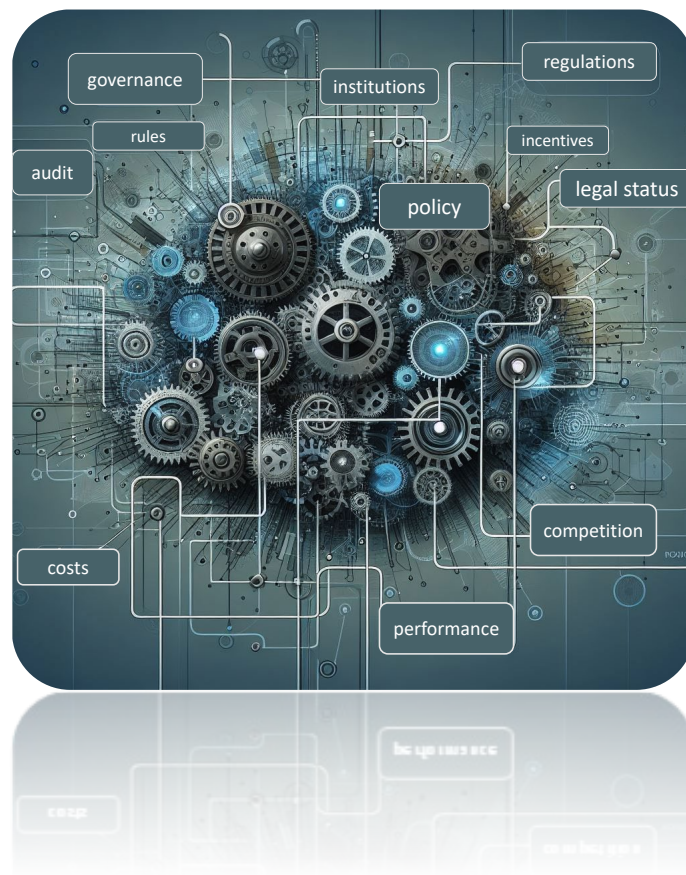


Performance Insight

ATM Cost-Effectiveness: a review of ANSPs regulatory, institutional and corporate governance arrangements



BACKGROUND

This PRC Performance Insight has been prepared by the EUROCONTROL Performance Review Unit (PRU) for the Performance Review Commission (PRC).

The PRC conducts independent measurement, assessment and review of the performance of the Pan-European Air Navigation Services (ANS) system, including its contribution to the efficiency of Pan-European aviation. The PRC strives to identify future improvements and makes recommendations as appropriate.

The PRC maintains an open and transparent dialogue with relevant parties, including but not limited to States, Air Navigation Service Providers, Airspace Users, Airports, social dialogue partners, civil-military organisations, international and national organisations, etc. The PRC conducts research into the development of performance measurement. This includes, inter alia, investigating how performance could best be described/measured in the long-term, developing and testing proposals for future indicators and metrics and contributing to future improvements in performance.

The PRC disseminates the results of its analysis to relevant parties, provided that no sensitive data are involved, to demonstrate the PRC's commitment to transparency and to promote the application of PRC analysis.

The PRC produces independent ad-hoc studies, either on its own initiative and/or at the request of relevant parties. The PRC's website address is: <https://www.eurocontrol.int/air-navigation-services-performance-review>.

NOTICE

The PRC has made every effort to ensure that the information and analysis contained in this document are as accurate and complete as possible. Despite these precautions, should you find any errors or inconsistencies we would be grateful if you could please bring them to the PRU's attention.

The PRU's e-mail address is pru-support@eurocontrol.int.

CREDITS

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Main findings



The predominant regulatory regime for ANS is economic regulation, but non-SES States continue to use the full cost-recovery approach. Most ANSPs are fully State-owned. Only ENAV and NATS have a mix of public and private ownership.



ANSPs subject to economic regulation were able to maintain their cost-base fairly stable between 2012 and 2019. However, some of them exhibited substantial capacity issues especially in 2018 and 2019. This indicates the need to find a better balance between cost-effectiveness and capacity performance.



ATCO productivity for the full cost-recovery and State bodies ANSPs were typically below the European average (except in 2022). Public Private Partnerships (PPPs) were consistently above average and showed a less severe drop during the pandemic. This result potentially indicates differing levels of flexibility in response to crisis situations.



Between 2012 and 2022, full cost-recovery ANSPs had the highest number of support staff per unit of output. ANSPs under economic regulation were quite close, with PPPs consistently showing the lowest number of unit support staff over the period.



Terminal ANS provision in some States has been liberalised, allowing for greater competition in this segment. For instance, in the UK, Spain, and Sweden the market shares of the non-incumbent ANSPs respectively represented 39%, 25% and 14% in 2022.



Although interesting findings emerged at aggregated level when considering different regulation regimes or legal statuses, there is no clear and straightforward relationships between individual ANSPs performance and the regulatory regime / legal status.

Introduction

Following the Summer 2022 survey on ATM Cost Effectiveness (ACE) products, the PRC decided to launch a review of the regulatory and institutional context in which Air Navigation Providers (ANSPs) operate and to look at the different corporate governance arrangements currently in place. These elements are expected to affect, among other factors, ANSPs behaviour, decision-making processes and to some extent the observed level of cost-effectiveness performance.

The findings of this Performance Insight are summarised from the latest ACE report [1] which

includes a chapter reviewing corporate governance arrangements in more detail.

Figure 1 shows the framework used in the ACE benchmarking analysis to describe the exogenous (outside ANSPs' control) and endogenous (under ANSPs' control) factors which influence ANSPs' performance [2].

Exogenous factors arise from the conditions an ANSP operates in, which may differ between countries and are likely to influence how ANSPs organise and conduct their business. These may also affect the way an ANSP manages its costs and how the level of charges is determined.

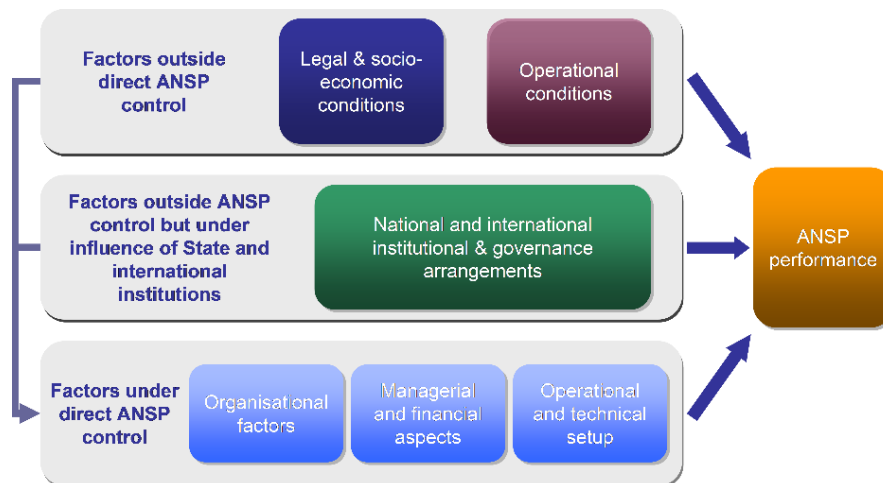


Figure 1: Factors affecting cost-effectiveness performance

The institutional and governance arrangements for Air Navigation Services (ANS) in a particular country are set in place by the policies and specific aviation laws of each country. These factors are exogenous to the ANSP, but decision-making concerning some of them is largely driven by national aviation policymakers. Some of these factors relate to international requirements such as those imposed by the International Civil Aviation Organisation (ICAO), EUROCONTROL and the Single European Sky (SES). Institutional and governance arrangements include factors such as:

- the way ANS is regulated, including market access and the degree of economic oversight/regulation;
- the institutional structure surrounding ANS, the ANSP ownership and control structure; and,
- the civil/military arrangements.

It is generally considered that institutional and governance arrangements do not affect ATM cost-effectiveness directly; rather they act as influences or constraints affecting endogenous factors (such as the overall business objectives, internal organisation, flexibility in decision making, and adaptability to change).

Over the past three decades, the aviation industry in Europe has experienced significant growth and transformation. During this period, several key developments and milestones have shaped the air traffic management sector and

contributed to changes in regulatory and institutional arrangements.

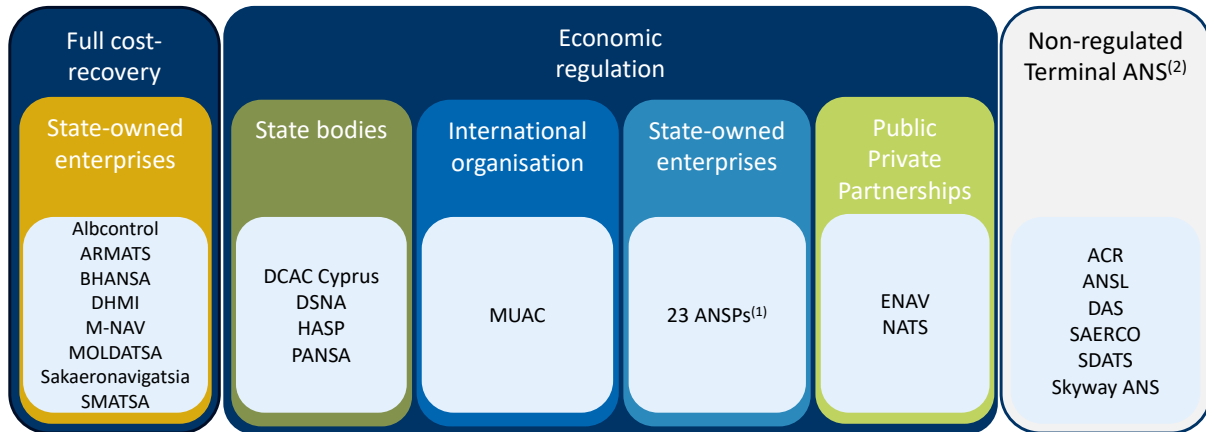
- The **full cost-recovery system** was established in the 1980s for the European Civil Aviation Conference (ECAC) Area, setting up the Central Route Charges Office (CRCO) and specifying the rules and procedures of the route charges system.
- The 1990s marked the **liberalisation of the European aviation market**; the **separation of oversight from airport businesses and from ANS provision** was implemented by some States.
- The **Performance Review Commission (PRC)** was established in 1998 to provide independent advice on ANS performance of the EUROCONTROL Member States and their respective ANSPs.
- The **Single European Sky initiative** was introduced in 2004 to enhance air traffic management and airspace efficiency by coordinating national airspace structures. SES regulations are binding on EU and associated States (currently Switzerland and Norway). The performance and charging schemes were first implemented 2012 and have evolved significantly since.
- The **COVID-19 pandemic** in 2020 significantly impacted the aviation industry, causing a sharp decline in passenger numbers and flights. The downturn caused financial challenges and reduced operations, affecting all parts of the system.
- Following a transition period, the **UK left the European Union** and the SES at the

end of 2020. Since then, the UK ANSP is solely regulated under the UK's own oversight arrangements. This is described in more detail in a case study in the latest ACE report [1].

- In parallel to the above-mentioned developments, the access to the **terminal ANS market has been opened to**

competition in some States, so that ANSPs may compete for the provision of these services at individual airports.

Figure 2 below provides the framework used in this Performance Insight to structure the analysis and classify ANSPs into groups with similar characteristics in terms of regulatory regime and legal status



(1) State-owned enterprises subject to economic regulation: ANS CR, Austro Control, Avinor, BULATSA, Croatia Control, DFS, EANS, ENAIRE, Fintraffic ANS, HungaroControl, IAA, LFV, LGS, LPS, LVNL, MATS, NAV Portugal, NAVIAIR, Oro Navigacija, ROMATSA, skeyes, Skyguide, Slovenia Control
 (2) List of independent terminal ANS providers is not exhaustive and includes only the major providers in Europe.

Figure 2: ANSPs classification per regulatory regime and legal status

This Performance Insight covers the following topics:

- A review of the main regulatory regimes and principles for ANS provision in Europe;
- The institutional set-up of ANS in Europe;
- ANSP legal status across Europe;
- Corporate governance arrangements of ANSPs;
- A quantitative review of ANS cost-effectiveness performance through a regulatory, institutional, and governance lens; and
- The introduction of competition in terminal ANS services.

Main regulatory regimes and principles for the provision of ANS in Europe

This section provides some insight on the main regulatory regimes and principles under which European ANSPs operate.

ICAO principles on charging for airport operators and air navigation service providers are *non-discrimination, cost relatedness, transparency, and consultation* [3]. ICAO guidelines determine that each State is ultimately responsible for the provision, operation and economic oversight of ANS in its Flight Information Regions (FIRs).

EUROCONTROL Member States have adopted basic principles for a harmonised regional en-route charges system involving a single charge

per flight [4]. The Central Route Charges Office (CRCO) operates the route charges system on behalf of the Member States with due regard to the guidelines on charges for air navigation services recommended by ICAO. ANSPs whose ANS costs are recovered through the EUROCONTROL route charges system are also required to provide economic information according to the Specification for Economic Information Disclosure (SEID) for performance review purposes [5].

The **Single European Sky** regulations have included a performance and charging scheme

applicable to States bound by SES regulations since 2012. The cost-efficiency of en-route ANS is primarily defined with reference to a single KPI, representing the year-on-year percentage change in the average determined unit cost (DUC) of ANSPs.

Incentives are set for the cost efficiency and capacity KPAs:

- *Cost-efficiency incentives* are based on performance against determined costs and include specific risk-sharing arrangements. The costs planned for the Reference Period (RP) are set in advance and frozen for the duration of the RP. If actual costs are lower than determined, the State/ANSP keeps the difference; if actual costs are higher than determined, the State/ANSP bears a loss. This mechanism is expected to provide incentives for States/ANSPs to effectively control their costs. In addition, the traffic risk-sharing arrangements are shaped so

that ANSPs can flexibly adapt to unforeseen changes in traffic volumes.

- *Capacity incentives* are based on a bonus and penalty, represented as a percentage of determined costs for both en-route and terminal targets, where these apply. A maximum bonus/penalty of 2% of determined costs can be applied; NSAs set pivot values around the reference value for average ATFM delay derived by the Network Manager from the EU-level targets, with ANSP outturn values below/above the pivot values receiving a corresponding bonus/penalty through an adjustment to the unit rate in year n+2.

The implementation of the performance and charging schemes has significantly influenced States' and ANSPs' behaviours, particularly in terms of awareness regarding improved planning, targeted investment, and enhanced performance management.

Institutional set-up

The institutional landscape for ANS in Europe comprises several actors, with some operating at European level, establishing common rules, and driving harmonisation and interoperability, and others at national level.

The main entities at European level are:

- The **European Commission (EC)** – it sets airspace safety, operation and licencing rules that are overseen by the **European Aviation Safety Agency (EASA)**. It is also responsible for the Implementing Regulations under the Single European Sky framework, along with issuing decisions on performance targets at EU-wide and local levels. The EC is also supported by the **Performance Review Body (PRB)** in implementing the SES performance and charging scheme [6], and the **European Defence Agency (EDA)** for civil-military ATM cooperation.
- **EUROCONTROL** – the Pan-European, civil-military organisation houses a number of functions that support the aviation system, including the Network Manager which supports optimised operational performance, the CRCO which offers a harmonised regional en-route charges

system, and other services including aviation intelligence, support to research & innovation, and training.

The main entities at national level are:

- **Member States** – they are responsible for monitoring the safe and efficient provision of ANS and for the control of compliance by ANSPs with the common requirements established at EU and international level. Their involvement in ANS takes different forms with different departments involved in the decision-making process. Departments providing oversight to the ANSP typically involve the ministry of transport and infrastructure, ministry of defence and in some cases the ministry of finance. Member States are responsible for signing off the national performance plans under the SES. For those countries not part of the SES, Member States continue to provide important oversight of the ANSP alongside Civil Aviation Authorities.
- **Civil Aviation Authorities (CAAs)** – oversee and enforce safety and airspace regulation in each Member State and in certain cases also undertake economic regulation. In the EU, many CAAs take the role of the National

Supervisory Authority, required to oversee the regulatory framework and certifying and designating ANSPs. They are required to be functionally separate from the ANSP to prevent conflicts of interest.

- **Air Navigation Service Providers (ANSPs)** – they provide all or some of the following services to air traffic during all phases of operations (en-route, approach and aerodrome): air traffic management; communication, navigation and surveillance; meteorological; search and rescue; and aeronautical information services to air traffic.

Other national entities include **meteorological authorities, military authorities** (i.e. a dedicated military organisation controlling military airspace), and **airport authorities**.

Under the influence of European legislation and, to some extent, the adoption of widespread practices, the institutional structures have converged. An emerging model of institutional structure involves the ANSP operating as an autonomous institution, either governed by its

own statute, national company law, laws related to State-owned enterprises, or a combination of these. A management contract or a regulatory licence is often part of the mechanism of control.

As already indicated, over the past 30 years the ANS industry has undergone substantial changes in several States, progressively separating the ANS provision from the oversight functions and/or airport management. Since the start of the ACE benchmarking activity, these changes have been observed, inter alia, in Denmark, Finland, North Macedonia, Norway, Spain, Slovenia and Sweden. A case study on Fintraffic ANS is included in the latest ACE report [1].

In addition, as of 30th April 2023, the Irish ANSP is formally separated from the Irish Aviation Authority (IAA) which is in charge of regulatory and oversight activities. ANS in Ireland is then provided by the Irish Air Navigation Service (AirNav Ireland) from 2023 onwards. A similar process is also on-going in Greece with the separation of HCAA from the ANSP HASP.

ANSP legal status

The dominant ownership model across ANSPs is 100% State ownership (with ENAV and NATS being the only examples with a significant non-governmental shareholding; ENAV's legal status is covered in a case study in the latest ACE report [1]). However, there are various legal forms associated with a full State ownership, shown in Figure 3 and described below:

- **State body** – established by or under an enactment and controlled, directly or indirectly, by the Government. Closely aligned with the government, albeit with legal/financial/staff differences.
- **International organisation** – MUAC is part of EUROCONTROL and it is therefore treated separately.
- **State-owned enterprise** – A legal entity created to undertake commercial activities on the State's behalf. It can be either wholly or partially owned by the State and is typically earmarked to participate in specific commercial activities. State-owned

enterprises are often legally separated from the government and have financial and administrative autonomy under the supervision of supervisory/executive boards. The rationale for this form of ownership, according to the OECD, includes maximising value for society through an efficient allocation of resources. This could be where there exists a) a natural monopoly or b) where the enterprise serves strategic goals within the national interest.

- **Public Private Partnership (PPP)** – collaboration between the State and a private-sector company. PPPs are predominantly owned by the State, but in the case of ANSPs, private sector involvement, particularly from airlines, may result in a greater influence over the services they are receiving. Whilst PPPs are a minority amongst European ANSPs, they are prevalent in airports to drive investment, diversification and quality of service.

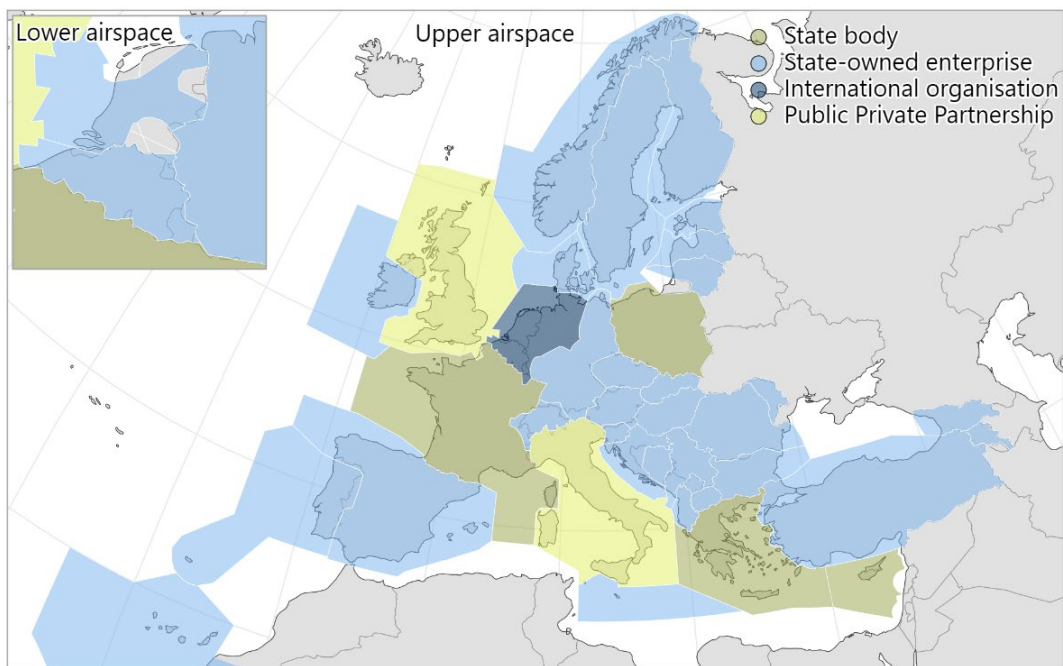


Figure 3: ANSPs classified by legal status in 2024

Corporate governance arrangements

Corporate governance arrangements can significantly impact the performance incentives for an organisation, although this may depend on certain characteristics of the arrangements that are not always apparent in the structures.

One observable factor is the widespread practice of the separation of responsibilities between a supervisory board and a management or executive board. This, as well as the composition of the board, may create incentives at the highest level of the ANSP to prioritise performance management.

Based on information collected as part of the ACE benchmarking process, a majority of ANSPs are governed by a supervisory board which oversees the appointment of the executive board of directors. By construction, DSNA, DCAC Cyprus, HASP and PANSA which are State bodies have no supervisory board structure. MUAC's activities are supervised by a group composed of civil and military representatives of

the four participating States (Belgium, Germany, Luxembourg and the Netherlands).

A more detailed description of each ANSP's corporate governance structure is available in its individual ACE factsheet [7].

The exercise of government control may influence the ANSP's behaviour and decisions on investment strategies, staff and recruitment policies, among others. A key element which can affect ANSP's behaviour is the process by which decisions are made and signed off.

ANSPs may also have public service obligations. These are services or actions that the ANSP is obliged to undertake by the government for public service reasons, yet they may not directly contribute to improve performance. For example, some ANSPs have an obligation to provide terminal ANS at regional airports.

ANS cost-effectiveness performance through regulatory, institutional, and governance arrangements

We analyse the trends in traffic, ATM/CNS provision costs, unit costs and ATFM delays over the 2012-2022 period. This corresponds with the implementation period of the SES Performance and Charging schemes for SES ANSPs.

In 2020, the **COVID-19 pandemic** and ensuing travel restrictions led to an unprecedented downturn in traffic (-56.8%) and as a result, unit ATM/CNS costs more than doubled.

Despite successive increases in 2021 and 2022, the number of composite flight-hours in 2022 remains -13% lower than 2019. ATM/CNS provision costs decreased (-2.0% p.a.) and they remain -6% lower in 2022 than 2019. **Russia's invasion of Ukraine** in 2022 had a profound impact on traffic flows in Europe, leading to airspace closures and reciprocal sanctions on air carriers issued by Western countries and the Russian Federation.

In order to have a quantitative view on the impact of economic regulation on ANSPs cost-

effectiveness performance, ANSPs are split into two groups:

- those operating under an economic regulation regime (30 ANSPs, including 29 operating under SES regulations and NATS); and
- those operating under a full cost-recovery regime (6 ANSPs¹).

While there is heterogeneity within both groups, it is particularly important to note that, within the full cost-recovery group, DHMI accounted for 74% of ATM/CNS provision costs in 2022. Consequently, DHMI significantly influences the average levels and trends for that group.

Figure 4 shows the changes in traffic, ATM/CNS provision costs, unit costs and ATFM delays over the 2012-2022 period for ANSPs operating under economic regulation and those operating under the full cost-recovery regime.

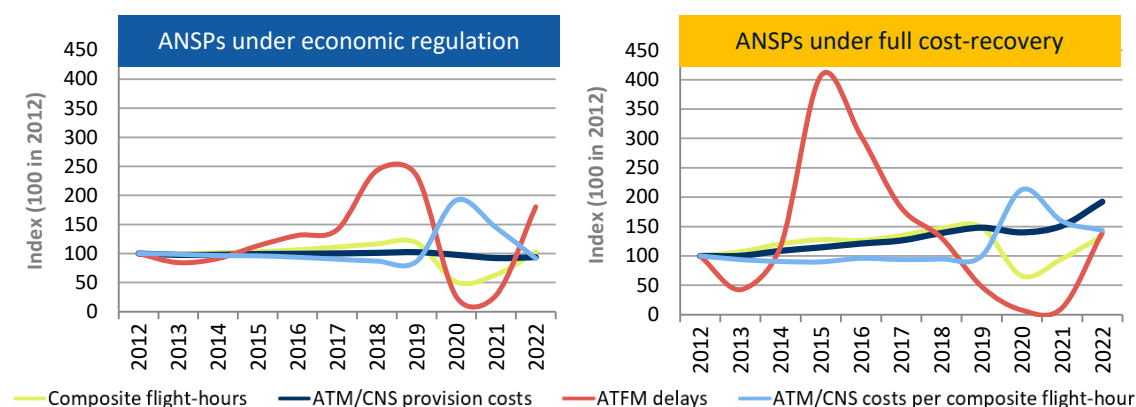


Figure 4: Changes in traffic, ATM/CNS provision costs, unit costs and ATFM delays (regulated vs. full cost-recovery)

Between 2012 and 2019, unit ATM/CNS provision costs decreased for ANSPs under economic regulation (-2.1% p.a.) as costs remained stable (+0.3% p.a.) amidst an increase in traffic (+2.5%

p.a.). The target-setting and monitoring processes in the SES II regulations contributed to provide incentives for these ANSPs to effectively manage their costs during RP1 and RP2.

¹ Albcontrol, ARMATS, DHMI, M-NAV, MOLDATSA and SMATSA, for which data is available over 2012-2022.

For the ANSPs operating under full cost-recovery, ATM/CNS provision costs and composite flight-hours rose at the same pace (+5.8% p.a.). As a result, unit ATM/CNS provision costs remained relatively stable for these ANSPs (-0.1% p.a.).

The trends between these two ANSP groups differed during the COVID-19 crisis. ANSPs subject to economic regulation reduced ATM/CNS provision costs (-2.9% p.a.), whilst ANSPs operating under full cost-recovery rose by +9.1% p.a. on average over 2019-2022 period.

ATCO-hour productivity

Figure 5 presents an analysis of the average ATCO-hour productivity for ANSPs, categorised by their legal status² and regulatory regime³, showing the percentage deviation of these different groups from the pan-European average.

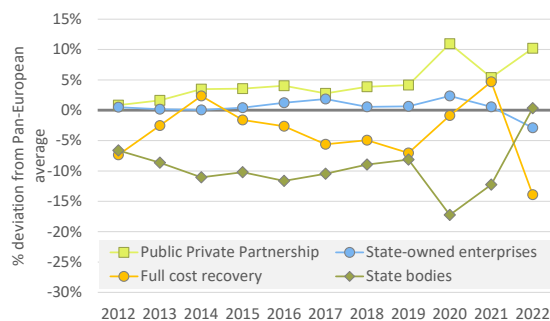


Figure 5: Productivity for ANSPs by regulatory and legal status

For economically regulated ANSPs, those operating as State-owned enterprises remained close to the average, those operating as State bodies consistently fell below the average, while the PPPs consistently exceeded pan-European average productivity.

In 2020, when traffic collapsed, State bodies and PPPs exhibited contrasting trends: State bodies

The latter is largely driven by DHMI whose ATM/CNS provision costs grew by +14.2% p.a. over this period.

Looking at the longer 2012-2022 period and excluding DHMI from the full cost-recovery group, the change in unit ATM/CNS provision costs would be -0.7% p.a., which is much closer to the average trend observed in the economically regulated group (-0.9% p.a.).

More detailed analysis at an ANSP level is included in the latest ACE report [1].

experienced a more significant productivity drop, while PPPs saw a less severe decline. This may indicate varying degrees of flexibility influenced by the legal status of the ANSPs. However, the observed trends remain average values sometimes masking very different situations at ANSP level, and the fact that many other factors affect ANSPs productivity.

Figure 6 presents the average ATCO-hour productivity levels and trends for the ANSPs subject to economic regulation and those operating under full cost-recovery. For the second group, the bars indicate the group average (six ANSPs) and the dots depict the average when DHMI is excluded from the group.

On average, ATCO-hour productivity for full cost-recovery ANSPs is slightly lower than that of the economically regulated ANSPs. However, the gap between the two groups becomes more pronounced when excluding DHMI.

² Although the privatisation of ENAV took place in 2016, ENAV has been classified in the public private partnership group for the whole period (2012-2022).

³ All ANSPs operating under full cost-recovery are State-owned enterprises.

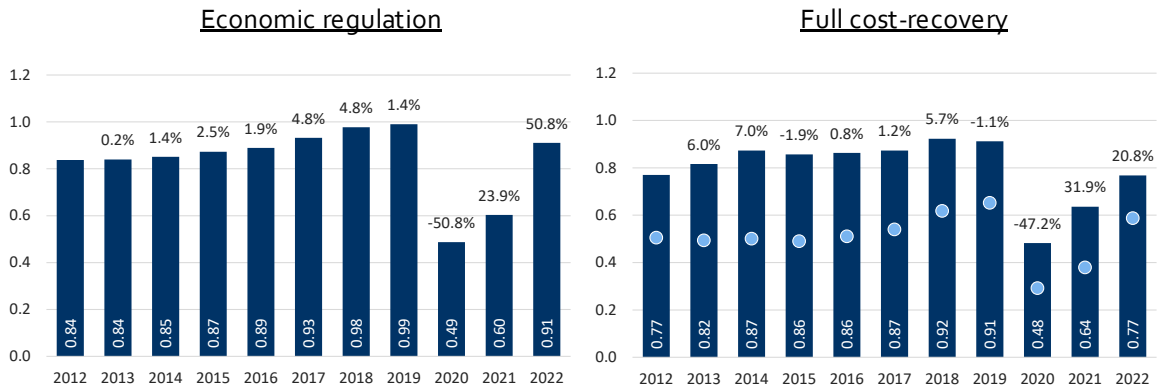


Figure 6: Productivity for ANSPs by regulatory and legal status

ATCO employment costs

Figure 7 below presents the ATCO employment costs per ATCO-hour for the ANSPs subject to economic regulation and those operating under full cost-recovery. For the second group, the bars

indicate the average calculated for the six ANSPs, and the dots depict the average when DHMI is excluded from the group.

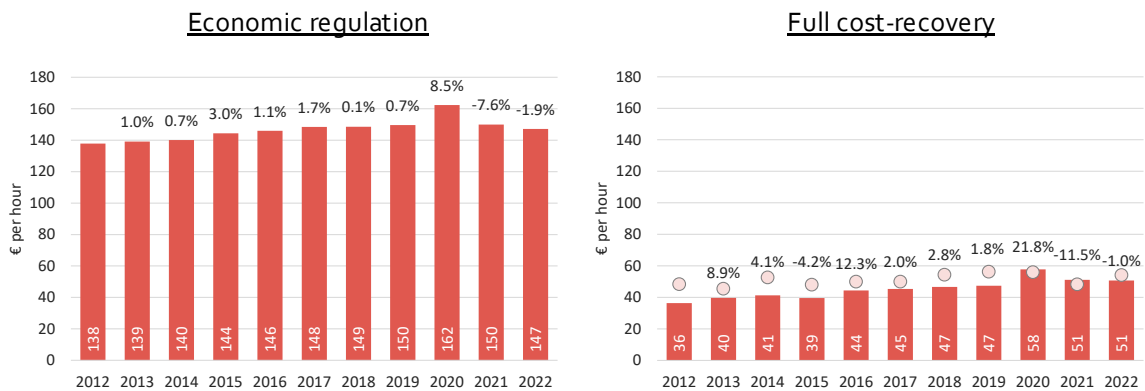


Figure 7: Trends in ATCO employment costs per ATCO hour (regulated vs. full cost-recovery)

ATCO employment costs for ANSPs subject to economic regulation were, on average, triple those for full cost-recovery ANSPs. It also shows that, between 2012 and 2022, unit ATCO employment costs grew significantly more for ANSPs under full cost-recovery. To that end, it is

important to remember that full cost-recovery ANSPs typically operate in countries with a lower cost of living. When adjusting the employment costs for cost of living, the disparity continues to exist, but in a significantly reduced magnitude.

Support costs

Figure 8 below presents the support costs per composite flight-hour for the ANSPs subject to economic regulation and those operating under full cost-recovery. For the second group, the bars

indicate the average calculated for the six ANSPs, and the dots depict the average when DHMI is excluded from the group.

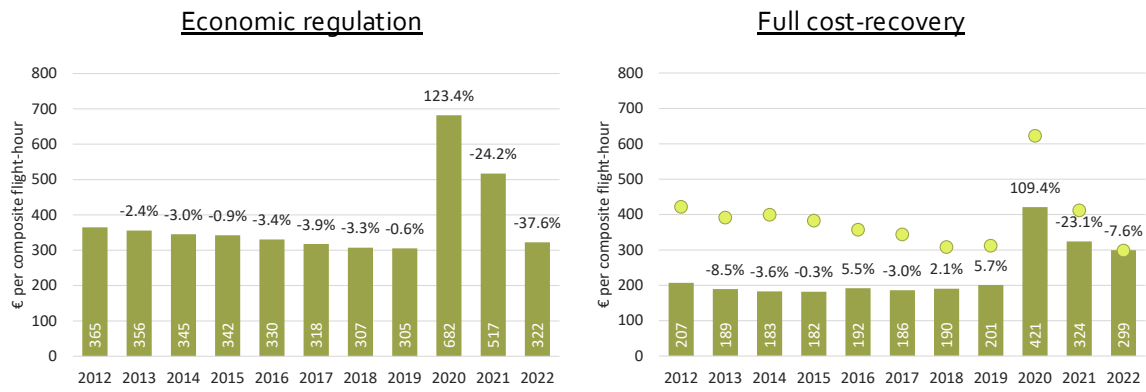


Figure 8: Trends in support costs per composite flight-hour (regulated vs. full cost-recovery)

Unit support costs for full cost-recovery ANSPs are lower than those for economically regulated ANSPs; however, when DHMI is excluded, a different situation is observed with relatively higher unit support costs for the full cost-recovery group and a 2012-2019 trend which is more in line with that observed for economically regulated ANSPs.

Support staff costs are a main component for support costs, so we consider differences in the number of staff employed by the different types of organisations. Given the heterogeneity of ANSPs in terms of size, the indicator used for this analysis is the number of support staff per composite flight-hour.

Figure 9 shows that, on average, full cost-recovery ANSPs employed more support staff per composite flight-hour and recorded a greater reduction in support staff numbers between 2012 and 2019. In addition to the incentives possibly created by differences in regulatory regime or legal status, it is important to consider that apart from DHMI, full cost-recovery ANSPs are relatively small, which limits the possibility to exploit economies of scale. Considering the ANSPs subject to economic regulation, those operating as public private partnerships consistently recorded a lower number of support staff per unit of output over the 2012-2022 period.

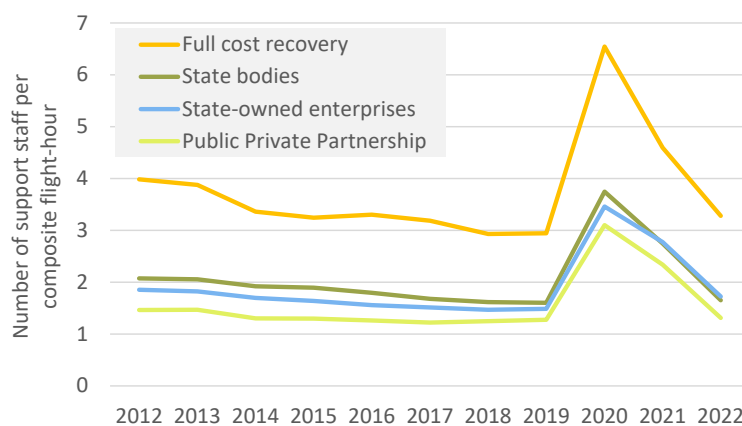


Figure 9: Trends in the number of support staff per composite flight-hour by regulatory and legal status of ANSPs

Competition in the terminal ANS provision market

Air navigation services in Europe have traditionally been provided by monopoly entities, limiting competition within and for the market.

To promote liberalisation, a form of competition has been introduced for the terminal ANS (TANS) market. We focus on three States with the largest

liberalised TANS markets – the United Kingdom, Spain, and Sweden.

States may liberalise their TANS markets to strengthen service performance. In theory, competition is expected to incentivise service providers to innovate and operate as efficiently as possible to either win contracts or maintain their position as incumbents.

In some countries ANSPs can compete for licenses to provide terminal services at specific airports through a bidding process. Once awarded, the ANSP holds the right to provide services at the airport for a determined period (typically 5 to 10 years), after which a new bidding

process is launched. Although the focus is mainly on Air Traffic Control (ATC) provision, the scope of services tendered out varies across airports, and can also include Aerodrome Flight Information Service (AFIS), Communication, Navigation and Surveillance (CNS), aeronautical engineering, as well as consultancy and training services.

Table 1 shows high-level information on the service providers selected to provide ANS in the airports of the United Kingdom, Spain, and Sweden and their market share in terms of Instrument Flight Rule (IFR) airport movements in the country.

Country	Service provider	Number of airports serviced	Market share (% of total IFR airport movements)
UK ⁴	NATS	16	61%
	Other ANS providers	101	39%
Spain	ENAIRE	21	75%
	SAERCO	14	12%
	Skyway ANS	8	13%
Sweden	LFV	11	86%
	Aviation Capacity Resources AB (ACR)	17	12%
	Saab Digital Air Traffic Solutions (SDATS)	4	2%
	Arvidsjaur airport	1	1%

Table 1: Air navigation services in top three TANS liberalised markets, 2022

Given the competitive nature of tendering in a liberalised TANS market, there is limited disclosure of information; therefore, it is difficult to quantitatively assess the impact and potential cost-effectiveness improvements that might be achieved through a competitive bidding process.

In the United Kingdom in 2022, NATS, the incumbent ANSP, provided TANS at 16 airports out of 117⁴ where terminal ANS provision is open for competition. While there are more than 50 other terminal ANS providers certified by the Civil Aviation Authority (CAA)⁵, most are local providers or insourced tower control and terminal activities by the airport (e.g. Birmingham, East

Midlands, Newcastle). In 2022, NATS held a market share of 61% of the total IFR airport movements.

In Spain, the liberalisation of TANS at airports began in 2011. As of 2022, two private companies operate in the Spanish TANS market – SAERCO, providing services at 14 airports, and Skyway ANS (8 airports). In 2022, these two private providers controlled 25% of the total IFR airport movements in Spain.

Sweden also liberalised the provision of TANS at regional airports. In 2022, LFV – the national ANSP, provided TANS at 11 airports, followed by

⁴ Only the airports with more than 50 IFR airport movements in 2022 are considered for this list.

⁵ The full list is available [on the UK CAA website](#).

ACR (which provides ATC/AFIS at 17 airports), SDATS (4 airports), and Arvidsjaur airport (in-house TANS provision). The three private providers jointly controlled approximately 14% of IFR airport movements in Sweden in 2022.

It should also be mentioned that the terminal ANS market has also been liberalised in Norway and in Germany, although the proportion of

airport movements controlled by non-incumbent TANS providers is lower. Competition for the provision of TANS is another important institutional change for the ANS industry that adds to the elements already identified in this report. This process is expected to foster innovation and drive efficiencies whilst maintaining the safety and reliability of services provided.

Conclusions

This performance insight presents an overview of ANSPs' institutional, regulatory and corporate governance arrangements. These are generally considered as providing incentives or constraints possibly affecting ANSPs performance. In addition, it is important to note that many other factors such as the economic environment, operational conditions, the managerial and financial setups also have an impact on ANSPs observed performance.

Following the introduction of the SES performance and charging schemes in 2012, the predominant regulatory regime for ANS became economic regulation through a determined cost approach. Non-SES States continue to use the full cost-recovery approach, which was commonplace before 2012.

Over the past three decades, the institutional landscape of airlines, airports and ANSPs has undergone significant changes. For airlines, it was marked by the liberalisation of the aviation market and the emergence of low-cost carriers. For ANSPs, the separation of oversight from airport business and from ANS provision became the most common model.

Most ANSPs are fully State-owned, but there are various degrees of separation from the government, ranging from State bodies to more autonomous enterprises. Only ENAV and NATS have a mix of public and private ownership.

Overall, ANSPs subject to economic regulation were able to maintain their cost-base fairly stable between 2012 and 2019. However, some of them exhibited substantial capacity issues especially in 2018 and 2019. This indicates the need to find a better balance between cost-effectiveness and capacity performance.

Following the COVID-19 pandemic, ANSPs subject to economic regulation reduced their

costs by - 2.9% p.a. between 2019 and 2022. In the meantime, costs for ANSPs under full cost-recovery rose by +9.1% per year. This result should be seen in the light of DHMI weight in this group (74% of the group's total costs).

Over the 2012-2022 period, ATCO productivity for the full cost-recovery and State bodies ANSPs were typically below the European average (except in 2022). Public Private Partnerships (PPPs) were consistently above average and showed a less severe drop during the pandemic. This result potentially indicates differing levels of flexibility in response to crisis situations.

Between 2012-2022, full cost-recovery ANSPs had the highest number of support staff per unit of output. ANSPs under economic regulation were quite close, with PPPs consistently showing the lowest number of unit support staff over the period.

Terminal ANS provision in some States has been liberalised, allowing for greater competition in this segment. For instance, in the UK, Spain, and Sweden the market shares of the non-incumbent ANSPs respectively represented 39%, 25% and 14% in 2022. This process is expected to foster innovation and drive efficiencies whilst maintaining the safety and reliability of services provided.

The analysis provided in this Performance Insight shows that although interesting findings emerged at aggregated level when considering different regulation regimes or legal statuses, there is no clear and straightforward relationships between individual ANSPs performance and the regulatory regime / legal status.

Glossary

ACE	Air Traffic Management Cost-Effectiveness
Albcontrol	National Air Traffic Agency, Albania
ANS	Air Navigation Services
ANS CR	Air Navigation Services of the Czech Republic
ANSP	Air Navigation Service Provider
Albcontrol	National Air Traffic Agency, Albania
APP	Approach Control Unit
ARMATS	Armenian Air Traffic Services
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
Austro Control	Austro Control Österreichische Gesellschaft für Zivilluftfahrt mbH, Austria
Avinor	Avinor Flysikring AS, Norway
B	Billion
BHANSA	Bosnia and Herzegovina Air Navigation Services Agency
BULATSA	Bulgarian Air Traffic Services Authority
CAA	Civil Aviation Authority
CNS	Communications, Navigation and Surveillance
Croatia Control	Hrvatska kontrola zračne plovodbe d.o.o., Croatian Air Navigation Services
DCAC Cyprus	Department of Civil Aviation of Cyprus
DFS	Deutsche Flugsicherung GmbH, Germany
DHMI	Devlet Hava Meydanları İşletmesi, Türkiye
DSNA	Direction des services de la navigation aérienne, France
EANS	Estonian Air Navigation Services
EC	European Commission
ECAA	European Common Aviation Area
ECAC	European Civil Aviation Conference
EDA	European Defence Agency
ENAIRE	Air Navigation Service Provider of Spain
ENAV	Italian Air Navigation Service Provider, Italy
EU	European Union
FIR	Flight Information Region
Fintraffic ANS	Air Navigation Service Provider of Finland (previously ANS Finland)
HASP	Hellenic Air Navigation Service Provider, Greece
HungaroControl	Hungarian Air Navigation Services, Hungary
IAA	Irish Aviation Authority, Ireland
IFR	Instrument Flight Rules
LFV	Luftfartsverket, Sweden
LGS	Latvijas Gaisa Satiksme, Latvia
LPS	Letové Prevádzkové Služby Slovenskej Republiky, Státny Podnik, Slovak Republik
LVNL	Luchtverkeersleiding Nederland, Netherlands
M	Million

MATS	Malta Air Traffic Services Ltd
M-NAV	Air Navigation Services Provider of the Republic of North Macedonia
MOLDATSA	Moldavian Air Traffic Services Authority
MUAC	Maastricht Upper Area Control Centre
NATS	National Air Traffic Services, United Kingdom
NAV Portugal	Navegação Aérea de Portugal – NAV Portugal, EPE
NAVIAIR	Air Navigation Services – Flyvesikringstjenesten, Denmark
NSA	National Supervisory Authority
Oro Navigacija	State Enterprise Oro Navigacija, Lithuania
PANSA	Polish Air Navigation Services Agency
PPPs	Public Private Partnerships
PRC	Performance Review Commission
ROMATSA	Romanian Air Traffic Services Administration
RP2	Reference Period 2 (2015 – 2019)
RP3	Reference Period 3 (2020 – 2024)
Sakaeronavigatsia	SAKAERONAVIGATSIA Ltd., Georgia
SEID	Specification for Economic Information Disclosure
SES	Single European Sky
skeyes	skeyes (previously Belgocontrol), Belgium
Skyguide	Skyguide, Switzerland
Slovenia Control	SLOVENIA CONTROL Ltd, Slovenia
SMATSA	Serbia and Montenegro Air Traffic Services Agency
TANS	Terminal Air Navigation Services

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