New Air Traffic Control Markets Promoted by Single Sky Regulation in Spain

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Taking advantage of the regulatory framework of the European Single Sky being developed in Europe, Spain has begun a process of liberalization of air traffic services that could lead to strategic changes in the development of air transport. A series of legislative elements has been put in place to make this possible. Although this regulatory framework opens the way for liberalization, the strategic nature of the sector, and the necessity of guaranteeing continuity of service and safety, means that there are some restrictions or prior conditions. This will act as a significant barrier to entry for new providers.

I. Introduction

THE current organizational models for air traffic services (ATS) in most European states, which are monopolies, can be inefficient and slow down the development of the air transport sector [1,2]. For this reason, institutions, society in general, and the European market are promoting liberalization of the service for both clients and users. As happened with the liberalization of the airlines [3], there are tensions due to the different view points of the individual states. The process was started by the United Kingdom, with an important change in the service provision model [4].

The process of evolution of the ATS sector is taking place within the context of the current economic difficulties, and it requires a detailed revision of the regulatory framework, and supervision of the same, to defend the public interest.

Political action favors the adaptation of national air navigation organizations to the new requirements with respect to service optimization in areas of operation that transcend the individual nations, as happens in other air transport sectors.

The change process in Spain has been accelerated because of the need to modify the management of human resources in regard to air traffic control (ATC), which has been characterized by an excessively rigid, complex, and economically untenable labor relations framework.

The main objective of the liberalization process is to begin the transformation of the organizational model of ATS in Spain, breaking with the current monopolistic situation and emulating the steps taken in the United Kingdom. The liberalization process is slow in taking off in the rest of states, but it will inevitably take place, similar to the expansion of the low-cost airlines [5].

In accordance with the current European regulatory and legal framework, the liberalization process of ATS in Spain is oriented toward satisfying the needs of customers, and society in general, and to overcoming the structural limitations of the present system.

II. Scope, Rationale, and Objectives

The process of market liberalization in the air traffic sector is confined to aerodrome information and control services.

The main objective is to improve the management of the current service providers; however, incoming providers can also benefit, and it is hoped that all parties can boost the air transport industry together.

In the middle of the 1990s, there were doubts that the liberalization that had taken place in the airline industry would have a clear and stable future [6], requiring changes to the ways companies operated in order to ensure economic viability [7]. A similar process is now underway for ATS providers.

III. Spanish Scenario

The Spanish airport public network comprises 47 airports, along with two heliports open to the civil passenger aviation.

These airports are managed as a network, with Spanish Airports and Air Navigation (Aena) being responsible for both airport management and the provision of air navigation services throughout the entire airspace. Table 1 gives the distribution of movements of the airports. The financial turnovers and efficiencies of these airports vary [8]. The network includes large international airports, such as Madrid and Barcelona, and airports with a reduced number of movements. Some of these airports have seen increased traffic over the last number of years, as a result of air transport deregulation, as per other European countries [9].

Data are available, comparing Spanish air traffic numbers with those of the other four biggest European countries in terms of air traffic: Germany (DFS), France (DSNA), England (NATS), and Italy (ENAV). These data are provided by EUROCONTROL [10–13].

Looking at total movement numbers, Aena is the fourth biggest air navigation service provider in Europe, experiencing a year-on-year growth of over 5% between 2003 and 2007. In 2008, traffic decreased by almost 1%, and in 2009, the reduction was 9% (see Fig. 1).

To evaluate the service given to companies and users, two relevant parameters are user delays and the cost of the service as compared with the other major European providers.

Although different techniques for the management of air traffic flows have been investigated [14], operational delays are still being experienced in the European context. The total delay of the Spanish air navigation system is the second greatest in Europe (after DFS), the figure having trebled in the five years from 2003 to 2007, reaching its maximum in the latter. In 2008, delays were reduced by 34%, and in

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Table 1   2009 movements by airport

Airport	Movements	Airport	Movements	Airport	Movements
Madrid Barajas	434,969	South Tenerife	50,270	Asturias	16,167
Barcelona	278,968	Gerona	50,044	Granada	15,870
Palma de Mallorca	177,658	Sabadell	48,421	Almeria	15,442
Gran Canaria	108,416	Jerez	44,793	Pamplona	11,860
Malaga	107,873	Lanzarote	43,041	San Sebastián	9,759
Valencia	87,601	Fuerteventura	36,880	Melilla	9,260
Alicante	75,401	Reus	30,874	Vitoria	9,100
North Tenerife	63,359	Menorca	28,453	Hierro	4,713
Santiago	57,998	Palma	19,985	La Rioja	4,517
Bilbao	54,160	Santander	18,681	Huesca	4,400
Cuatro Vientos	53,315	Vigo	16,629	Burgos	2,222
Ibiza	53,275	A Coruña	16,264	La Gomera	2,053
Seville	53,267				

2009, levels were similar to those of 2008. As can be seen in Fig. 2, the trend for the other providers was that delays decreased or remained stable, while in Spain, they increased significantly.

With regard to the cost of the service, in Europe, a unit rate for services is established in each country. When this is multiplied by weight and distance factors, the resultant is the amount an airplane must pay for flying in the respective airspace. This payment serves to cover the costs the provider incurs on providing the service; that is, the aim is to cover costs.

Bearing this rate in mind, the prices in Spain (peninsular en route charges) in 2010 are the highest of the major European providers (€84.11): 59% greater than the European average (€52.90); see Fig. 3.

Aena's en route charges (peninsula) have increased 10% from 2007 to 2010. DSNA's increase over the same period was 7%. DFS, ENAV, and Aena (Canary) increased their tariffs by between 1 and 2%. In the case of NATS, there was a 4% reduction.

The Dirección General de Aviación Civil (Spanish Civil Aviation Authority) has shown that the current costs of the air navigation services provided by Aena are the highest in Europe. According to information provided by EUROCONTROL [10–13], via the performance review commission, Aena has the highest costs of any air navigation service provider in Europe, four times above the average; see Fig. 4.

Aena has the highest costs of any air navigation service provider in Europe. If we look closely at the nature of these costs, we see that the cost of air navigation personnel in Spain makes up 71% of air traffic management (ATM)–communications, navigation, surveillance system (CNS) costs, whereas in the rest of European, the cost averages 63%.

Regulation 1070/2009/EC [15] establishes a system to evaluate the performance of air navigation service providers. EUROCONTROL has already indicated that Aena's current situation, particularly in the matter of cost efficiency, is so far removed from the European average that it makes it impossible to achieve the objectives that the European Commission will set for the ATM network as of 2011.

This could have consequences, not only for Spain but for the entire European network, given the importance of this country to continental air traffic.

Overall, adequate aerodrome management is directly conditional on adequate ATM, insofar as the inefficiency of air traffic systems have an immediate effect on airport capacity, the costs of air navigation, the costs borne by airlines and, ultimately, the price passengers pay to fly with these companies. As such, a change in the management model, and its related costs, is essential to guaranteeing the sustainability of air transport.

Therefore, this information would lead one to believe that it is necessary to change the service provision model and the related business framework to bring both costs and service levels into line with European levels.
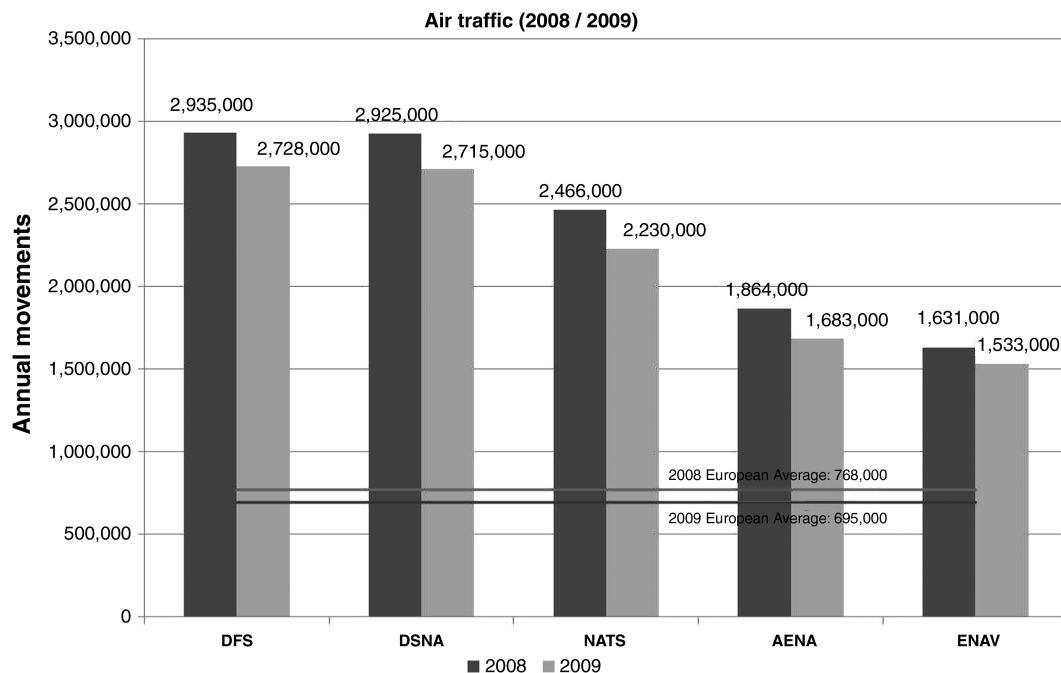
Fig. 1   Controlled flights.
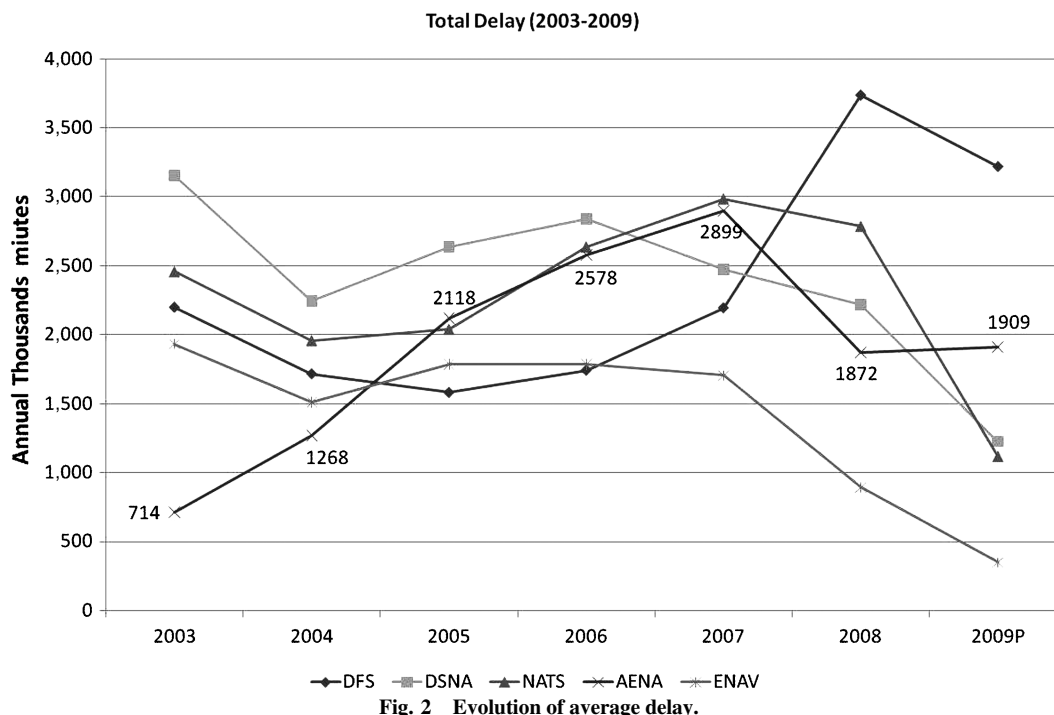
Total Delay (2003-2009)

Fig. 2   Evolution of average delay.

The main aim of Aena, with this whole process, is to reduce the costs of providing air control services by approximately 20% and, obviously, pass these cost reductions on in the form of lower approach charges at these airports. Bearing in mind the comparative information previously indicated, the intention was to satisfy this objective, given that European providers with lower costs than Spanish ones could be potentially interested parties. However, the end result of the process will have to be analyzed in detail to verify the final results, as there may be deviations from the forecast outcome for a number of reasons:

1) European providers will need to rely on both Spanish controllers and infrastructure in Spain to provide services, which may lead to variations in their costs.

2) The entry in the sector of new providers, with newly formed companies that will need to equip themselves with the necessary technical infrastructure and human resources to enable them to provide services, may mean higher implementation costs.

3) Finally, the process will necessarily involve approximately 200 controllers. The companies will have to negotiate with both the controllers currently working for Aena and recently trained ones. In any case, the laws of supply and demand dictate that a peak in demand for such a large number of controllers may cause costs to shoot up.

Therefore, the final costs of the process will have to be analyzed to see if the objectives laid out have been fulfilled.
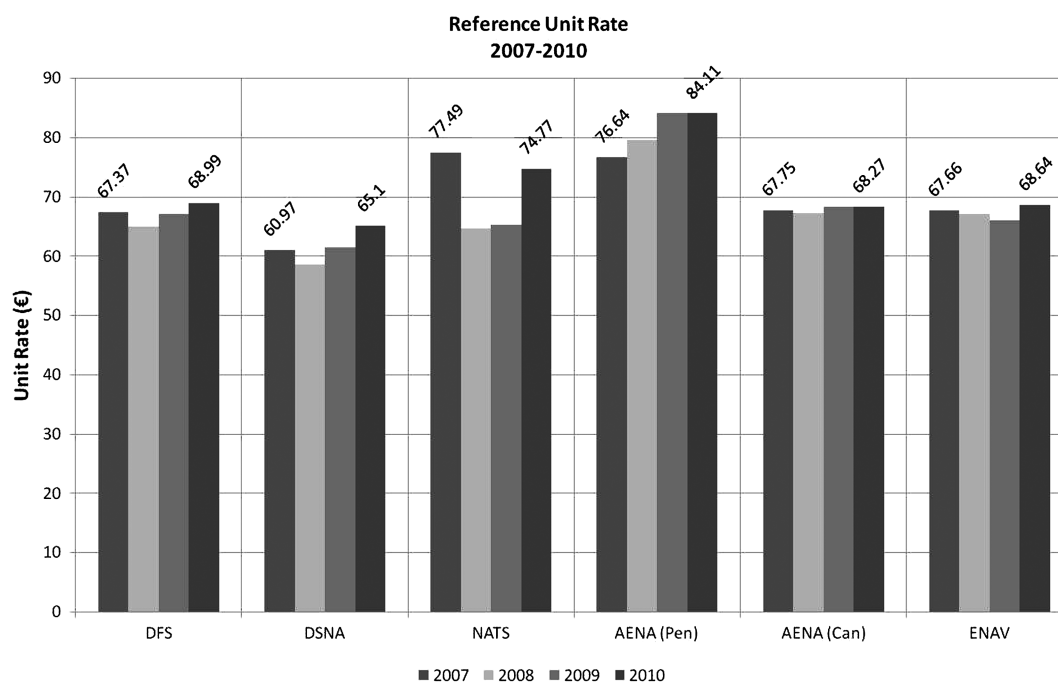
Reference Unit Rate
2007-2010

Fig. 3   Route charges.
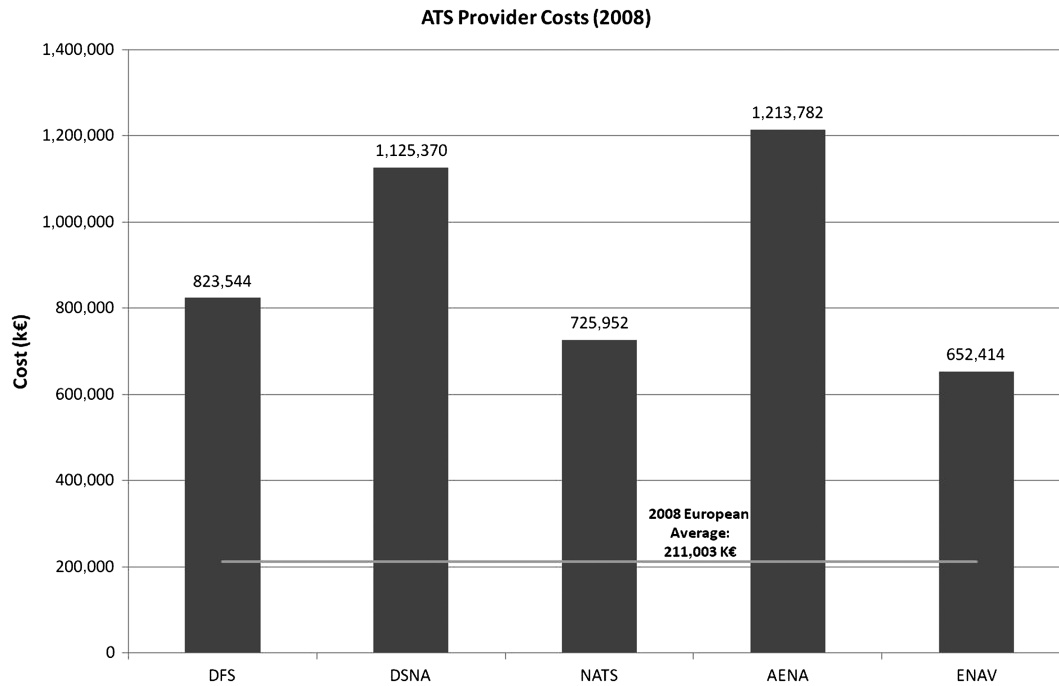
ATS Provider Costs (2008)

Fig. 4   Service costs (K€ represents €1000).

IV.   Enhanced Regulatory Framework

The process of deregulation in Spain falls within the regulatory framework provided for by the different European regulations. Furthermore, a series of regulations has recently been published. Some of these regulations have been incorporated into European directives.

In particular, the following have been published:

1) The first regulation is Law 9/2010 [16], under which the provision of ATS is regulated. The obligations of the civil providers of these services are established, and specific working conditions for civil air traffic controllers are set out.

2) The second regulation is Royal Decree 1516/2009 [17], which regulates the licensing of air traffic controllers.

3) The third regulation is Royal Decree 931/2010 [18], which deals with the procedure for certifying civil air navigation service providers and the corresponding regulatory control.

4) The fourth regulation is Ministerial Order FOM/1841/2010 [19], which sets forth the requirements for the certification of the civil providers of training for air traffic controllers.

5) The fifth regulation is Royal Decree 1001/2010 [20], which sets out the aeronautical safety regulations in relation to the working times and rest periods for civil air traffic controllers.

These regulations constitute the basis for potential new providers to take the decision to participate in the process of deregulation, bearing in mind their own business interests, and considering possible barriers and requirements.

The principal regulatory aspects are set forth next, as well as the main implications they may have for any new providers wishing to operate within the Spanish framework.

These regulations have been drawn up, taking into consideration the problems that may accompany the entry of a new provider into market. The barriers that may curb this process of deregulation have been identified and, as far as possible, legal measures have been introduced to try to minimize these and to facilitate the entry of new providers. They are, in this sense, regulations that can in no way be considered protectionist; in fact, the opposite is true, as they try to facilitate new providers as far as possible and, in some cases, act against the possible interests of the current provider.

The objective of these regulations is to serve as a basis for a substantial change in the service provision model, as has happened in the United Kingdom [3].

V.   Law 9/2010 on Regulation of Provision of Air Traffic Services

The European Single Sky Regulations require a clear differentiation between the different air navigation and airport management parties:

1) The first requirement is a regulating organism that determines the airport and air navigation policy and represents the state before international bodies and the European Union.

2) The second requirement is a supervisory administrative authority to watch over and guarantee fulfillment of the safety rules and regulations.

3) The third requirement is a series of airport or air navigation service providers, under the supervision, inspection and sanctioning power of the supervisory authority.

As such, in the case of Aena, the spirit of the law has two aims:

1) The first aim is the separation of the functions of the ATS provider and airport operator. Aena currently carries out both functions in Spain. Law 9/2010 [16] aims to clearly separate these functions, and it emphasizes the general framework of relations that should exist between the companies that exercise these functions.

2) The second aim is the entry of new providers. Law 9/2010 [16] permits the current airport operator (Aena) to hire an ATS provider other than the current one (Aena itself), properly certified by the supervisory authority. The entry of new providers is contemplated solely in the case of ATS for airports, with Aena continuing to be the exclusive provider in the rest of the airspace. This will, if costs can be reduced, attract companies that are looking to operate in secondary airports [21]. The process of a possible switch in provider must be led by the airport operator, which must set out the different phases of the process. As such, the law defines a series of obligations to which Aena, as airport operator and current provider, must adhere to guarantee the transition of the service:

3) The third aim is the carrying out of a safety study. To fulfill the corresponding European regulation, a change of service provider implies a change in the ATM system and, as such, it must be notified and the corresponding safety study carried out to ensure that the change process can be made without operational risks.

4) The fourth aim is the definition of the procedures for the selection of new service providers. The airport operator must initiate a public procurement process to select a service provider, defining the

corresponding selection criteria and guaranteeing free and fair competition between the interested parties.

5) The fifth aim is the guaranteed continuity of service on the part of Aena. In the aerodromes where there will be a switch in provider, Aena will continue to provide ATC services during the transition period. In this way, unless the incoming provider negotiates specific conditions with the airport operator, it will have the flexibility to define a workable transition plan that will enable it to guarantee a safe and stable rollout of the service.

The objective of these measures is to guarantee a transition with the smallest operational and social impact possible and to facilitate the entry of a new provider. Logically, these conditions may also be applicable in subsequent switches in provider.

The process will based on a public tender, open to all certified providers, where one can assume that two fundamental aspects will be taken into account:

1) The first fundamental aspects are technical-operational aspects, which are based on the experience of the applicant and its approach to the conditions with regard to providing the service, which will guarantee the safety and continuity of the service.

2) The second fundamental aspects are economic aspects, which will allow the costs associated with the service to be reduced, with a consequent reduction in the rates currently paid by the airlines.

Obviously, the contract drawn up between the airport operator and ATS provider for the aerodrome should set out the consideration to be paid for that service to said service provider. The airport operator will be able to pass on to the airport users the costs of the ATS of the aerodrome in agreement with that laid out in the applicable community legislation, whatever the legal nature of the consideration may be.

Therefore, the service cost will undoubtedly be a very important aspect, as long as fulfillment of the operational aspects is guaranteed.

VI. Human Resources in Air Traffic Services

A key element in the liberalization process is the shaping of new and modern ATS social and employment guidelines. This requires a clear preparation, treatment, and development of all processes relating to the human resources of ATC.

The importance of the human factor in the process is twofold:

1) The first important factor is the necessity to regulate training and working conditions to serve as overall guidelines, notwithstanding the collective agreements of each company.

2) The second important factor is the training of incoming personnel and the relocation of personnel from the current provider, which will be key elements in the transition from one provider to another in order to guarantee continuity of service.

With regard to air traffic controllers, until now, no applicable legislation has existed. Rather, there has been an agreement between this sector and the sole provider in Spain (Aena). All providers will obviously have to fulfill any and all regulations laid down by the authority. In particular, those relating to the 1) organization of work and 2) the licensing of personnel.

A. Community Air Traffic Controller License

The new provisions of the International Civil Aviation Organisation (ICAO), by way of amendments to Annex I [22] to the Convention on International Civil Aviation, as well as the publication of Directive 2006/23/EC [23], relating to the community air traffic controller license, has required modifications to Spanish legislation.

The incorporation of this directive to the legal systems of the member states guarantees fulfillment of the new provisions introduced by ICAO and establishes common guidelines, which have three main aims:

1) The first aim is to guarantee maximum levels of responsibility and competition.

2) The second aim is to improve the availability of air traffic controllers.

3) The third aim is to promote mutual recognition of licenses.

In the context of this new framework, the Royal Decree [17] published in Spain fundamentally deals with the conditions for obtaining an air traffic controller license and the requirements for carrying out this activity, in relation to service provision, as well as the required education, training, and capability.

B. Mutual Recognition of Community Air Traffic Controller Licenses

To promote the entry of European providers, fulfill Directive 2006/23/EC [23], and facilitate the selection, hiring, and training of personnel, Royal Decree 1516/2009 [17] recognizes the licenses of European personnel.

It is up to the State Agency for Air Safety (AESA) to recognize and accept the community air traffic controller licenses, as well any specializations that have been issued by the national supervisory authorities of the member states of the European Union, as well as the accompanying medical certificate.

C. Language

The language requirement is one of the critical aspects with regard to personnel. Air transport is fundamentally international and, as such, it is important to ensure that the ability of service provider personnel with regard to the required languages does not in anyway constitute an obstacle to the development of this mode of transport.

As such, the minimum required level of proficiency will be operational level 4 of the language proficiency rating scale, as defined by ICAO, for both English and Castilian Spanish.

In a process of opening up to new providers, specifically European providers, this requirement may be a significant barrier to entry. Although the English language requirement may be satisfied given the large number of European professionals, the requirement to have fluent Castilian Spanish may force the new provider to rely on Spanish personnel, which will obviously reduce its ability to select and recruit personnel.

To avoid this circumstance, it has been established that in those units where ATC service is provided to a significant volume of international air traffic operations, the Castilian Spanish language proficiency requirement may be relaxed, for a limited period of time, for those who hold community ATC licenses.

With this measure, the new provider can agree with the aviation authority and the national supervisory authority on a reasonable transition period for the selection of personnel. If the personnel do not have the appropriate level of Spanish language, the provider can define a training course.

D. Working Conditions and Management of Human Resources

Law 9/2010 [16] establishes the obligations of civil providers of ATS and lays down certain working conditions for civil air traffic controllers, changing the service provision model for ATS in Spain, which until now has been exclusively provided by the public entity Aena and regulated specifically by means of a collective agreement.

In this new context, the implementation of the law and the effective liberalization of services requires the establishment of operational safety conditions within ATC to ensure the safe provision of services while at the same time permitting an ordered and rational organization of the work of the control units with sufficient flexibility to ensure that the civil air traffic controllers have the necessary rest periods.

To determine the rules governing aeronautical safety, in relation to the working and rest times of controllers, the most advanced international practices and regulations have been taken into consideration, such as the regulations of the Federal Aviation Administration (FAA) of the United States or the British Civil Aviation publication 670 [24]. The latter is one of the most advanced and demanding but, at the same time, flexible, which is necessary to adapt to the different sizes of providers and types of traffic.

According to these precedents, Royal Decree 1001/2010 [20] establishes 1) the maximum periods of aeronautical activity, 2) break periods, 3) on-call periods, and 4) time dedicated to training carried out with real traffic.

The maximum time of continuous aeronautical activity that an air traffic controller can perform is also regulated.

Given the detailed information contained in the regulation, we shall not repeat it here, but we simply refer the reader to the text of the regulation itself [20]. Nevertheless, it is important to highlight the importance of this text, since a new provider will have to negotiate and agree to working conditions with its workers to, at the very least, guarantee fulfillment of this regulation.

One of the key elements of this regulation is the effective and efficient management of human resources while simultaneously guaranteeing operational safety and rest periods for personnel. In the Spanish case, this it is an aspect that can be greatly improved, as it is impacts on two key elements: hourly costs and productivity.

In spite of the fact that air traffic growth has stagnated, the number of air navigation staff in Aena has grown at an annual rate of 3% over the last five years.

If the hourly cost of control personnel in operational positions is analyzed, we can see that Spain has the highest hourly costs in Europe, €191/h, as opposed to the European average of €100/h. As in the case of airlines [25], personnel costs are one of the key elements to be taken into consideration when looking at the overall costs of service provision.

If we look at productivity, which is taken to be control hours versus operating hours, Aena's productivity is 31% lower than the European average, and it is the lowest of the five biggest air navigation service providers; see Figs. 5 and 6.

Therefore, we see that Spain has the highest costs and the lowest productivity. Obviously, there is great scope for improvement.

Scheduling a unit's work shifts and deciding minimum staffing levels are crucial to both guaranteeing service continuity and reducing costs.

The comparative costs shown may vary if the fact that Aena has approximately 600 controllers in nonoperational posts is taken into consideration. These 600 have been included in the staff numbers and, as such, impact on the cost and efficiency calculations. If, in Aena's case, these were removed from the calculations, then the hourly cost would be significantly lower. However, to ensure parity of conditions, this number would need to be known for the other providers, and this information is not included in that provided by EUROCONTROL.

E. Management of Human Resources During Transition Period

One of the critical points for any new provider will be to have duly certified and trained staff. The spirit of the different regulations is twofold:

1) The first critical point would be to guarantee the jobs of the personnel who currently provide the service, either working for the new provider or the previous one.

2) The second critical point would be to make it possible for the incoming provider to negotiate with the current control staff with a view to potentially hiring them, depending on the conditions to which they may agree.

A number of key questions relating to ATC human resources during the transition period must be looked at as part of the joint agreement:

1) The first question is about the various options regarding the working conditions and timescales for the transfer of personnel from the current provider to the new units. Obviously, this entails prior planning of the processes and procedures for the relocation of resources.

2) The second question is about the preparation of the conditions that may be offered as a right of option to personnel who may be interested in remaining in the unit with the new provider.

3) The third question is about the preparation of plans and conditions of possible support by Aena to the new provider (or of shared responsibility) for a limited period, until the handover in the units has been completed.

The new provider must define the strategy that it will implement within each unit during the transition period based on its potential, resources, and possible previous experience. It should not be overlooked that the very planning of the transition phase could be one of the key factors, both with regard to the selection of the provider by the airport operator (as for its subsequent designation) and based on the analysis that the state safety agency may carry out on this transition process.

VII. Company Legal Requirements

The activity related to the provision of ATS services, due to its critical and highly specialized nature, needs to guarantee both operational safety and continuity of service. At the European level, the common conditions that are required of each service provider have been defined, with the national supervisory authority of each state being responsible for guaranteeing their fulfillment.

Certification, by a supervisory authority of a member state, of the fulfillment of these requirements is sufficient guarantee to permit a company carry out this activity within the European Union.
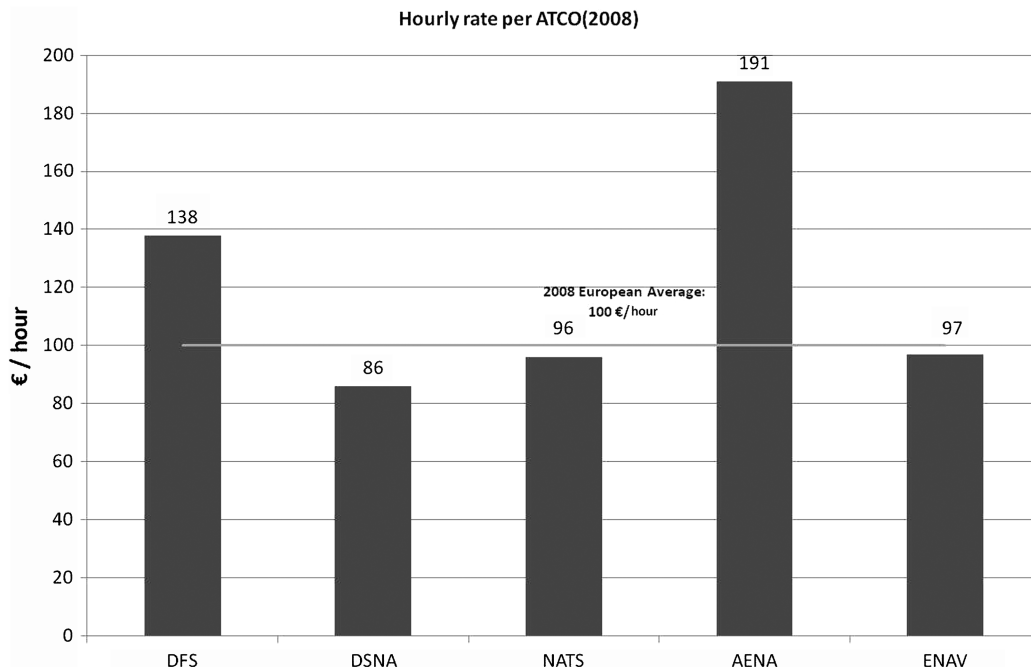

Fig. 5   Hourly costs.
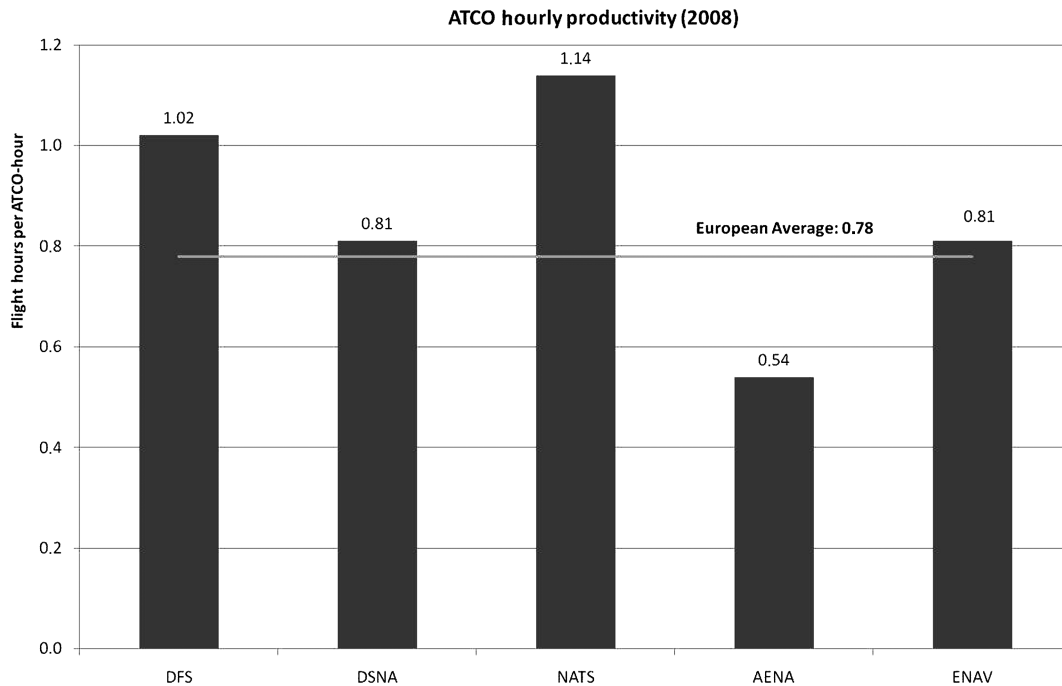
ATCO hourly productivity (2008)

Fig. 6   Productivity (ATCO denotes air traffic controller).

With this in mind, community regulatory guidelines have been established, a number of whose measures should be highlighted: Regulation (EC) 549/2004 [26], which lays down guidelines for the creation of the European Single Sky, and Regulation (EC) 550/2004 [27], which relates to the provision of air navigation services in the European Single Sky. These regulations set out the conditions for the certification of air navigation service providers and entrust the national supervisory authorities with the emission of certificates, having verified that the civil air navigation service provider fulfills the common requirements set out in regulation (EC) 2096/2005 [28].

Taking these regulations into consideration, Royal Decree 931/2010 [18] has been published in Spain with the aim of setting out the procedure for issuing, renewing, and modifying civil air navigation service provider certificates and to regulate the supervision of providers by the AESA. This Royal Decree also contemplates the conditions under which certificates may be revoked.

The AESA is responsible for issuing, renewing, modifying, or revoking certificates, and for supervising civil air navigation service providers.

In the liberalization process that is beginning in Spain, Royal Decree 931/2010 [18] allows for the following:

1) The first allowance is certificate recognition. This maintains that providers, who are certified and providing services in a European country, will automatically fulfill the requirements.

2) The second allows is for new providers. Given the possibility of opening up the market in Spain, this sector may attract new economic and social partners interested in entering the market. The legislation provides a common and objective procedure for dealing with the demands and requirements.

In the liberalization process that is starting, the airport operator must select, based on the conditions for public bidding, a certified provider to provide the service.

A.   New Providers

Royal Decree 931/2010 [18] provides useful guidelines for all potential new entrants into the market, setting out the standards and requirements. As has already been stated, the requirements are as established by European regulations, and interested parties will have to carry out a detailed analysis of these to ensure compliance.

One of the aspects that should be emphasized is the validity of the relevant certificate:

1) The initial certifications and any modifications to the certificates for the provision of a new service will be valid for one year.

2) In subsequent renewals, the certificate will be valid for five years.

3) The certificate will automatically lapse if the service provider does not provide the air navigation services for which it has been certified within one year of the initial certification, or within two years in the case of renewals.

4) Furthermore, the certificate will lapse if, having initiated the service, it stops providing the service for a period exceeding two years.

This is an important aspect to bear in mind in the case of new providers. The Spanish liberalization process does not currently envisage clearly defined timescales, nor has the set of airports where it is hoped to introduce the new service been published. This constitutes a problem for potentials entrants:

1) If the certification process is begun soon, and if the outcome is favorable, new entrants will have up to one year to win some of the new contracts. This may force a concerned party to apply to provide services in airports that are not economically attractive, simply to maintain the certificate.

2) The certification process does not have a clearly defined timescale, and it may last up to six months. If there is a delay in initiating the certification process, not having the corresponding certificate when the tendering processes start can mean that a party is excluded from the process.

Therefore, this may be an important aspect to consider when deciding to initiate the process, and it is a risk that should be borne in mind by new providers.

Although we will deal with training later on, it is important to note that a service provider who has been appointed to provide services in any of the liberalized airports must have previously been certified as a training provider. This may make it more difficult for companies who do not have previous experience in the sector.

B.   Initiating Service

Initiating the service and the handover between providers is one of the most critical aspects of the whole process. For that reason, Royal Decree 931/2010 [18] lays out the conditions for commencing the provision of services by new providers and substitution of the previous ones in order to guarantee operational continuity and safety.

The new provider must define a transition plan that contains measurable criteria to enable progress to be monitored and to know when handover has been completed and normal provision of the service can start. Throughout this process, special attention must be paid to all aspects relating to personnel training.

The transition plan should be carried out according to the methodology approved by EUROCONTROL for the execution of the safety risk assessment and mitigation process. In particular, the following should be explicitly defined: 1) the definition phase of the new service to determine the safety objectives, 2) the design phase to determine the safety requirements, 3) the startup phase with assessment and demonstration of the fulfillment of the criteria established in the two previous phases, and 4) the normal operation phase of the service and how the operational safety management system of the service provider meets the safety objectives and requirements set out in the previous phases. It should be argued that the general risk is acceptable during the service.

To guarantee continuity of service, until the effective entry of the new designated provider, the previous provider is responsible for the safe, effective, continuous, and economically and financially viable provision of said services according to that set forth in Law 9/2010 [16].

As has already been indicated in this paper, the aim of the regulations mentioned is to guarantee the entry conditions of new providers, which is why the specific requirements that the current provider must satisfy are also set out. These are as follows:

1) The current provider must agree with the new provider on a handover plan of the service that includes all necessary aspects of the operation.

2) The current provider must agree to and permit the new provider with access to the facilities.

3) The current provider must supply the new provider with detailed information on the facilities and equipment being transferred.

4) The current provider must supply the new provider with any documentation that may affect operational safety.

In this way, some of the most critical aspects, such as training and familiarization of the new provider's personnel with the scenario and operational procedures, will be suitably dealt with in the transition process.

VIII.   Personnel Training Requirements

For the certification process (in the case of not already being a certified provider) and subsequent selection by the airport operator, the new provider should prepare in advance the means of selection, training, and hiring of ATS personnel. The existing situation in Spain means that there is just one training services provider dedicated exclusively to the training that Aena required.

To open the market to new service providers, a series of actions should be carried out to ensure the availability of personnel, with a valid license, who can be hired by these new companies.

Ministerial order FOM/184/2010 [19] is fundamental in this regard:

1) It defines the conditions that a training center must fulfill to be certified as a trainer of ATC personnel. In this way, it makes it possible for training courses to be given so as to guarantee the supply of professionals who fulfill the requirements.

2) It defines the conditions that a provider must fulfill to ensure compulsory on-the-job training. The new entrant will have to train its personnel in these facilities and, as such, must fulfill a series of requirements. As will be seen later on, this may be a very important aspect to consider when evaluating a new provider, along with a list of other considerations.

3) The education and training of personnel is one of the most critical aspects of the process, and it will be subject to revision and supervision by AESA. Besides the training issues derived from this liberalization process, the expected increase in air traffic volume and complexity will impose new needs and requirements for the training of future controllers as recognized by the FAA [29].

A.   Ministerial Order FOM/1841/2010

Royal Decree 1516/2009 [17] establishes that the provision of training for air traffic controllers, as well as the procedure for its evaluation, will be subject to certification by the national supervisory authority: in this case, the AESA. Ministerial Order FOM/1841/2010 discussed the requirements for certification [19].

When talking about the training of ATC personnel, there are two distinct phases:

1) The first phase is initial training, the aim of which is to obtain a license for the provision of services.

2) The second phase is on-the-job training, which enables a controller with a valid license to serve in a particular facility.

It should be noted that a company may be certified for the different training phases. A service provider must necessarily be certified, at the very least, for the required on-the-job training of its personnel. In the case of initial training, there are three options:

1) The first option is to become certified as providers of initial training and do it themselves.

2) The second option is to hire other providers to give the initial training.

3) The third option is to hire personnel who have completed this training successfully and, therefore, have a controller or student controller license.

This regulation permits the company to choose the option that is most beneficial to its interests. In fact, since the legislation was published, a number or training initiatives have begun in Spain that will foreseeably mean that licensed personnel will be available in 2011.

B.   Implications for New Providers

As has been previously indicated, a company that wishes to provide services must at least be certified to give specific on-the-job training. An additional requirement is that this company have personnel who, apart from having the controller license, are also instructors (this specialization is known as rating), so that they can be responsible for training the rest of the personnel.

This condition, in the case of companies who will be certified for the first time and are not service providers in other airports, has important implications:

1) Along with requesting certification as an ATS provider, the company should also be certified as a training services provider. This implies that the conditions and requirements for entry in the sector will be more onerous and, of course, more expensive.

2) The company must have ATC instructors. This requires the company to hire trained personnel who have this rating and who also satisfy the language proficiency requirements previously mentioned. This may force the company to hire personnel who work for the current provider (Aena), meaning that its scope for negotiation is limited.

Even in the case of already being a certified provider in Europe, and providing services in other airports, the company may have instructors, but it is unlikely that these fulfill the Castilian Spanish language proficiency requirement, i.e., minimum level 4.

This will therefore be an important issue for the new provider to analyze and resolve.

C.   Training During Transition Phase

Legislation requires that the new designated service provider prepares a plan for transitional training or commencement of training, covering in detail all aspects necessary to guarantee the safe, effective, and continuous provision of services.

This transitional plan must, at the very least, include the procedures and mechanisms to ensure the training of personnel, including their familiarization with equipment and facilities, identifying all measures that may require the participation of the outgoing provider.

On the basis that the incoming provider already has instructors, one of the most critical aspects of the transition process will be the specific training of these instructions since, later on, these instructors will train the new provider's personnel. As has previously been stated, as this issue is extremely important, it has been specifically

addressed, and the regulation defines a series of conditions aimed at facilitating the entry of the new provider.

D. Training and Assessment of Instructors in Event of a Switch in Providers

As part of the necessary agreements between the service providers involved in the transition, the outgoing provider will be responsible for training and assessing the new provider's instructors.

In a process of change, this training may constitute a problem, and if it turns out that there are circumstances that prevent the outgoing provider from training and assessing the new provider's personnel, the new service provider may request approval by AESA to implement one of two possible solutions:

1) The first solution will be to carry out the assessment using authorized examiners from ATS units, similar to any provider of certified training. In this way, in the case of a previously certified provider who is providing services to other units, the provider itself can train its personnel and, in the case of new providers, they can come to an agreement with other providers to carry out this activity.

2) The second solution will be to opt for training the incoming instructors and examiners based on self-learning, familiarization, and simulation, with prior approval by AESA.

E. Training and Assessment of Instructors in Event of Commencing Service Provision

It may be the case that a provider is assigned to a newly opened airport. In fact, in Spain, a number of private airports are currently being built that will require ATS service providers.

In these cases, the service provider should set out a plan for the on-the-job training of instructors and examiners who will work in the unit based on self-learning, familiarization, and simulation. These can subsequently train the rest of the personnel.

Therefore, in these cases, as with other aspects that have previously been mentioned, the spirit of the legislation is, apart from setting out the requirements for certification as a training company, to identify the critical aspects, with regard to training, in a possible process of transition between providers, and to facilitate the means necessary to guarantee continuity of the service and safety during the transition.

IX. Start of Tendering Process

The tendering process began in January of 2011 with the first group of airports. The airports included in this first group to be liberalized were chosen based on two criteria:

1) First, the three largest airports in terms of traffic volume were excluded: Madrid, Barcelona, and Palma de Mallorca.

2) Of the remaining airports, only those that provide aerodrome control service were chosen, i.e., those that do not provide approach control service from the airport.

Having applied these criteria, the result was a group of 13 airports. To ensure an orderly process while at the same time guaranteeing competition by enabling the entry of different providers, these 13 airports were divided into three groups. These groups roughly coincide with geographical areas and are 1) lot 1: Alicante, Valencia, Ibiza, and Sabadell (eastern peninsula); 2) lot 2: Seville, Jerez de la Frontera, Vigo, Coruña, Melilla, and Madrid/Cuatro Vientos (remaining airports on the peninsula); and 3) lot 3: Lanzarote, Fuerteventura, and La Palma (airports in the Canary Islands).

The process that is starting has generated a lot of expectation among different operators, due both to the large number of airports involved and the fact that, for many operators, it will be their first foray into this market. However, we must not lose sight of the fact that this is a highly critical service for the transport system and will obviously have a very large impact on operational safety and service continuity. As such, the selection of newly formed companies without any experience of the sector may impact on the service.

For this reason, the tendering process includes an initial preselection stage, where successful candidates must meet certain minimum requirements, and a later bid stage, where technical and economic aspects are analyzed in detail. The aim is to ensure that only those candidates who can offer certain minimum guarantees in regard to the service provision, in the event of being successful, progress to the second stage of the process.

A. Phase 1. Preselection Process

The purpose of this phase is to select companies that have demonstrable economic and technical solvency. The objective is to avoid selecting companies that cannot guarantee service continuity and safety afterward, either due to technical or financial problems.

From a technical point of view, to pass the preselection stage, potential candidates must be able to meet one of the following conditions:

1) The candidates must have controllers with the required licenses and ratings to cover the provision of services in the airports where they wish to operate.

2) The candidates must demonstrate a minimum of four years of experience as providers of aerodrome control services in airports with a traffic volume similar to those involved in the tender process.

B. Phase 2. Bidding Process

Those companies that pass phase 1 will be invited to take part in phase 2. Here, they will have to demonstrate organization of and criteria relating to service provision so that each provider can be evaluated. The financial bid of the candidates will also be evaluated in this stage.

Obviously, only those providers with experience in other airports, or those companies that reach agreements with the former to form a joint venture to provide these services, will satisfy the necessary conditions to enable them to pass the preselection phase.

X. Liberalization in Spain Compared with Other European Initiatives

As has previously been stated, the regulation of the European Single Sky has encouraged the appearance of new ATS providers and, in conjunction, has also enabled the monopoly on service provision in some European countries to be broken. There are prior examples of liberalized markets in Europe, such as the United Kingdom and Sweden. However, in Spain, there are certain characteristics that are not found in the aforementioned cases.

In the case of the United Kingdom or Sweden, the airports are managed independently by different entities (public or private). However in Spain, as indicated in Sec. III, Aena is both the ATS service provider and airport operator in 47 of the 49 civil aerodromes. Therefore, the process that has been started involves a sole airport operator for all the units.

In a market that has been a monopoly up to now, with just one provider, a process has begun to change the provider in a large number of control towers organized, as stated in Sec. IX, in airport groups. In other European countries, this process was done on an airport by airport basis and, as such, was not interesting for large providers due to not being profitable. In the Spanish case, there has been great interest from European providers, as the chance to gain access to 13 airports simultaneously means that by working in a network, the service can be profitable.

In those countries where the liberalization process is most advanced, there are a large number of well established ATS service providers (54 in the United Kingdom). This may make it difficult for external providers to enter into small aerodromes, due to very strong competition. However, in Spain, up to December 2010, there was only one certified provider (Aena). That month, a second provider (INECO) was certified; nevertheless, as it is a subsidiary of Aena, it cannot participate in the tendering process. In other words, in the tendering process, there is no local provider who has experience of the aerodromes in question. This situation coupled with the requirement to have demonstrable technical expertise (as stated in Sec. IX) means that experienced European providers have a very good opportunity. The main reasons are the absence of national

competition and the necessity for economic operators to ally themselves with experienced providers.

A major difference is the contracting of CNS. In other European situations, the airport operator contracts a provider who guarantees to have the necessary means to supply the service. In the case of Spain, as Aena is the current provider, the intention is to protect the engineering role of CNS systems. This means that only ATS services will be contracted, and the maintenance, verification, and validation of CNS systems will continue to be carried out by Aena, the certified CNS systems service provider. Depending on the provider, this may be an advantage, as they will not need to have engineering personnel but, in some cases, the provider may also be interested in carrying out this activity as a complement to ATS.

The liberalization process that has begun affects the aerodrome control service only, i.e., the service provided in the airspace surrounding the aerodrome. Under no circumstances may a provider other than Aena be chosen to supply the approach control service or the en route control service. In other European countries (e.g., the United Kingdom), as well as providing the aerodrome control service, in some airports, the chosen provider also provides approach services. Even the en route control service, which in the United Kingdom is provided by NATS, may also be supplied by another provider. However, in Spain, the provision of approach and en route control services will continue to be a monopoly of Aena, and no other providers may supply services in these volumes.

Accordingly, this process will not affect the definition and implementation of functional air blocks (FABs) being promoted by the European Commission, given that the relevance and future of FABs lies in en route airspace. In Spain, the entry of new providers is not envisaged, in the short term, outside the airport environment.

XI. Conclusions

The plan to liberalize ATS in airports, which has begun in Spain, presents existing European providers and new providers with a unique opportunity to enter the Spanish market. It has required a great deal of essential prior legislative effort to guarantee continuity of service and operational safety. It is necessary to analyze the implications of these regulations on new providers and to make use of the different options available.

Although initiatives of this type have already taken place in Europe (e.g., the United Kingdom), the Spanish case is somewhat different in that a significant number of new airports are expected to open in Spain, in a number of stages, which will necessarily create expectations in the sector. The overall objective of the process is to stimulate the air transport market through improved efficiency in the provision of ATS. To that end, the companies concerned must plan the whole process in detail, starting with certification as a provider, followed by the selection and training of personnel, and ending with the effective organization of the service, being mindful of the newly adopted restrictions and regulations.

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