since 2015, as the following graph shows:

Graph 6. Cost per movement comparison for liberalised and non-liberalised airports. Index number 2012=100.



Source: compiled by author based on data from Aena, S.A.

Additionally, it is important to point out that **the improvements in efficiency generated by liberalisation have not only *not* been achieved at the expense of lower quality services, but rather the opposite: quality of service has improved more at liberalised airports than at non-liberalised ones**. The ATFM slot adherence quality indicator (or CTOT compliance)[92] indicates that **at the 12 liberalised towers, quality increased by more than 7% between 2012 and 2017**[93], whereas, on average, at **the airports where ENAIRE continues to provide the aerodrome control service, quality has remained virtually constant**. Of these, approximately half of the incumbent operator's aerodromes

[92] The ATFM slot adherence indicator (or CTOT compliance) is defined as the percentage of compliance with ATFM time slots (between -5 minutes and +10 minutes), that is to say, the percentage of flights that take off within a time interval that ranges from 5 minutes before and 10 minutes after the departure slot (the time) within which the aircraft should take off.

[93] This indicator is frequently used in studies by EUROCONTROL and air navigation organisations to measure quality of service.

(which include the vast majority of the aerodromes comparable to those liberalised) have improved their numbers, while quality at the other half has declined.

In any event, given the different types of airports in Spain, it is preferable to break down the analysis into groups of similar airports. The 38 airports included in this efficiency analysis are classified into five different groups, each of which includes aerodromes comparable to each other:[94]

- Aerodromes with more than 150,000 annual IFR movements (hereinafter, 'large').
- Aerodromes with between 30,000 and 150,000 annual IFR movements, provided that aerodrome and approach ATS are not provided together and that they have not been designated as AFIS aerodromes (hereinafter, 'mid-sized'). This group includes six airports of the twelve with liberalised ATC service.
- Aerodromes with fewer than 30,000 annual IFR movements, provided that aerodrome and approach ATS are not provided together and that they have not been designated as AFIS aerodromes (hereinafter, 'small'). This group includes six airports of the twelve with liberalised ATC service.
- Aerodromes in which aerodrome and approach ATS are provided together by the same air traffic controllers.
- AFIS aerodromes.

Below, the results are broken down by airport size.

Large airports:

At Spain's three major airports, where liberalisation has not taken place, there was an **average efficiency increase of 20% between 2012 and 2017** (23% at Adolfo Suárez Madrid-Barajas, 13% at Barcelona-El Prat and 18% at Palma de Mallorca). This result is lower than that for the liberalised airports as a whole, and it is partially the result of an increase in traffic. It is possible that at these airports, costs have been kept low as a result of the incumbent operator reacting pre-emptively to the entry of competition by increasing its own efficiency.

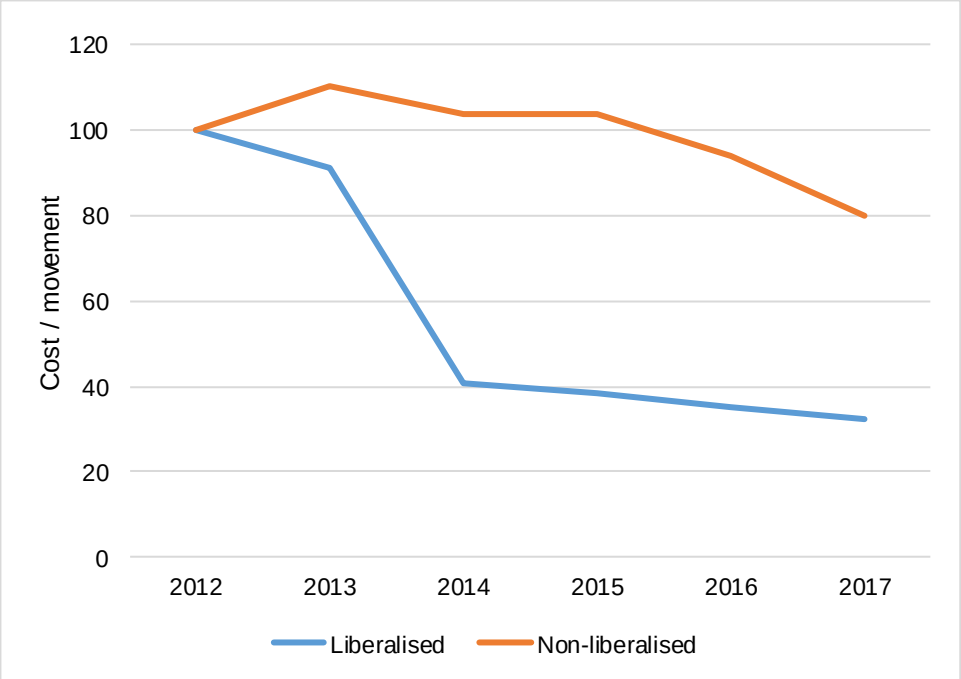
[94] According to information provided by Aena, S.A.

Mid-sized airports:

Among the liberalised airports, the greatest increases in efficiency have taken place at mid-sized airports. As Graph 7 shows, **the cost per movement at liberalised mid-sized airports fell 65% between 2012 and 2017**, topping 70% at some aerodromes (Lanzarote and Ibiza) and in no case less than 55%. Between 2013 and 2014, coinciding with the actual entry of other operators at the liberalised towers, we see a sharp 55% drop in the indicator, the largest efficiency gain in the entire period. During the other years, the improvement is constant and steady, with reductions around 7% per year.

For their part, **at non-liberalised mid-sized airports, the cost per movement fell, on average, almost 20% between 2012 and 2017**. Between 2012 and 2015, the indicator remained relatively constant, then reported a considerable drop of 10–15% a year starting in 2015 (Graph 7).

Graph 7. Cost per movement comparison for liberalised and non-liberalised mid-sized airports[95]. Index number 2012=100.



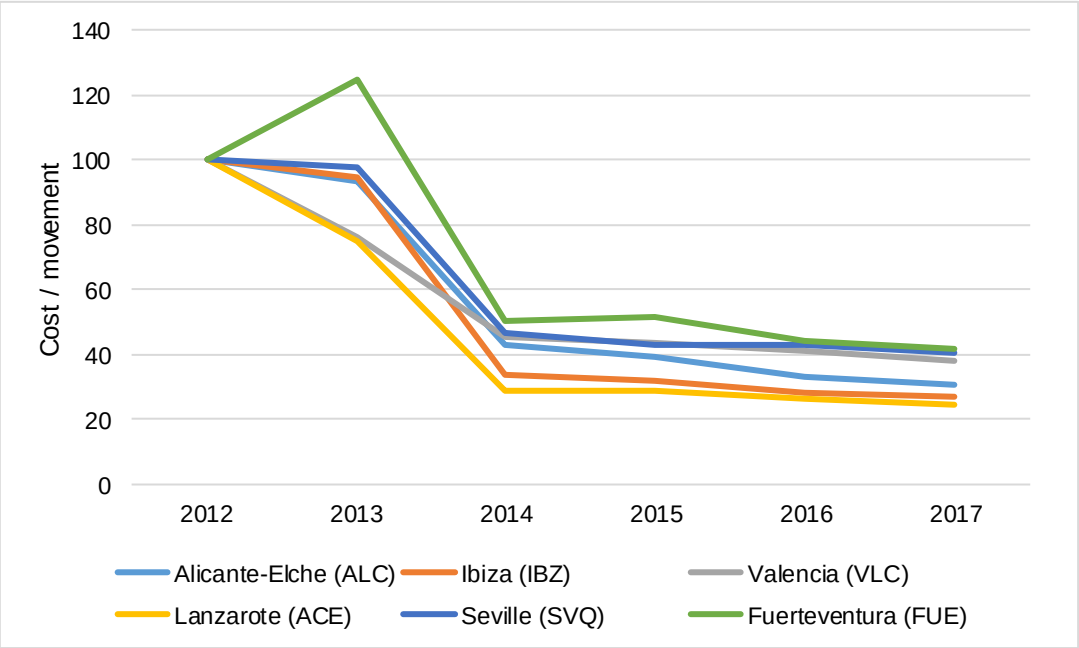
Source: compiled by author based on data from Aena, S.A.

Graphs 8 and 9 show trends in the efficiency indicator by airport for the mid-sized group, distinguishing between liberalised and non-liberalised. From these it is

[95] Comparable airports with between 30,000 and 150,000 annual IFR movements.

possible to reach conclusions similar to those obtained from Graph 7 with aggregate data by group, there being no significant trends in comparison with the aggregate trend in any case.

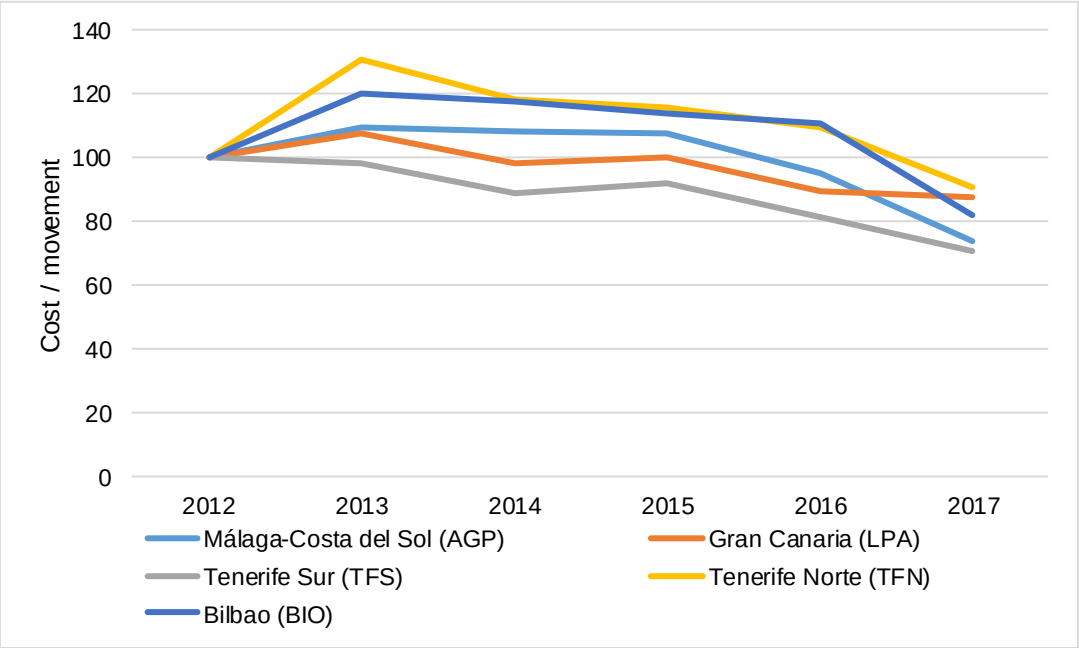
Graph 8. Cost per movement at liberalised mid-sized airports.[96] Index number 2012=100.



Source: compiled by author based on data from Aena, S.A.

[96] Comparable airports with between 30,000 and 150,000 annual IFR movements.

Graph 9. Cost per movement at non-liberalised mid-sized airports[97]. Index number 2012=100.



Source: compiled by author based on data from Aena, S.A.

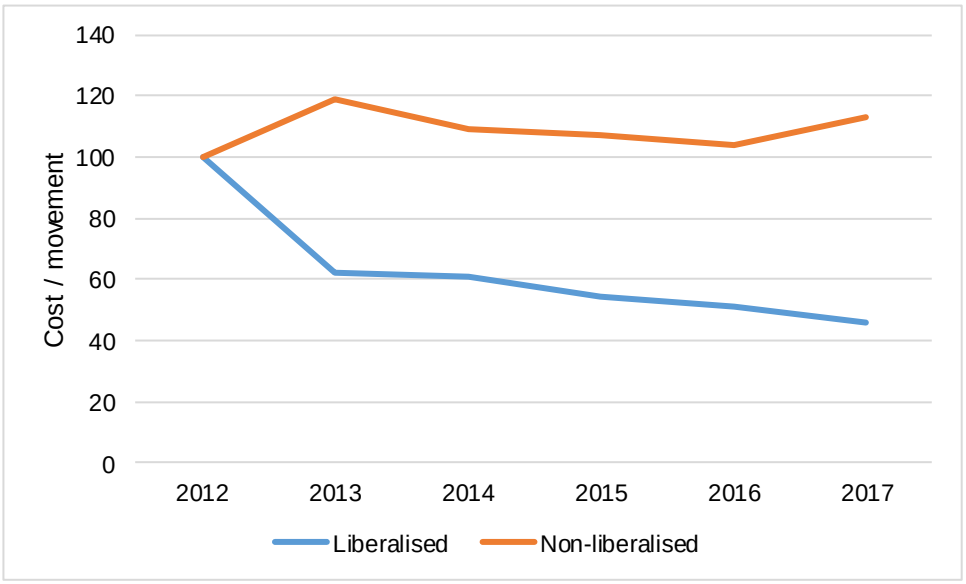
Small airports:

Efficiency gains at liberalised small airports are slightly below 55%, which represents an average annual cumulative gain of 15% (Graph 10). The replacement of the incumbent operator by new players took place in effect in late 2012 for four of the six liberalised airports in this group, and in 2013 for the remaining two. As at the mid-sized airports, at the small ones, the biggest gains took place during the period when the incumbent was replaced, when the indicator improved by 38%. Subsequently, the annual efficiency increases were repeated, but on a smaller scale (on average, 7% a year). It should be noted that the lack of available data prior to 2012 probably means that the reduction in the cost per movement indicator has been underestimated.

In the same graph, it is possible to see that **on the whole, non-liberalised small airports did not report efficiency improvements**, with the indicator following a constant or slightly increasing trend over the course of the period. However, it is true that the small number of aerodromes included in this group means that the unusual variation at one of them (Melilla) distorts the overall result.

[97] Comparable airports with between 30,000 and 150,000 annual IFR movements.

Graph 10. Efficiency indicator comparison for liberalised and non-liberalised small airports[98]. Index number 2012=100.



Source: compiled by author based on data from Aena, S.A.

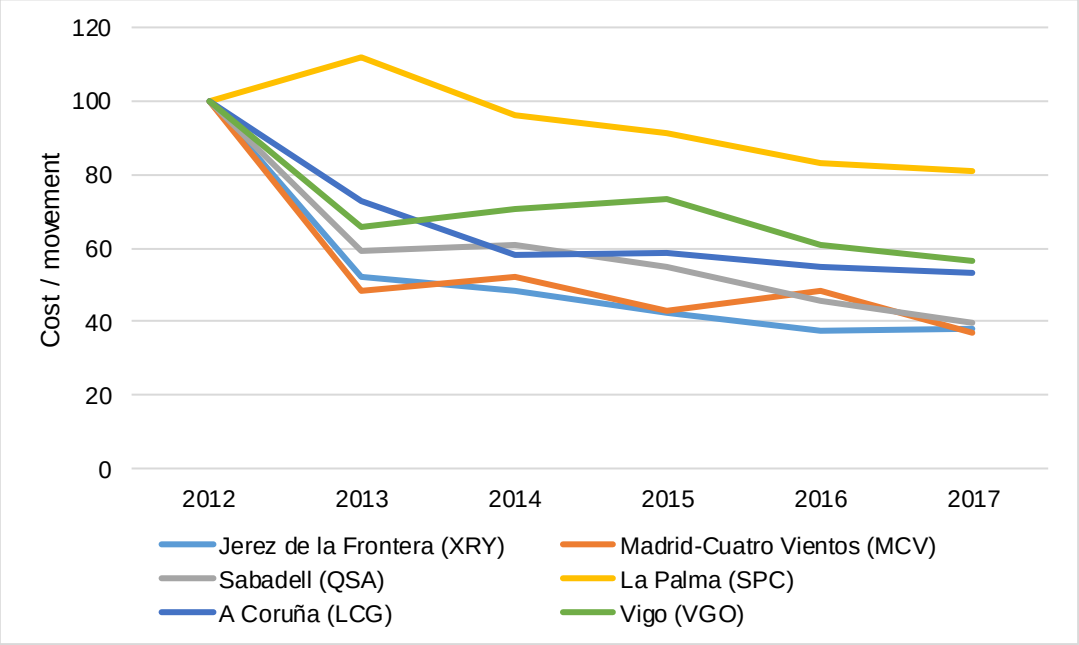
Graphs 11 and 12 show the individual variation at small airports in terms of movements, liberalised and non-liberalised, respectively.

In the case of towers opened up to competition, it is worth mentioning the trend at La Palma, whose efficiency gains between 2012 and 2015 (around 20%) are smaller than at the rest of the liberalised airports. However, at this airport, the non-incumbent operator began providing service in effect in 2012, meaning that it is possible that part of the savings had already been realised in that year and the impact of competition has not been fully captured. Additionally, this airport saw a significantly smaller improvement in traffic than at the other aerodromes shown in the graph, which also impacts the less favourable variation in this indicator.

At non-liberalised airports comparable to the preceding ones, the upward trend in the indicator at the Melilla aerodrome is noteworthy, indicating an almost 70% loss in efficiency between 2012 and 2015. Although it is true that there was a 20% decline in the aerodrome's movements during that period, with the available data, it is not possible to draw conclusions regarding the reason for such a pronounced loss.

[98] Comparable airports with fewer than 30,000 annual IFR movements.

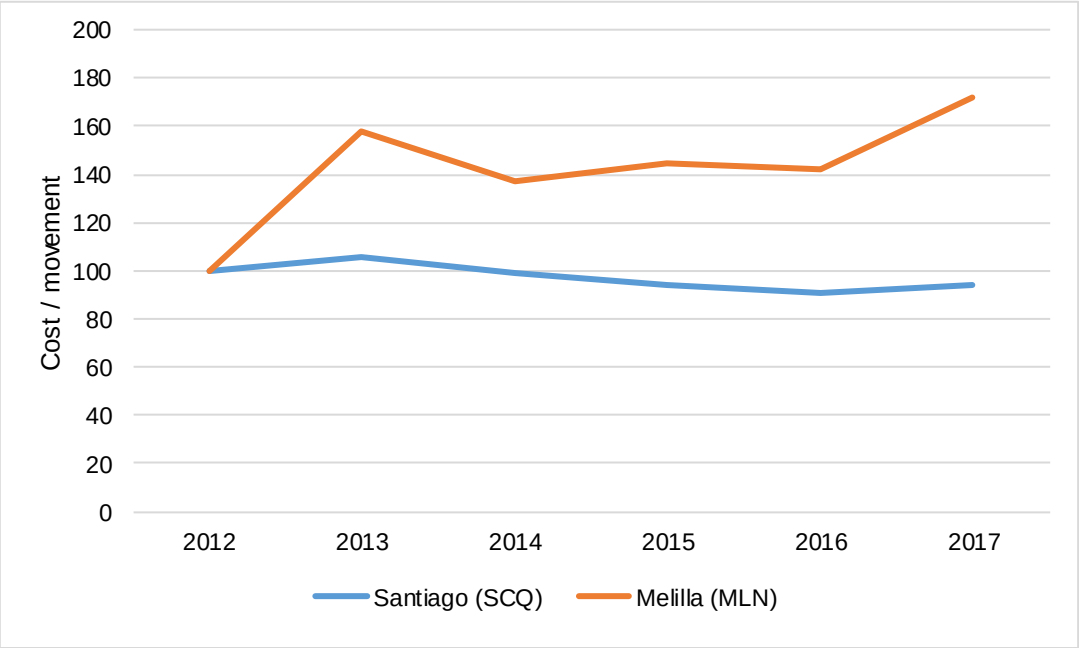
Graph 11. Efficiency indicator at liberalised small airports[99]. Index number 2012=100.



Source: compiled by author based on data from Aena, S.A.

[99] Comparable airports with fewer than 30,000 annual IFR movements.

Graph 12. Efficiency indicator at non-liberalised small airports[100]. Index number 2012=100.



Source: compiled by author based on data from Aena, S.A.

Airports where the approach ATS is provided jointly:

At the group of airports where the same air traffic controller provides approach and aerodrome ATS simultaneously, which have not been liberalised, **the efficiency indicator has declined in most cases** (Girona-Costa Brava, Asturias, FGL Granada-Jaén, Almería, SB Santander, Vitoria, San Sebastián, Pamplona and Logroño-Agoncillo, in other words, at all of them except Menorca and Reus).

This decline in efficiency (**on average, 20% between 2012 and 2017**) coincides with a considerable drop in traffic at most of the airports in this group (Girona-Costa Brava, Reus, Asturias, Almería, SB Santander, San Sebastián, Pamplona and Logroño), which was not accompanied by proportional cost reductions, necessary to keep the cost per movement at the 2012 level. And in some cases, said costs even increased.

AFIS airports:

Between 2012 and 2017, AFIS service was provided instead of aerodrome ATC at four airports in the Aena network (Huesca-Pirineos, El Hierro, Burgos and La

[100] Comparable airports with fewer than 30,000 annual IFR movements.

Gomera). As Act 9/2010 indicates, AFIS, '*because they do not require air traffic controllers, are much more economically efficient and equally safe*'. However, **it has not been possible to quantify a total for the increased efficiency generated by designating these airports as AFIS** using the cost per movement indicator, **as the change was implemented between 2010[101] and 2011[102],** dates for which it has not been possible to obtain data.

Since 2012, the group of AFIS airports has seen a 14% drop in cost per movement, due to smaller cost increases as traffic at these aerodromes has increased. However, the trends vary among airports: efficiency increased 77% at Huesca-Pirineos (at the same time as movements doubled), while at El Hierro, Burgos and La Gomera, it fell 28%, 30% and 55%, respectively (movements dropped almost 20% at Burgos, and remained constant in the other two cases). Despite not having the data to calculate the cost per movement indicator between 2010 and 2012, information from Aena confirms that the switch from ATC to AFIS meant a cost savings of 60% and 67% at the Burgos and La Gomera airports, respectively[103].

Analysis of the impact of increased traffic on efficiency improvements

Given the definition of the efficiency indicator (cost per movement), variations in the number of movements affect estimated efficiency results. Between 2012 and 2017, there was a very significant increase in air traffic (between 2013 and 2017, the number of passengers at airports in the Aena network rose 33% and the number of operations, 21%)[104], which may explain part of the efficiency gains at Spanish airports. Therefore, it is important to analyse to what extent improvements in efficiency have been due to the increase in traffic or to a reduction in costs.

Graph 13 shows the rate of change for the indicator by group of airports, distinguishing between liberalised and non-liberalised within them, as well as costs and movements, for 2012 to 2017. This graph makes it possible to identify the contribution of each of the two elements to changes in the indicator.

At liberalised mid-sized aerodromes, efficiency gains (67%) are mostly due to a cost reduction of almost 60%, together with the also positive impact of the 27% increase in the number of movements. **Non-liberalised mid-sized aerodromes owe their 19% improvement** in the cost per movement indicator

[101] At La Gomera and El Hierro, the latter with AFIS during only part of its hours.

[102] At Burgos and Huesca-Pirineos.

[103] 10 February 2011 press release (Burgos) and 30 July 2011 press release (La Gomera).

[104] Source: www.aena.es. Accessed 27th June 2018.

almost entirely to the **upward variation in movements** (close to 20%), although in part to a 5% reduction in costs.

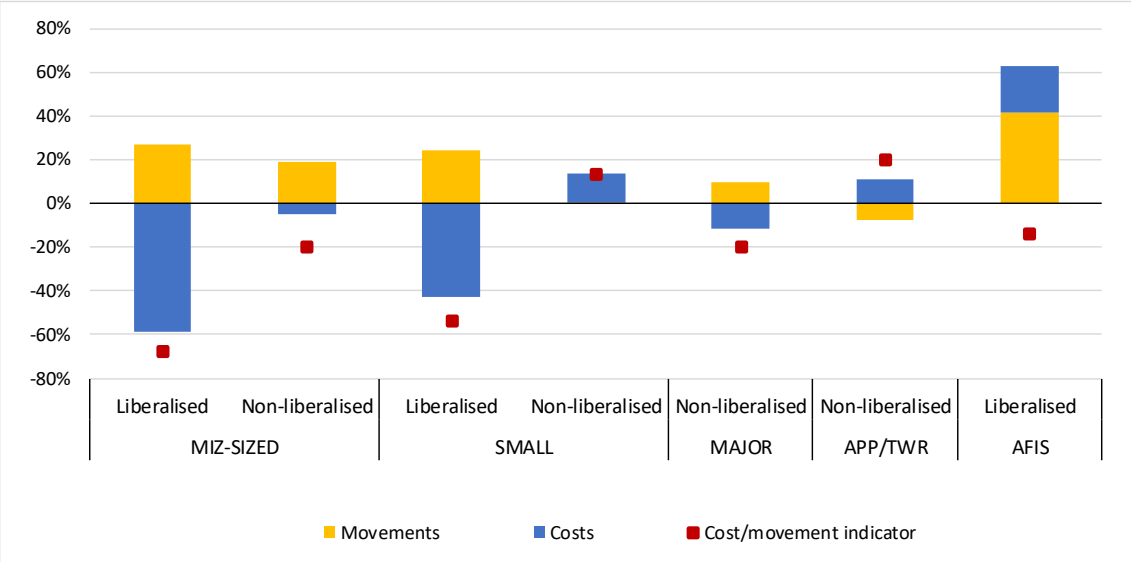
At liberalised small aerodromes, it is also cost savings (43%) which explain most of the efficiency gains between 2012 and 2017 (54%), more so than the increase in the number of movements (24%). **In contrast, non-liberalised aerodromes saw a 13% increase in costs, while their movements remained constant**, resulting in a 13% rise in the cost per movement.

The three major Spanish airports (which have not been liberalised) increased their efficiency by almost 20% due to the combined impact of a 12% reduction in costs and a 10% increase in movements between 2012 and 2017.

At aerodromes where the same air traffic controller simultaneously provides approach and aerodrome ATC services (APP/TWR), which have not been liberalised either, efficiency dropped 20% between 2012 and 2017 due to a 11% cost increase, together with an over 7% decline in movements.

Lastly, the aerodromes designated as AFIS have increased efficiency by 14%, as despite the fact that their costs were up 22% during the period analysed, movements increased 41%.

Graph 13. Rate of change in the cost/movement indicator and its component parts (2012–2017)



Source: compiled by author based on data from Aena, S.A.

4. ANALYSIS OF THE CURRENT SITUATION FROM THE PERSPECTIVE OF COMPETITION

Having described the current situation in the ATS market in Spain, as well as the related training markets, and having looked at the results of the liberalisation in terms of efficiency, this section will now study in detail the main restrictions currently in existence which hamper the dynamic operation of said markets and the ability to leverage all the benefits deriving from competition.

Before analysing the specific problems identified in the Spanish case, we present the main benefits which could be derived from introducing greater competition in aerodrome ATS.

4.1. Benefits of introducing greater competition in aerodrome air traffic services

As economic theory maintains, opening up the aerodrome ATS market to competition, which was initiated as a result of Act 9/2010, should give rise to positive economic outcomes both in the affected sector and in related markets, and even on an aggregate scale, generating economic efficiencies that contribute to improving consumer welfare.

4.1.1. Benefits of competition in the affected market

In competitive markets, companies make an effort to improve their product offerings with regard to their competitors, trying to gain market share to generate or increase profits (and ultimately, to not be pushed out). This introduces pressure to reduce prices, increase offerings and/or improve the quality and variety of goods or services. This competitive tension produces economic efficiency gains in the affected sector, to the benefit of the consumer of the product or service. The effect on efficiency can occur in different ways.

Firstly, efficiency gains may derive from the 'inter-company' allocative effect, in other words, from the effect caused by their entering or leaving the market[105]. The existence of various companies operating in the same market means that those which provide a better service, in the opinion of the consumer, gain market share at the expense of the less competitive firms. The reallocation of resources from the less productive operators to those which are so to a greater extent increases the overall efficiency of the market, as it optimises the allocation of said economic resources. This dynamic may also result in the departure of relatively

[105] See, for example, Hsieh & Klenow (2009).

uncompetitive companies: those which cannot absorb the price decreases which alternative operators can implement, or those which cannot provide a service with the quality that consumers demand and their competitors supply. This departure from the market also entails a transfer of market share to more efficient companies.

Focusing attention on aerodrome ATS, with the liberalisation, the operator selected to provide the service at each airport is decided based on the proposal of the airport manager. In the case of the 12 Aena, S.A. towers whose ATC service have been liberalised thus far, the selection was carried out through a tender process. By means of this tool, the public sector introduces competition for the market, giving different interested companies the opportunity to compete, submitting their bids to provide aerodrome ATS. Out of all of them, the operator whose tender is most efficient – based on the awarding criteria defined in the tender requirements – is selected, awarding them the contract for provision of the service during a given period of time. The 'inter-company' effect of the competitive process does not occur on a continuous basis, but rather the possible entries and departures of companies or transfers of market share (due to changes of operator at towers) are realised at the time the results of the tender process are implemented (provided that provision of the service is not introduced at new aerodromes or that it is no longer provided at existing ones). Despite the fact that potential changes of operator do not take place on a continuous basis, the positive 'inter-company' effects deriving from competition will continue to occur.

Secondly, competitive tension – and especially competitors entering the market – constitutes an incentive for incumbent operators to boost their internal efficiency, increasing their productivity in order to have the capacity to compete with other operators on better terms[106]. Companies can improve how they manage their resources, increasing production with the resources on hand, or reducing the resources required to achieve the same production, through cost savings. Even if no new competitors have entered the market, the mere possibility that this could happen may give rise to a reaction of this kind by the incumbent company, to protect itself from potential competition by improving the service provided. These efficiency gains resulting from competition can be designated as 'intra-company' effect.

Unlike 'inter-company' competition, these efficiency gains can take place continuously over time, although again, if the economic conditions for provision of the service are fixed at the beginning of the contract, efficiency in the form of

[106] See, for example, Nickell (1996) or Bloom & Van Reenen (2007).

savings for the airport manager will not materialise until a new tender process takes place.

The third way to gain efficiency is related to dynamism, achieved through innovation[107]. Competition generates incentives for innovation, whether it be product, process or organisational innovation. Competing companies are spurred to innovate as a way to increase their efficiency, in order to be able to compete with the other operators in the market and avoid being pushed out. Innovation is a factor with especially long-term effects, given that it requires a learning period and resources allocated to R&D&I activities. But when it takes place, it gives rise to considerable productivity benefits at the innovative company itself, as well as externalities for other companies that benefit from the new knowledge and techniques developed, in the same industry or others. Innovation in the processes involved in the provision of ATS (always meeting the technical and safety requirements stipulated by regulations) and organisational innovation can generate extensive increases in efficiency.

4.1.2. Benefits of competition in upstream and related markets

Efficiency in the markets for goods and services required as inputs in air traffic activities has an impact on the performance of ATS, the quality of its provision and the price at which it can be offered. Consequently, improvements made in upstream markets will be transferred to ATS.

The air traffic controller training market has an enormous influence on air traffic services. Thus, its functioning will have downstream effects in the ATS market. There are circumstances that prevent the hiring of new air traffic controllers at the towers in an agile and efficient manner. This complicates the provision of ATS, especially in cases of a change of ATS operator within a tower. If existing problems in the air traffic controller training market are corrected and its operation improves − to which increased competition could contribute − the effect will spread to ATS in the form of organisational improvement and increased efficiency, whether as lower costs for provision of the service or as increased quality (particularly if the human capital is enhanced). But the relationship between the proper operation of the training market and ATS is not one-way. The previous argument is also valid for the opposite direction: if the ATS market does not function adequately, this has a negative impact on air traffic controller training.

[107] There is empirical evidence supporting the thesis of a direct linear relationship between competition and innovation (Geroski, 1995; Nickell, 1996; Blundell, Griffith, & Van Reenen, 1999). Aghion et al. (2005), among others, assert the existence of an inverted-U relationship between competition and innovation, and maintain that the level of competition that maximises incentives to innovate (the optimum level) is close to perfect competition.

Therefore, more competitive operation of the ATS market fosters proper development and dynamism in training activities, which, as mentioned above, will in turn yield positive returns for the ATS market.

Additionally, improvements in efficiency related to technical advances in other related activities can generate considerable benefits for the provision of ATS. This would be the case of innovation in the communication, navigation and surveillance (CNS) services market[108], such as the development or improvement of the equipment used by air traffic controllers, which can result in significant increases in ATS productivity.

In addition, improvement in approach and en-route ATS could also lead to increased efficiency in the aerodrome service. For example, if approach air traffic control achieves better sequencing of aeroplanes for landing, aerodrome air traffic control will benefit, as its workload will be optimised, resulting in an increase in the quality of service. Opening up approach ATS to competition – not currently permitted under Spanish regulations – could give rise to efficiency gains through the mechanisms mentioned in the previous section, extending to the aerodrome service. In addition, the restriction on the liberalisation of approach ATS makes it impossible to generate additional efficiency with regard to the current situation at the 11 control towers where the same approach air traffic controller simultaneously provides aerodrome air traffic control. In these cases, it would be inefficient to liberalise the aerodrome service, given that, de facto, it would mean doubling the number of air traffic controllers necessary to provide the two services. However, if regulations did permit the liberalisation of approach, as is already the case in other countries such as the United Kingdom, Germany and Sweden (see Appendix), these aerodromes could be opened up to competition, putting the combined provision of approach and aerodrome ATS out to tender, so that a single air traffic controller (regardless of the operator for which they worked) could provide both services simultaneously.

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[108] Arblaster (2018): CNS (communication, navigation and surveillance) services are based on the main technologies and infrastructure elements which support air navigation services:

- Communications allow the flow of information and instructions between air traffic controllers and pilots, as well as between air traffic control centres and other relevant stakeholders.
- Navigation services and systems assist pilots in planning and controlling aircraft movements between locations, continuously indicating to them the exact position of the aeroplane.
- Surveillance systems provide air traffic controllers with a visual display on a screen of the aircraft flying in the airspace under their control, allowing them to monitor and control the separation between them.

4.1.3. Benefits of competition at lower links in the chain and in aggregate

Aerodrome ATS is an intermediate good, necessary as an input for the provision of air transport services. The airport manager is responsible for paying the aerodrome ATS provider the consideration for the work they perform. Consequently, efficiency improvements in these services, as a result of greater competition, will be transferred to the airport manager in the form of higher quality of service or lower costs (whether through an agreement for a lower consideration for the ATS provider or, once the contract award at the liberalised airports expires and the service is put out to bid again, through more competition in the selection processes, with more competitive financial and/or technical proposals from the bidders). In this way, the airport manager obtains the direct benefits of the improvement in the efficiency of ATS[109].

However, profit gains deriving from the efficiency of ATS are not limited to this link, but sometimes produce knock-on effects. The savings generated for the airport manager may be passed on to the airlines in the form of lower airport fees. And the lower costs borne by the airlines can in turn be transferred to the final consumers, to the users of air transport of passengers and goods. Likewise, all levels of the chain benefit from not only the savings generated, but also the positive effects on quality of service.

Additionally, the air transport industry is essential to key activities in the Spanish economy, such as tourism, which accounts for a significant percentage of Spain's GDP[110]. In 2017, of the almost 82 million international tourists who visited Spain, 81.5% arrived by plane[111]. Therefore, the positive impact of increased competition in ATS can be highly significant in aggregate, even affecting the country's macroeconomic development.

In conclusion, a higher level of effective competition in the aerodrome ATS market, as well as related markets, generates greater efficiency and greater competitiveness, and increases the welfare of consumers in the ATS market and related sectors, which can ultimately affect economic growth[112].

[109] Forlani (2010) demonstrates that the market power of upstream service providers affects the productivity of downstream operators.

[110] 11.2% in 2016 (National Statistics Institute - INE).

[111] Aena, S.A.

[112] OECD (2014)

4.2. Liberalisation of aerodrome ATC services

As demonstrated in section 3, **the results of introducing competition in the aerodrome ATS market are highly positive in terms of quality and economic efficiency, with an average reduction of the average cost of 60% at liberalised airports as well as quality improvements**. What is more, efficiency has not only increased at the 12 control towers where the incumbent operator has been replaced, but some of this has also extended to the rest of the industry, generating savings and boosting consumer welfare.

Therefore, **continuing the liberalisation process begun in 2010 is recommended**. As is clear from the Preamble to Act 9/2010, the aim of the law was a progressive and orderly restructuring of the system. This has come to a standstill due to the fact that the service has not been put out to tender at additional towers.

Given the current regulation that prevents the liberalisation of approach ATS, **at 11 of the non-liberalised towers, it would not be economically efficient to liberalise the aerodrome ATC service separately, as it is provided together with the approach service**. At these towers, a single air traffic controller provides approach and aerodrome services. Therefore, putting the aerodrome services out to tender would entail splitting up the duties which are now the responsibility of one air traffic controller into two, one for approach (which would continue to be provided by ENAIRE air traffic controllers) and another for aerodrome (which would be provided by the successful bidder's air traffic controllers), thus duplicating the costs of providing the service.

However, **at the remaining 10 airports, the service could immediately be opened up to competition, generating potential additional efficiency gains**, as seen at the already liberalised towers. If more control towers were liberalised, operators other than the incumbent, and potential new entrants, would enjoy a larger potential market, effective competition in the market would increase, and this and related activities would be stimulated.

4.3. Liberalisation of approach ATS

Act 9/2010 expressly excludes approach ATS from the liberalisation, maintaining the monopoly held by Aena/ENAIRE in this segment.

However, having confirmed the positive results of the liberalisation experience in the aerodrome ATS market, that the quality and safety of the service have not been compromised by the change of operator and that it has generated economic efficiencies, **it is advisable to continue moving forward with the liberalisation**

process, expanding it by opening up the market to new airports, as well as new services.

In fact, **in the other European countries that have undertaken liberalisation of aerodrome ATS (United Kingdom, Germany and Sweden), the approach market has also been opened up to competition**. This fact indicates the there are no technical or safety factors which might prevent this service from being provided by operators other than the incumbent under a free market regime, on condition that the providers meet the necessary requirements.

Opening up approach ATS to competition would generate greater efficiency gains in that and related services. If the approach market were opened up to competition, operators other than the incumbent (as well as potential new players) would enjoy a larger potential market, both markets would be stimulated, and this would generate greater incentives for operators to boost their competitiveness and efficiency.

In addition, if approach ATS were ultimately liberalised, there **would no longer be any limitations preventing the liberalisation of the 11 aerodromes from which aerodrome and approach ATS are provided together** by the same air traffic controllers, given that both services could be put out to tender together at the airports where this was necessary. Consequently, the potential gains from opening up this segment to competition are high. All of this would result in significant savings for the airport manager, as well as the other links in the chain, and improve consumer welfare through lower fees.

4.4. Liberalisation of AFIS

The liberalisation of AFIS in 2010 has made it possible for new service providers to enter this sector and has stimulated the market. Despite the fact that the CNMC does not have specific data to quantify the benefits deriving from liberalisation, insofar as the cost of providing AFIS is less than the cost of ATC services, simply switching from an aerodrome with ATC services to an AFIS aerodrome generates efficiency gains, as is recognised in the Preamble to Act 9/2010 and information from Aena[113].

Unlike what has been seen in the ATC services segment, since the liberalisation, different aerodromes have in fact been designated as AFIS. This has made the resulting tender processes possible, making this market more dynamic than that of ATC services.

[113] According to Aena press releases, replacing ATS with AFIS entailed cost savings of 60% and 67% at the Burgos and La Gomera airports, respectively.

The CNMC considers it advisable to continue moving forward in this manner at those airports whose characteristics so permit, always taking into account the high safety standards that characterise civil aviation.

4.5. Air traffic controller training. Relationship with ATS

Air traffic controller training services and ATS are closely related. The first provides essential inputs for the second, so that the functioning of one influences the other.

Focusing our attention on training services, **even though they have been liberalised since 2010, activity has been limited, due to lack of both demand and supply**.

Demand for training courses depends largely on the prospects of potential students with regard to the possibilities of being hired after their training. There are various reasons for this:

- **The training is costly**. Based on the prices published by the different certified training providers, for the 2018 courses (Table 6), the cost of the training necessary to obtain a student air traffic controller licence with all ratings (aerodrome, approach and en-route) is close to €63,000. The price of training to obtain a licence with aerodrome air traffic control ratings is about €26,000.
- **The duration of this training is approximately 1 year** to obtain all the ratings, and **5–6 months** for training to obtain the aerodrome rating alone.
- **Ratings expire** if the holder does not practise, which may require them to repeat the training[114].
- **The training is specific**, meaning that it has no alternative uses. Therefore, investment in ATC training courses represents a sunk cost for students.

[114] See section 2.5.

Table 6: Prices and duration of ATC training courses (2018)

PRICES AND DURATION OF ATC TRAINING COURSES (€)					
Company	**Basic initial training (duration)**	**Aerodrome air traffic control training (duration)**	**Approach air traffic control training (duration)**	**En-route air traffic control training (duration)**	**Total (duration)**
SENASA	25,650 (20 weeks)		38,475 (27 weeks)		64,125 (47 weeks)
FLIGHT TRAINING EUROPE S.L. (FTE) X–JEREZ	28,500 (22 weeks)		39,000 (34 weeks)		66,000 (56 weeks)
SAERCO	5,000 (11 weeks)	18,000 (3 months)	18,250 (3 months)	18,250 (3 months)	59,500 (50 weeks)
FerroNATS Air Traffic Services	27,500 (5-6 months)		-	-	-
Entry Point North Spain	n.a. (13 weeks)	n.a. (13 weeks)	34,000 (28 weeks)		n.a. (54 weeks)

n.a.: not available.
The FerroNATS school only offers training courses to obtain the aerodrome rating.

Sources: Information published on the SENASA, FTEJerez, SAERCO, FerroNATS and EntryPoint North Spain websites.

If there are no prospects of being hired, this disincentivises demand for training courses. The absence of demand in turn affects the supply side.

This is, to a large extent, what happened in the training market in Spain between 2010 and 2015. The latest air traffic controller hiring rounds took place as a result of the 2010 tender processes. After that, ENAIRE did not announce any selection processes, and private providers did not gain access to new control towers (which would have required them to increase their staff). At the same time, in the training market, just one new competitor entered the market during these years (FTEJerez, in 2011).

The resumption of hiring in the ATC services market beginning in 2015, with the publication of new vacancy announcements by ENAIRE, and the movement of air traffic controllers between service providers that this generated, **has stimulated training services**. In fact, coinciding with greater competition among ATS providers to attract controllers, two new competitors have entered the training market since 2015: SAERCO (in 2015) and FerroNATS (in 2018). It is no coincidence that in both cases they are ATS providers.

One of the challenges ATS providers in Spain currently face is the lack of people with air traffic controller or student air traffic controller licences. For this reason, in its most recent vacancy announcements in 2016 and 2017, ENAIRE did not require candidates who wished to participate in the process to hold a student air traffic controller or air traffic controller licence, and granted those who successfully made it through the process a period of 18 months to complete the initial training and obtain the ratings required in the announcement. ENAIRE will only hire those who obtain the licence within that period.

This manner of proceeding is not unusual. In other European countries where ATS have also been liberalised, like the United Kingdom, Germany and Sweden[115], ATS providers operate in the same way: they do not require a licence to participate in their selection processes, instead conducting a pre-selection and subsequently training the candidates who make it through the process. Unlike in Spain, the ATS providers defray the cost of the training.

By conducting the selection process prior to training and providing grants for those selected, the ATS companies assume the risk associated with this training. This has the positive effect that ATS providers have broad knowledge and experience in the sector and know what characteristics are necessary for an individual to successfully complete the training, making them able to design selection processes with which to identify the best candidates for training. In addition, they have more information than individuals about the prospects of being hired (hiring depends on the ATS companies themselves).

All of the above demonstrates that there is a considerable symbiosis between ATS and training. Proper functioning and dynamism in one are essential for the proper functioning of the other. The greater the competition in one, the greater it will be in the other.

For this reason, the best way to intensify competition in training is to intensify competition in ATS. From this perspective, it is necessary to continue moving forward with the liberalisation of ATS in Spain by putting new control towers and new services, such as approach ATC, out to tender.

The greater competition in training services this will generate may be expected to contribute to reducing the problems identified in this area:

- It will reduce the uncertainty associated with the decision to undertake training. Insofar as ATS providers also compete in the training market, when one of them offers a new training courses, this may be a signal that they plan to hire in the near future.
- This will drive training companies to increase their efficiency and reduce prices to make the option of obtaining a student air traffic controller licence more attractive.
- It will incentivise ATS providers to compete for student air traffic controllers by, for example, offering them training grants, as happens in other countries.
- To the extent that there are more ATS providers, this increases the incentives for independent companies to enter the training market, which

[115] See Appendix.

may reduce the price of training and generate greater competition in the training market for ATS.

4.6. Protocol for the proper and orderly movement of air traffic controllers between civil providers of aerodrome air traffic control services, AMS and AFIS

In the context described in the previous section, it is worth mentioning the *Protocol for the proper and orderly movement of air traffic controllers between civil providers of aerodrome air traffic control service, AMS and AFIS*, signed in October 2017 by ENAIRE, INECO, FerroNATS and SAERCO, and whose key features are summarised in section 2.6.

The main aim of the Protocol, no longer in effect as of October 2018, was to help ensure continuity in the provision of aerodrome air traffic services.

However, **the veto power on movement of air traffic controllers which all the signatories to the Protocol mutually recognised could represent a barrier to the movement of controllers between operators**.

Nor was the added value of this measure entirely clear, as, over and above the Protocol, the providers (which are the ones with the legal obligation to ensure continuity in the provision of ATS[116]) can always agree on periods of advance notice or similar measures with their employees.

In fact, while the Protocol was in force, **the signatories to the Protocol never exercised or received vetoes on the movement of controllers**, nor did the movements of controllers between operators that did take place put the continuity of the provision of the service at risk.

4.7. Relationship between the airport manager and the air traffic services provider

Since the liberalisation of aerodrome air traffic services in 2010, Aena has undergone a major restructuring, separating the airport management company and the air navigation services provider into two different entities in 2011. This created Aena Aeropuertos S.A. (which in 2014 changed its name to Aena, S.A.), which took on the management and operation functions for airport services; while Aena (which in 2014 became ENAIRE) remained responsible, among others, for

[116] In accordance with Article 2 of Act 9/2010, the designated civil provider of air traffic services is obligated to ensure the safe, effective, continuous, and economically and financially sustainable provision of said services.

air navigation and air space. In February 2015, 49% of the capital of Aena, S.A. was privatised in a public stock listing on the Ibex-35, while the remaining 51% of its capital remained in the hands of ENAIRE, which therefore has effective control of the company.

It is the opinion of the CNMC that the separation of the airport management company and the air navigation services provider into different entities supported the positive implementation of the liberalisation of aerodrome ATS.

However, **the fact that ENAIRE has retained effective control over Aena, S.A. may have an impact from the perspective of competition, especially given the advantageous starting position of Aena/ENAIRE in the ATS market,** where it held a monopoly until 2010. For example, this could give rise to conflicts of interest deriving from the fact that one of the ATS providers (ENAIRE) has the capacity to make or veto decisions of the company to which it supplies its services (Aena, S.A.). In any event, **the vertical integration of the two companies may create perverse incentives to create restrictions on competition in the liberalised market**, by imposing or maintaining barriers to entry for other operators.

Therefore, **it would be advisable to move forward with the actual separation of the two entities**, so that ENAIRE no longer holds majority control over Aena, S.A., thus avoiding possible restrictions on competition in the liberalised market.

5. CONCLUSIONS

Over the course of this study, the liberalisation process of aerodrome ATS begun in 2010 in Spain has been analysed. The process ended up introducing competition in aerodrome ATC services at the control towers of 12 airports, as well as putting the AFIS at another 6 out to bid. ATS training services were also liberalised.

The liberalisation has translated into greater efficiency in the provision of ATS, primarily at the aerodromes affected by the liberalisation, all without weakening the quality indicators in the Spanish airport network. On the whole, liberalised airports not only have reported significantly greater efficiency gains than at non-liberalised airports, but quality has also improved more than at non-liberalised ones. Additionally, at the aerodromes where the provision of air traffic control services has been replaced with AFIS, there have also been considerable cost savings[117].

Efficiency gains benefit, firstly, the airport manager, because they mean savings in terms of the consideration paid to the ATS provider. In addition, they benefit airport users (airlines) in the form of lower fees, and all in all, the final users of the air transport services (travellers, primarily) through lower prices. It should be remembered that ATS account for around […] of Aena's total regulated costs.

However, after an initial phase in which aerodrome ATC services were put out to tender beginning in 2010, the process has halted. The Ministry of Public Works has not identified any more airports where the aerodrome control services could be put out to tender. This situation contrasts with AFIS, where the ministry has designated six AFIS aerodromes since 2010, making it possible to put these services out to tender.

During this period, other European countries have carried out their own liberalisation processes (Germany and Sweden[118]). The main difference with Spain is that these countries have opted to liberalise both aerodrome and approach ATS.

The length of time that has passed since the reform, as well as the comparative experience of other countries, makes it possible to evaluate the Spanish liberalisation and identify areas for improvement or where further action can be taken to enjoy all the benefits deriving from the introduction of competition in the form of greater efficiency, higher quality and lower prices.

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[117] According to Aena press releases, replacing ATS with AFIS entailed cost savings of 60% and 67% at the Burgos and La Gomera airports, respectively.

[118] The United Kingdom liberalised aerodrome and approach ATS in the 1980s.

It is the opinion of the CNMC that there are currently circumstances which represent barriers to competition in the ATS market and that, as such, they prevent the market from functioning in a truly competitive manner. What is more, ATS are closely linked to the training of ATS professionals.

The analysis of the sector has enabled the CNMC to conclude that limited competition in ATS has in turn had consequences for the training market, where competition is also weak. Weak competition in one market feeds back into the weakness of the other because ATS providers cannot operate without ATS professionals, while at the same time, the lack of job prospects with ATS providers disincentivises training demand and supply.

For this reason, the CNMC considers it necessary to move forward with the liberalisation of ATS, always taking account of the high safety and quality standards that are characteristic of civil aviation.

The next section presents several recommendations intended to eliminate the obstacles to competition observed, as well as to expand the reform begun in 2010, with the aim of obtaining improvements in efficiency, quality, and ultimately, boosting general welfare.

6. RECOMMENDATIONS

The analysis of the aerodrome air traffic services sector in Spain conducted in this study has yielded positive conclusions regarding the implementation of the liberalisation of the sector. A number of restrictions which are detrimental to competition have also been identified. These restrictions hinder the proper functioning of the market and the enhancement of consumer welfare. Thus, several recommendations intended for competent entities and government bodies are presented.

FIRST. Expand the liberalisation of aerodrome ATC to more towers

From the Preamble to Act 9/2010, it is clear that the liberalisation process was intended to entail a progressive and orderly restructuring of the market. In 2010, an order of the Ministry of Public Works identified 13 airports (in the end, 12 were put out to tender) where the aerodrome ATC service would be opened up to competition. However, since then, the liberalisation process for aerodrome ATC has been interrupted. The CNMC can find no justification for halting the opening up of this market to competition, given that the implementation of liberalisation at the 12 towers has resulted in increased efficiency in the provision of ATS.

Therefore, the CNMC recommends putting the aerodrome ATC service out to bid for the towers at airports which have not yet been opened up to competition, in order to thus obtain additional efficiencies in this market, as well as related markets, generating savings, improved quality and increased consumer welfare.

SECOND. Designate airports whose characteristics so allow as AFIS

Switching the services provided in an aerodrome from ATC services to AFIS generates efficiency gains due to the lower cost entailed by provision of the latter, as the Preamble to Act 9/2010 and Aena both recognise. Therefore, it is recommended to designate those aerodromes where ATC is currently provided but whose characteristics allow for the provision of AFIS under safety conditions as AFIS, in accordance with the criteria set forth in *Royal Decree 1133/2010, of 10 September, regulating the provision of the aerodrome flight information service (AFIS)*.

In addition, as has been done thus far, the providers should be selected based on competitive processes, in order to increase competition and obtain the resulting benefits.

THIRD. Liberalise approach ATS

Act 9/2010 excludes approach ATS from the liberalisation. However, in the other European countries which have undertaken a liberalisation process, approach ATS has been opened up to competition, meaning that there are no technical or safety factors preventing this. In the opinion of the CNMC, there is no justification for maintaining ENAIRE's monopoly on this segment and it is thus recommended that this restriction on competition be abolished. If this recommendation were applied, it would be possible to obtain significant efficiency gains within the approach ATS market. This would in turn make it possible to open up to competition towers where aerodrome ATS is provided by the same air traffic controllers together with approach ATS, which would result in greater savings.

FOURTH. Eliminate the vertical integration of ENAIRE and Aena

The existing vertical relationship between the air traffic services provider (ENAIRE) and the airport management company (Aena, S.A.), in which the former holds 51% of the capital of the latter, disincentivises the continuation of the liberalisation process for air traffic control services. In the decision to put the ATS at an aerodrome out to tender, which legally is the responsibility of Aena, S.A., its shareholding relationship with ENAIRE may have some influence, detracting from the objectivity of the decision-making process. Therefore, it is recommended to move forward with the separation of the two entities.

FIFTH. Stimulate greater competition in the air traffic controller training market

Although this training activity was liberalised in 2010, the market has lacked dynamism: there has been little demand for training, due to potential students having limited expectations of being hired, and the shortage of demand has affected supply. Since 2015, the resumption of hiring by ATS providers has stimulated the training market, but there is room for improvement in how it functions.

The markets for air traffic controller training and ATS are interrelated: it is essential for the one to function well for the other to function properly. Therefore, to incentivise competition in the air traffic controller training market and make it more dynamic, it is recommended that the liberalisation be expanded to other control towers or other services (approach control). This would in turn result in greater efficiency in the provision of ATS.

APPENDIX: INTERNATIONAL COMPARISON

1. United Kingdom

Approach and aerodrome ATS have been liberalised in the United Kingdom since 1985: any air navigation services provider certified by the national authority of a Member State may provide these services. The sole exception is approach ATS for the London Terminal Manoeuvring Area (known as the London Approach Service), which are considered too complex to be liberalised and are provided by the state-owned provider under a monopoly regime. The London Terminal Manoeuvring Area includes the approach to the Heathrow, Gatwick, Stansted, Luton and London City airports[119]. En-route ATS are also provided by the state-owned provider under a monopoly regime throughout the national territory.

The state-owned provider of air navigation services is NATS Holdings Ltd. The company has been a public–private partnership since 2001. The government holds a 49% shareholding (including a 'golden share'), 42% is held by the Airline Group[120], 5% by NATS personnel and 4% by LHR Airports Limited. The group is divided into two subsidiaries:

- NATS Services Ltd. (NSL), which provides approach and aerodrome ATS. NSL operates in the liberalised segment of the market.
- NATS En Route Limited plc (NERL), which provides en-route ATS throughout the entire territory and approach ATS in the London Terminal Area under a monopoly regime. That is, it is the air navigation services provider for the non-liberalised segments.

Despite the fact that provision of approach and aerodrome ATS by other providers has been possible for several decades, the CAA (Civil Aviation Authority, the regulator in the sphere of aviation) did not consider market

[119] Helios (2015).

[120] The Airline Group is a consortium made up of seven British airlines: USS Sherwood Limited, British Airways PLC, Pension Protection Fund, easyJet Airline Company Limited, Virgin Atlantic Airways Limited, Deutsche Lufthansa AG, Thomson Airways Limited and Thomas Cook Airlines Limited.

conditions to be present in this sector[121] until 2015[122]. Prior to that date, ATS at commercial airports were provided by either the state-owned provider of air navigation services, or self-provided by the airports themselves.

The first public call for tenders for ATS was issued in 2011. It was for Luton Airport, with the contract being awarded to the incumbent, NSL. The second call for tenders was organised for the Birmingham Airport in 2012. In this case, the airport opted to begin self-providing[123].

Despite these initial steps, in 2013 there were still no third-party companies (other than NSL or the airports themselves) providing services at commercial airports, nor were there regular calls for tenders. According to the CAA, NSL provided services for 60% of movements at all commercial airports in the United Kingdom. The remaining 40% were self-provided by the airports themselves (in-house). However, since 2013 there have been several contractual negotiations (not necessarily via a call for tenders) which have energised the market[124].

As a result of these changes, in 2018, the structure of the industry was substantially different to that of 2013, as shown in Graph 14. Market share, measured as percentage of annual movements, has decreased for both the incumbent (NSL) and the airports that self-provided. A new service provider has entered the market, ANSL (subsidiary of the German firm DFS), gaining a 17% market share in five years.

[121] The CAA understands market conditions to be present if the following requirements are met:

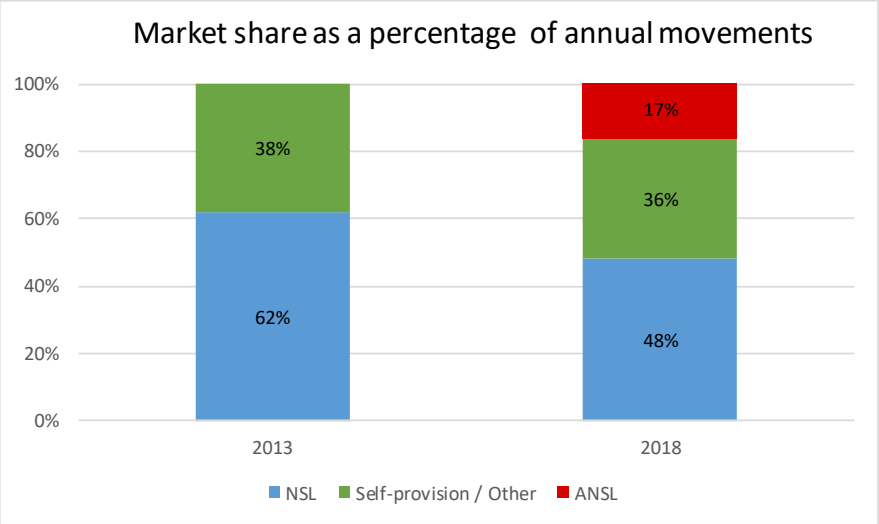
- There are no significant existing legal or economic barriers which prevent a service provider from entering or leaving the ATS market;
- There are no significant legal or economic barriers which prevent airport managers from choosing between contracting with an ATS provider or self-providing;
- There are different ATS providers and tender processes are held for these services;
- Airports are subject to economic regulation or actively compete to attract airlines. In short, they have commercial incentives to manage the costs of ATS;
- The providers that provide en-route ATS have separate books for these activities.

[122] CAA (2015).

[123] Arblaster (2018).

[124] CAA (2018).

Graph 14: Comparison of ANSP market share in the United Kingdom



Source: Compiled by author based on data from the CAA.

Apart from the entry of ANSL, the CAA considers that there are potential entrants in the British market, and that there are smaller service providers operating at some small–medium sized airports that represent a credible alternative for other airports of the same size[125].

As Graph 7 shows, since 2013, there have been four open calls for tenders at large airports (with over 70,000 annual IFR movements): Gatwick, Luton, Birmingham and Edinburgh. In contrast, Heathrow, Manchester, Stansted and Glasgow were not put out to tender, but instead renegotiated with NSL. London City did a pre-call for tenders, but in the end decided to enter bilateral negotiations with NSL.

[125] CAA (2018).

Table 7: Contracts for ATS at airports with over 70,000 annual IFR movements

CONTRACTS FOR ATS AT AIRPORTS WITH MORE THAN 70,000 ANNUAL IFR MOVEMENTS				
Airport	**Services contracted for**	**Date of tendering**	**Process**	**Result**
Heathrow	Aerodrome ATS and engineering services	2014/15	Renegotiated (market testing: benchmarking of the incumbent compared to third parties; transfer of assets to Heathrow as replaced)	- NSL - 10-year contract - Started in April 2015
Gatwick	Aerodrome ATS and engineering services	2013/14	Call for tenders: 3 bids	- ANSL - 10-year contract - Started in March 2016
Manchester Airports Group (MAG)	Aerodrome and approach ATS and engineering services. Joint contract for the Manchester and Stansted airports	Not available	Renegotiated	- NSL - 10-year contract - Started in March 2015
Luton	Aerodrome ATS and engineering services	2017	Call for tenders	- NSL - 5-year contract + option to extend another 2 years
Birmingham	Aerodrome and approach ATS and engineering services	2012/13	Call for tenders: 1 bid and development of alternative for self-provision	- Self-provision - Started in April 2015
Edimburgo	Aerodrome and approach ATS and engineering services	2016	Call for tenders	- ANSL - 10-year contract - Started in April 2018
London City	Aerodrome ATS and engineering services	2016	Renegotiated (following a cancelled call for tenders)	- NSL - 10-year contract
Aberdeen, Glasgow and Southhampton (AGS)	Aerodrome and approach ATS and engineering services	Not available	Renegotiated. Separate contracts (one for each airport) replaced by one joint contract expiring in March 2021.	- NSL - The airport manager plant to put ATS out to bid when the contract expires in March 2021

Source: CAA.

As a reflection of the dynamism of the British market, there are currently 62 organisations certified by the CAA as air traffic service providers, the majority of which are airports, in order to self-provide. Self-provision is very common because airports are not legally obligated to put these services out to tender. The CAA has recommended putting the services out to tender on several occasions, although there is no obligation to do so.

One important issue in the United Kingdom is that, when an airport decides to change its air navigation services provider, by law[126], the controllers who had been providing the service at the tower are transferred to the new service provider, which is subrogated to the previous provider's position, maintaining the same employment conditions. This facilitates and accelerates transfer of provision of the service, as it is not necessary to hire new controllers or student controllers and train them at the tower to obtain the unit endorsement.

There is one exception in the case of controllers employed by NSL who were already employees of NATS when the partial privatisation of the company took place. At that time, they acquired the right to remain at NATS, even in the case of a change of service provider, if the new provider does not maintain their rights relating to retirement (if it does not maintain the conditions/benefits of the NATS pension fund). Therefore, it is possible that some NSL employees would decide

[126] Transfer of Undertakings (Protection of Employment) Regulations (TUPE).

to remain at NSL and not move to the new service provider, in which case it would be necessary to hire and train new controllers, with the challenges this entails.

Lastly, as regards air traffic controller training, there are only two certified training organisations in the United Kingdom: NATS and Global Aviation Training Services (ATS) Ltd. NATS trains its own employees: in its selection processes, it does not require candidates to hold a student controller licence, instead it trains the candidates who make it through the selection process.

2. Germany

ATS have been liberalised at some German aerodromes since 2009 and can be provided by civil air navigation services providers certified according to European regulations. In order to carry out the liberalisation, it was necessary to modify both the German Constitution and the Air Traffic Act (Luftverkehrsgesetz).

Previously, the constitution reserved any matters related to air navigation for the federal government. The 2009 constitutional reform opened the door to provision of certain air navigation services by foreign providers authorised according to European law[127].

Since before the 2009 reform, German regulations have distinguished between two types of aerodromes:[128]

- Those known as 'international' aerodromes: where the federal government, by means of the Ministry of Transport and Digital Infrastructure, has identified a need for reasons of safety or transport policy[129].
- Those known as 'regional' aerodromes: where that need has not been identified.

Although the distinction appears in the Air Traffic Act, the designation 'international' or 'regional' is not a legal name (it does not appear in the law), but rather informal. Therefore, it should not be understood in the literal sense: it does not reflect the reality of traffic at each airport, there being regional aerodromes with both incoming and outgoing international flights.

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[127] Article 87d.1 of the German Constitution.

[128] § 27d of the Air Traffic Act.

[129] There are 16 German airports considered 'international': Berlin/Schönefeld, Berlin-Tegel, Bremen, Dresden, Düsseldorf, Erfurt, Frankfurt/Main, Hamburg, Hannover, Cologne/Bonn, Leipzig/Halle, Munich, Münster/Osnabrück, Nürnberg, Saarbrücken and Stuttgart.

The distinction is important because at 'international' aerodromes, both provision and the cost of air navigation services are by law the responsibility of the state-owned provider of air navigation services, DFS Deutsche Flugsicherung GmbH (DFS)[130]. DFS is a 100% public sector firm (private shareholding in DFS is excluded by law[131]). At 'regional' aerodromes, the costs of these services are borne by the airport manager, which can pass them on to the users[132].

The 2009 reform of the Air Traffic Act introduced two major changes:

- Firstly, a set of air navigation services are identified as support services, excluding them from the sovereign functions of the State, and are subject to market conditions and discipline. These are the aeronautical information service (AIS) and CNS service[133]. They may be provided by any air navigation services provider certified according to European regulations.
- Secondly, it opened the door to allow ATS at 'regional' aerodromes[134] to be provided by providers other than DFS[135], on condition that they are certified according to European regulations and offer sufficient guarantees that they are able to provide them[136]. Previously, the ATS at those aerodromes had by law been provided by DFS (unlike with 'international' aerodromes, it was the regional aerodromes that assumed the costs of the service).

There are currently five certified civil air navigation services providers in Germany, as shown in Table 8.

130 § 31b of the Air Traffic Act.

131 § 31b of the Air Traffic Act.

132 § 27d. 3 and 4 of the Air Traffic Act.

133 § 27c.2 of the Air Traffic Act.

134 Either just aerodrome ATS or both approach and aerodrome services (dependent on each aerodrome).

135 § 31f.1 of the Air Traffic Act.

136 § 31f.2 of the Air Traffic Act.

Table 8: Certified civil air navigation service providers in Germany

CIVIL PROVIDERS OF AIR NAVIGATION SERVICES CERTIFIED IN GERMANY		
Service provider	**Services for which it is certified**	**No. of aerodromes where it provides ATS**
DFS Deutsche Flugsicherung GmbH	ATS, Training	16
DFS Aviation Services (DAS)	ATS, Training	9
ACG Austro Control GmbH	ATS	10
Airbus Operations GmbH	ATS	1
Rhein-Neckar Flugplatz GmbH	ATS	1

Source: BAF (Bundesaufsichtsamt für Flugsicherung).

DFS Aviation Services (DAS) is a subsidiary of DFS. It was created in 2005 under the name The Tower Company GmbH (TTC) to provide ATS at regional airports, in anticipation of the reform and opening up that took place in 2009. In 2017, it changed its name to DAS. DAS provides services at 9 regional airports.

As Table 8 shows, the main service provider at regional airports is ACG Austro Control GmbH, the Austrian state-owned provider of air navigation services, which operates at 10 regional airports.

Apart from DAS and ACG, the Hamburg-Finkenwerder and Mannheim aerodromes each have an in-house provider certified to self-provide ATS (Airbus Operations GmbH and Rhein-Neckar Flugplatz GmbH, respectively).

As regards the requirements required to obtain a student air traffic controller or air traffic controller licence, German regulations[137] are very similar to Spain's: in addition to the requirements set forth in Regulation (EU) 2015/340, German regulations require the candidate to hold an academic qualification that allows access to higher education[138], demonstrate a suitable level of both English and German, although knowledge of German is only required to obtain the ratings related to aerodrome and approach control[139]. In addition, a minimum age of 21 is required to issue an air traffic controller licence[140].

Lastly, the entire cost of controller training is defrayed by the ATS provider, including initial training − in the selection processes, candidates are not required

[137] Air Navigation Personnel Training Regulation (Flugsicherungspersonalausbildungsverordnung – FSPersAV).

[138] § 6.1.2 of the FSPersAV.

[139] § 6.1.5 and § 10.2 and 3 of the FSPersAV.

[140] § 15.1 of the FSPersAV.

to have a student air traffic controller licence. Instead, providers pre-select personnel, who they then subsequently train.

3. Sweden

Sweden liberalised the provision of aerodrome and approach ATS in 2010, although the law expressly excluded state airports. There are currently 10 state airports owned by the public company Swedia[141]. The other Swedish airports are mostly under municipal ownership[142].

ATS at state airports are provided by the state-owned provider of air navigation services, LFV, under a monopoly regime. LFV also has the monopoly on en-route ATS.

As regards the liberalised segment of the market, the first private ATS provider entered in 2011. This is ACR, which currently provides services at 15 control towers[143] (compared to the 5 non-state aerodromes where the incumbent LFV provides services[144]), making it the most important private operator in Sweden.

As in the case of the United Kingdom, when there is a change of service provider at a tower, the entrant must offer controllers the same employment conditions as the incumbent. Should the controllers decide not to switch companies, the incumbent must make a sufficient number of controllers available to the entrant until the entrant's new controllers are rated to provide services at the tower[145].

As regards obtaining student air traffic controller and air traffic controller licences, the first step is to be selected by one of the ATS providers in a selection process. They all require a strong command of Swedish to be eligible[146]. Once selected, the candidate receives initial training, after which they obtain a student air traffic controller licence. They then receive OJT from the ATS provider at the facility where they will be working. The entire cost of initial training is defrayed by the

[141] Åre Östersund, Göteborg Landvetter, Kiruna, Luleå, Malmö, Ronneby, Stockholm-Arlanda, Stockholm-Bromma, Umeå and Visby.

[142] ACI Europe (2016).

[143] ACR.

[144] LFV.

[145] Helios (2015).

[146] For example, LFV requires a C1 level.

ATS providers, which generally have agreements with specific training companies[147].

4. United States

In 1982, the Federal Aviation Authority[148] (FAA) implemented the Federal Contract Tower Program (FCT Program). It initially included the control towers at five low-traffic airports. Today, there are 253 control towers in the programme[149], from which they provide services for commercial, transport and military operations.

The programme enables the FAA to provide aerodrome control services indirectly, by subcontracting to private providers of ATC services. The FAA has final responsibility for the services[150].

The FCT Program is only open to control towers at aerodromes with low traffic density and where only VFR flights operate. The programme distinguishes between towers fully or partially financed by the FAA. The former are those whose profit/cost ratio is greater than or equal to one. At these towers, the FAA pays the entire cost of the private service provider (this group is currently made up of 228 of the 250 towers in the programme). The partially financed towers are those whose cost/benefit ratio is less than one. At these towers, payment of the remuneration to the private ATC service provider is divided between the FAA and the airport manager[151].

There are four private ATC service providers currently operating at these towers[152]. In a 2012 audit report, the Department of Transportation Office of the Inspector General concluded that the control towers included in the programme are efficient from the point of view of their costs, and safe. In particular, the report noted that the average cost of services at an FCT tower is up to 1.5 million less that at the towers in the programme directly managed by the FAA. The cost

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147 LFV students receive their training at Entry Point North (Entry Point North is a training organisation owned by the state air navigation services providers of Denmark, Sweden and Ireland). ACR students are trained in Finland.

148 The FAA is an agency of the U.S. Department of Transportation, responsible for civil aviation safety.

149 USCTA (U.S. Contract Tower Association).

150 U.S. Department of Transportation. Office of Inspector General (2012).

151 49 U.S. Code § 47124 - Agreements for State and local operation of airport facilities.

152 Midwest ATC Services, Robinson Aviation (RVA), Serco Management Services, CI2 Aviation, Inc. (USCTA).

difference is primarily due to the fact that the FCT towers operate with fewer controllers and pay lower wages.

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