Journal of Airline Operations and Aviation Management

Article

The Sustainability of Airlines' Operations at Andalusian Airports and Tourist Destinations

Lázaro Florido-Benítez

Department of Business Organisation and Marketing, University of Málaga, Spain

Email: fb@uma.es, Orcid id: https://orcid.org/0000-0003-3360-6423

DOI: https://doi.org/10.64799/jaoam.V4.I1.3

Abstract.

The objective of this research is to analyse the sustainability of airlines' operations in Andalusian airports and tourist destinations. The management of commercial airlines and how they act in uncertain times is of great importance to improving their resilience and sustainability in the aviation and tourism industries. To determine the number of operations by airlines on Andalusian airports and their positioning at these five airports from 2004 to 2022, we collected airport and airline data from AENA's official website. Findings revealed that Andalusian airports are highly dependent on LCCs' operations. Indeed, LCCs provide more operations than legacy carriers in Andalusian airports. Moreover, we compared the five Andalusian airport data from the pandemic crisis in 2020 with the financial crisis in 2008. The pandemic crisis was worse than the financial crisis in passenger (–60%), operations (–47.2%), and air cargo terms (–3.6%). For this reason, this research has great scientific value for researchers, airlines, airport operators, DMOs, and stakeholders because it helps us better understand the importance of airlines' operations at airports and tourist destinations.

Keywords: airlines operations; sustainability; airports; Andalusia; tourist destinations.

Received Date 04 January 2025
Revised Date 30 March 2025
Accepted Date 05 May 2025

1. Introduction

Low-cost and legacy carriers are an integral factor in determining the accessibility and frequency evaluation of tourist destinations and their airports. Most airlines experienced rapid growth up until 2019. Indeed, according to the World Tourism Organization (UNWTO) reported that 54% of foreign tourists travelled by air in 2021, fully revealing the important position of air transport in tourism demand and supply [1]. Conversely, the COVID-19 pandemic, Brexit, Russia's invasion of Ukraine, and Israel and Hamas war have provoked a change of strategy by airline operators in terms of operational activities and sustainability policies at airports and cities due to cost increases (labour and oil) as the results of the pandemic crisis and the ban on 90% Russian oil imports in 2022 by the European Council, which is diversifying energy supply sources and routes from other countries [2, 3]. Andalusian airports and tourist destinations are not exempt from the real difficulties confronting airline operators worldwide because Andalusian and Spanish tourist destinations are highly dependent on air transport, and 75% of tourists visiting Andalusia and Spain arrive by airplane [4].

The pandemic crisis and Brexit effects have been devastating for Andalusian tourist destinations, especially in the number of passengers' arrival at Andalusian airports, with a mean drop of –72.8% and –55.6% in 2020 and 2021, in comparison with 2019 [5]. Airports are ambassadors of tourist destinations, and low-cost and legacy airlines provide air corridors from origin to destination to improve the accessibility (included people with reduced mobility) of cities [6]. Airline operators and airports contribute to promoting local and regional economies in cities (see [7, 8, 9, 10]), but sometimes it is not enough to have an airport and airline operators in the city to be economically and operationally sustainable for both the city and airlines. However, there are limited scientific studies that tackle the sustainability of airlines' operations in a tourism context [11, 12, 13, 14] to enhance the efficiency, sustainability, and air accessibility of tourist destinations [15, 16, 17].

Zieba and Johansson [18] note that the sustainability of airlines is still an underexamined area in scholarly research. Indeed, post-pandemic scenarios in the aviation industry need to be analysed from different points of view due to an environment with high levels of instability and economic uncertainly [19] to make better future decisions. Thanks to the liberation of the European airline market, the accessibility of European cities improved [20, 21], especially in Spanish and Andalusian tourist destinations, where international tourists are the most valuable active in the tourism industry. The management of commercial airlines and how they act in uncertain times is of great importance to improving their resilience and sustainability in the aviation and tourism industries. Airlines boost the economies of cities and contribute to developing better sustainable development plans because they bridge people and specific places to the benefit of both. Abdi et al. [22] claim that tourist development plans developed by DMOs and regional authorities must address the sustainability of air routes and operations in the long term to maintain and increase the number of tourist arrivals at destinations. Tourist destinations need to be attractive in terms of business, technologies, tourist attractions, accommodations, and means of transport to attract thousands of tourists to the city by air transport every year [23].

To fill these research gaps, the objective of this research is to analyse the sustainability of airlines' operations in Andalusian airports and tourist destinations. In order to recoup the original investment in the aircraft and personnel expenditures, airline operators seek to optimize the benefits of each flight and route in the airports and cities in which they operate. Airline operators must reach the economic breakeven point and apply price discrimination, which enhances

revenues without increasing costs, to be sustainable in an ever more tailored, specialized, and competitive market. To improve the sustainability of airlines at tourist destinations, it would be necessary to tackle managing the main causes of interoperability and inefficiency of routes, flights, operations, and frequencies by airline operators, airports, and Destination Marketing Organizations (DMOs). For instance, the sustainability of Ryanair is based on secondary airports, reducing costs, offering lower prices than its competitors (Internet sales), and achieving successful arrangements with airports and DMOs.

On the contrary, legacy airlines have implemented new strategies to be more sustainable at airports and tourist destinations, like services' digitalization to simplify the customer journey and reduce costs, more efficient and sustainable airplanes (Airbus a350-900/Airbus a320neo, or Boeing 787 Dreamliner), paying extra for additional amenities based on products and services of quality, including low-cost carriers (LCCs) in their portfolio business to compete with the main LCCs like Ryanair, Southwest, EasyJet, AirAsia, IndiGo, Vueling, and Jet2.com, amongst many others. And finally, legacy carriers are designing new marketing and communication strategies based on promotion campaigns such as social media, TV, digital newspapers, and their official website and apps to stage their strengths, comparative advantages, and services (e.g., operating with hub-and-spoke airports and LCCs, higher air frequency and connectivity, plans to decarbonize the aircraft, or better quality, comfort, and convenience of flights) to attract more customers [24, 25].

2. Literature Review

2.1 The airline industry at Andalusia tourist destinations

Air connectivity provided by commercial and private airlines is vital for the development of islands and cities because airlines facilitate network connections (connectivity) and give accessibility to tourist destinations to stimulate tourism demand. Tourism demand for tourist destinations depends on airlines' connectivity and accessibility, and destinations' infrastructures [24]. The tourism industry at Andalusian destinations comprises various sectors like airports, airlines, DMOs, hotels, public transport, tourist attractions, restaurants, tour operators, and stakeholders [26, 27, 28]. The International Air Transport Association (IATA) reported that 58% of the world's population travelled by air in 2019 [29]. For instance, theme parks, museums, DMOs, and airport and airline operators jointly develop promotion campaigns and marketing strategies to stimulate tourism demand in cities and increase the number of tourists, especially in the US and Europe [30].

The Andalusian territory houses six airports: Málaga Costa del Sol airport (IATA code is AGP) localised in the city of Málaga; San Pablo airport in Seville (IATA: SVQ); Jerez La Parra airport in Cádiz (IATA: XRY); Federico García Lorca Granada-Jaén airport (IATA: GRX) in Granada; Almería-Antonio de Torres (IATA: LEI) in Almería, and Córdoba airport (IATA: ODB) in the city of Córdoba. In this research, Córdoba airport will not be analysed because this airport is used for military flights, aerial photographs, agricultural treatment companies, and other aerial work. Andalusian airports are managed by Spanish Airports and Aerial Navigation (AENA), a government-owned company; this is the largest airport operator in the world [31,32,33]. These five Andalusian airports analysed in this study provide globalized accessibility and connectivity to the Andalusian tourist destination with flights to 285 destinations around the world, and are operated by 110 commercial airlines, including low cost and legacy carriers (see Table 1). Lin [34] claims that airports and airlines' operations increase as the range of new air routes increases, the frequency of flights increases,

and links to hub airports and tourist destinations with high tourism flow demand increase.

Table 1. Andalusian airport destinations in 2023.

Airport	IATA code	Category	Destinations	Airlines
Málaga Costa del Sol	AGP	Tourist	151	64
Seville	SVQ	Regional	74	20
Jerez	XRY	Regional	19	12
Granada-Jaén	GRX	Regional	19	5
Almería	LEI	Tourist	22	9

Source. Own elaboration from [32, 33].

Andalusian DMOs encourage air connectivity through marketing and promotion campaigns to attract tourist segments [35]. In 2023, Andalusia, the city of Málaga, and Torremolinos city have developed new promotion campaigns in the World Travel Market (UK) and ITB Berlin (Germany) events, which include promoting the brand image of these three tourist destinations in London and Berlin cities through Vueling, Iberia, and Air Europa airlines' liveries and seats, and tourist buses to attract a large number of tourists with high purchasing power (see Figure 1).

Figure 1. Torremolinos city's promotion campaigns with Vueling airlines and tourist buses at ITB Berlin.

Source. Own elaboration. Note. Torremolinos tourist destination is localized in the province of Málaga.

The location of airports is an added value to improve the number of tourists in cities, and airlines' accessibility and connectivity are a competitive advantage in a globalized economy [24]. A study carried out by Zhang et al. [36] revealed that direct flights to foreign destinations, a high flight frequency, number of seats, and types of aircraft (efficiency, capacity, and low CO2 emissions) are part of a well-connected air transport system that improves a city's tourism and economic development. Airlines have democratized tourism and travel, and airports have provided access points to a global network of air travel and air logistics [37].

2.2 The sustainability of commercial airlines, a hard and tricky way in times of crisis

Ensuring airlines' economic sustainability is decisive for the tourism industry, and the accessibility of tourist destinations. The COVID-19 pandemic, Brexit crisis, and Russia-Ukraine war are having a huge impact across the globe,

especially in the air transport and tourism industries. The side effects caused by these catastrophic events have impacted negatively on airline operators; they are facing a liquidity crisis and declining profits due to the increase in oil prices, over mounting fixed costs, and debt. In 2020, Austrian and Norwegian airlines temporarily suspended flight operations due to the impact of the COVID-19 pandemic and subsequently received financial aid from governments. Although with a debt-to-equity swap reduction of about $795 million, Spirit Airlines has emerged from its Chapter 11 restructuring. In fact, this LCC also received a $350 million equity investment from investors to support future initiatives and cover new air routes in the US [38]. Air transport will always be exposed to exogenous variables such as financial and economic crises, decarbonization activities, wars, the oil crisis of 2002, or even terrorist attacks, as in the case of 11 September 2001. Agrawal [39]. revealed that the operational viability of airlines is focused on the recovery of variable expenses and minimizing losses due to the pandemic crisis. Moreover, DMOs, airports, and stakeholders play an important role in the sustainability of commercial airlines through promotion campaigns of tourist destinations, and the opening of new air routes [40, 41]. US airlines implemented diverse strategies in terms of route entry and retention, pricing, and load factor to tackle the pandemic crisis [42]. Airline operators need to develop promotional campaigns based on ticket price discounts, loyalty programs, or even special awards to recognize their most loyal passengers [43].

For instance, passengers of legacy carriers are less sensitive to prices and frequencies of flights than LCCs because legacy carriers provide better non-stop point-to-point services at hub and spoke airports (connectivity), and better ancillary services [44]. LCCs provide differentiated services, regional airports, and pricing strategies to compete with legacy carriers [45, 46, 47, 48]. Indeed, on air routes like London-Málaga or Manchester-Málaga, it is possible to complete a daily flight with guaranteed benefits, EasyJet and Ryanair airlines are good examples of this. On the contrary, the regional routes' sustainability needs more economic resources to reach benefits and a sustainable demand of passengers [49]. The air traffic flows and connections between cities through commercial and private airlines provide economic benefits to local and regional territories. For this reason, the presence of durable air routes in the long term stimulates tourism demand and improves the economic growth of tourist destinations [50].

2.3 Airline's operations at airports, a survival competition

The air transportation market is very competitive, especially in commercial airlines, where the liberalisation and deregulation of the sector facilitated the entry of new firms in 1978. Indeed, da Silveira Pereira and de Mello [51] consider that airline operators need to improve commercial's politics and negotiate with local and regional authorities marketing and promotion activities to increase the number of operations at airports, or even to survive in periods of uncertainly. Most airlines establish integrated hubs and operations control centres for the monitoring and adjustment of tactical operations at specific airports and strategic cities [52]. Sometimes airline operations are influenced by the airport's category, hotel location decisions by tourists, and the city's tourist attractiveness. For this reason, tourism flows are considered in the planning and management of DMOs to stimulate tourism demand at airlines and tourist destinations [53]. In 2022, Ryanair and EasyJet low-cost carriers were the main airline operators in European countries by average daily flights [54]. The airlines that provide services and operations (slots) to airports and cities must be profitable for airline operators, airports, and DMOs. The symbiotic relationship between airlines and tourist destinations contributes to enhancing tourists' experiences at destinations and their leisure time efficiency [55].

The COVID-19 pandemic has affected the airline market structures and increased fierce competition between all

US and European airlines (e.g., increase in operating costs, large-scale employee dismissals, cease of operations, and bankrupt airlines) to increase the number of operations at airports and the number of passengers, with the aim of recovering economic losses caused by the effects of the pandemic crisis. Weekx and Buyle [56] note that most airlines' survival mostly depends on state aid, more sustainable operations in terms of costs and revenues, increasing the number of operations at airports, and growing debt. These new circumstances are provoking new business, hybrid market, and operational strategies, and some legacy carriers are increasing their market share and becoming more dominant while other airlines are disappearing. For example, Iberia and British Airways (International Airlines Group known as IAG) bought Air Europa airlines for 423 million euros in February 2023, or the purchase of Flybe's slots at Heathrow and Schiphol airports (Flybe declared bankruptcy) by the Air France-KLM Group. In fact, this group is negotiating the purchase of the state-owned TAP Portuguese flag carrier due to the TAP airline's strong presence in ten Brazilian destinations as a key factor for new strategic and operational alliances [57, 58, 59].

3. Methodology

To determine the number of operations by airlines on Andalusian airports, and their positioning at these five airports from 2004 to 2022, we collected airport and airline data from AENA's official website. Our dataset comprises a panel of 13,050 observations (total airport operations and airlines' operations), spanning 19 years (2004–2022) from five Andalusian airports and provinces analysed. In addition, we have to stress the importance of the period assessed in this study, as well as the evolution of airlines' operations in the last 19 years, because we may also compare the impact of the financial crisis in 2008 and the COVID-19 pandemic crisis in 2019 at Andalusian airports and the airlines that were operating in these airports. Kaffash and Khezrimotlagh [44] note that airport and airline operations during the pandemic and financial crisis are another topic that attracts scholars' attention because the effects of the pandemic and financial crisis on LCC and legacy carriers have not been compared within one systematic review or other method and supported by updated qualitative and quantitative data [60, 61]. This is one of the main reasons why we implemented in this research airlines that ceased operations or filed for bankruptcy and were operating at Andalusian airports within the period set in the said paper. Commercial airlines like Air Berlin, Monarch Airlines, or even the recent Flybe are a real example of the difficulty in generating benefits in the air transport industry.

In benchmarking regional airports in a national and international context, researchers must take into account all commercial and private airlines that are operating at airports to assess the importance of the airport and airlines' operations because both provide the accessibility and connectivity of the destination where these are operating [5, 56]. An LCC or legacy carrier is dominant at an airport when it has performed the most flights on that airport [62]. The methodology and result sections in this research must be analysed in a tourism context because Andalusian tourist destinations and airports are highly dependent on international tourist arrivals and commercial airlines, which provide air accessibility and connectivity to the cities. Moreover, this study has implemented hotel occupancy rates from the National Statistics Institute's (INE) database to measure the impact of airlines' operations and passengers at Andalusian hotels during the period defined in this research.

For instance, US (prevalence of domestic tourism) and Spain (prevalence of international tourism) tourist destinations and their tourism flows are linked to LCC's operations due to the supremacy of operations at airports by

these types of airlines. In the last 30 years, the proliferation of LCCs in air transport has provoked new and significant challenges for legacy airlines at US and Spanish airports and tourist destinations [63, 64]. Although legacy carriers weathered the economic and pandemic crisis better than LCCs in terms of costs and benefits. From a managerial perspective, we are also interested in comparing LCC and legacy carriers' operations at Andalusia airports using AENA Group's statistics data, so airport and airline operators and DMOs can make better decisions about sustainable and operational activities and business and marketing strategies in times of economic uncertainly.

4. Results of research

4.1 Andalusian airports' revenues are associated with airlines' operations

Government bodies introduce requirements of competition at public airports in the areas of passenger, airline operations, air cargo, and aircraft handling (e.g., slots, aircraft maintenance, operational bases, logistics activity, amongst many others) so they can maximize their own benefits and recover the investment of airport infrastructure in the long term [65]. That is, government bodies want assurance that airport operators can be sustainable and self-sufficient in economic and operational terms. Panel A of Figure 2 displays the total national and international passenger arrivals at five Andalusian airports, with Málaga airport being the main gateway for access to the territory of Andalusia, an air globalised connectivity that has brought 260 million passengers (2004-2022) and great benefits for Málaga airport and the destinations visited. Nevertheless, Seville airport combines its business portfolio better than the rest of the Andalusian airports, this regional airport is focused on passengers, air cargo, logistics, Airbus' military transport assembly line, aircraft maintenance, and the operational bases of LCCs services. Seville airport received 85 million passengers, but its true strength lies in the diversity of its business portfolio.

AENA Group categorizes Jerez and Granada-Jaén as regional airports, and Almería as a tourist airport. Although their passenger and operations figures are lower than those of Málaga and Seville airports, these three airports are very important to Andalusian destinations because they have improved accessibility and connectivity throughout the Andalusian territory. Among these three airports that received 52 million passengers in the period established by this research, this represents quite a significant number to enhance the Andalusian economy and tourism industries. From 2004 to 2022, Andalusian airports have not stopped growing in passenger terms (see Panel A of Figure 2), except in 2020 and 2021, where we can see a mean drop of –74.5% in 2020, and –59.7 in 2021 in passenger arrivals [32]. These findings were rather startling if we compare these two years with data obtained in 2019. Indeed, if we compare the five Andalusian airport data from the pandemic crisis in 2020 with the financial crisis in 2008, the pandemic crisis was worse than the financial crisis in passenger (–60%), operations (–47.2%), and air cargo terms (–3.6%).

Notwithstanding, the categorization of an airport is very important for airline operations and tourist destinations where airports are operating since the growth of airline operations depends on the connectivity potential of the airport to other destinations. Moreover, Cheung et al. [66] suggest that most LCC and legacy carriers want to operate in large hub airports because these airports offer more transfer opportunities and strategic partnerships with other airlines than regional and tourist airports.

For instance, the category of Málaga Costa del Sol (tourist airport) is limited by AENA Group and the Spanish

government because they want to maintain absolute air routes and logistics supremacy in Madrid-Barajas (IATA: MAD) and Barcelona-El Prat (IATA: BCN) airports. This circumstance reduces the economic and operational growth of Málaga airport (IATA: AGP). Given that this airport can be a hub-and-spoke perfectly in passenger terms according to the category adopted by the Federal Aviation Administration (FAA), this US government entity notes that to be a large hub airport, it must receive 1 percent, or more than 6,61 million passengers, of the annual US commercial enplanements [67]. In the case of Málaga airport, this quota of 1%, or 6,61 million passenger enplanements per year, was easily reached by 7.5% and 18,5 million passenger enplanements in 2022. Málaga airport has the operational capacity to be a hub airport, although MAD and BCN airport's interests are imposed for political reasons [68].

According to the results of research, Panel B of Figure 2 illustrates how airlines' operations continue to grow at Andalusian airports, especially Málaga airport, with 144 thousand operations in 2022 and matching the figures of 2019. This is not by chance, there is a joint strategic plan behind all of this, Málaga's DMO, Málaga's airport, commercial and private airlines, and stakeholders work together to align and position the city of Málaga worldwide as an important referent in the tourism, technology, logistics, and cybersecurity sectors. Google, Vodafone, Virus Total, DHL, Amazon, CitiGroup, EasyJet, Mayoral, Santander Bank, CapGemini, and Melia Hotels, amongst many others, have settled in this productive city due to its easy air connectivity, accessibility, and direct flights to the main cities around the world.

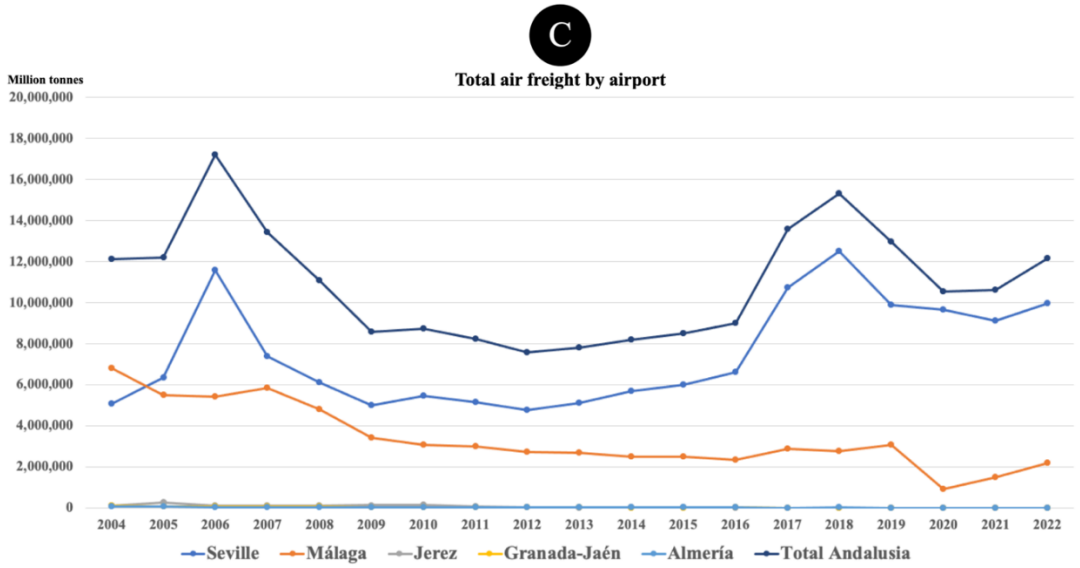


Figure 2. Total passenger arrivals, airlines' operations, and air freight at five Andalusian airports (2004-2022).

During the pandemic crisis, the airlines' operations in Andalusian air-ports plummeted to levels never seen before. In 2020, it dropped by –47%, and by –31% in 2021 on average between the five Andalusian airports with respect to 2019. As we can see in Panels B and C of Figure 2, Seville airport put up better against the pandemic crisis thanks to its dynamic business portfolio, as we remarked previously. Furthermore, Seville airport became the Andalusian's first airport in air freight with 68.4% of the total Andalusian air cargo, followed by AGP airport with 30.7%, XRY airport (0.47%), GRX airport (0.25%), and LEI airport with 0.15%. These results show how air cargo operations help to improve and increase airline operations at airports and reduce the effects of seasonality in the air transport and tourism industries. The real eco-nomic nature of commercial and private airlines and airports is to maximise the benefits associated with their operations, while also im-proving the local and regional economies of tourist destinations.

However, the rest of the tourists and regional Andalusian airports suffered an immediate and sharp decline in airline operations due to the imposition of domestic and international travel bans by governments around the world, especially Málaga airport, which is highly dependent on international tourism flows. For this reason, this research has great scientific value for researchers, airlines, airport operators, DMOs, and stakeholders because it helps us better understand the importance of airlines' operations at airports and tourist destinations. For example, in the period analysed (2004-2022) over 30 commercial airlines ceased operations or filed for bankruptcy in Europe (see Table 2), which dominated the first 10 places at Andalusian airports in terms of passengers and operations, like Air Berlin, Monarch Airlines, Thomas Cook Air-lines, Clickair, or Hapag-Lloyd Flug airlines. Airlines' cease of operations brought about a very difficult situation for these five Andalusian airports because there were no other airlines that covered the air routes abandoned at that time by ceased airlines, not to mention the total loss of passengers and tourists at Andalusian airports and tourist destinations. These findings reveal the importance of the sustainability of airlines' operations for cities and airport operators.

During the pandemic crisis, the airlines' operations in Andalusian air-ports plummeted to levels never seen before. In 2020, it dropped by –47%, and by –31% in 2021 on average between the five Andalusian airports with respect to 2019. As we can see in Panels B and C of Figure 2, Seville airport put up better against the pandemic crisis thanks to its

dynamic business portfolio, as we remarked previously. Furthermore, Seville airport became the Andalusian's first airport in air freight with 68.4% of the total Andalusian air cargo, followed by AGP airport with 30.7%, XRY airport (0.47%), GRX airport (0.25%), and LEI airport with 0.15%. These results show how air cargo operations help to improve and increase airline operations at airports and reduce the effects of seasonality in the air transport and tourism industries. The real eco-nomic nature of commercial and private airlines and airports is to maximise the benefits associated with their operations, while also im-proving the local and regional economies of tourist destinations.

However, the rest of the tourists and regional Andalusian airports suffered an immediate and sharp decline in airline operations due to the imposition of domestic and international travel bans by governments around the world, especially Málaga airport, which is highly dependent on international tourism flows. For this reason, this research has great scientific value for researchers, airlines, airport operators, DMOs, and stakeholders because it helps us better understand the importance of airlines' operations at airports and tourist destinations. For example, in the period analysed (2004-2022) over 30 commercial airlines ceased operations or filed for bankruptcy in Europe (see Table 2), which dominated the first 10 places at Andalusian airports in terms of passengers and operations, like Air Berlin, Monarch Airlines, Thomas Cook Air-lines, Clickair, or Hapag-Lloyd Flug airlines. Airlines' cease of operations brought about a very difficult situation for these five Andalusian airports because there were no other airlines that covered the air routes abandoned at that time by ceased airlines, not to mention the total loss of passengers and tourists at Andalusian airports and tourist destinations. These findings reveal the importance of the sustainability of airlines' operations for cities and airport operators.

Table 2. Andalusian airports affected by airlines that ceased operations/filed bankruptcy.

Nº	**Ceased operations/filed for insolvency**	**Airline category**
1	Spanair	LCC
2	Monarch Airlines	LCC
3	Air Berlin	LCC
4	Thomas Cook Airlines	LCC
5	Air Comet	Charter flights
6	Air Madrid S.A	Charter flights
7	Blue Line Airlines	Charter flights
8	British Midland Airways LTD	Charter flights
9	Air Méditerranée	Charter flights
10	Germania Fluggesellschaft mbH	Charter flights
11	DutchBird	Charter flights
12	Air Scandic	Charter flights
13	Aigle Azur	Charter flights
14	Germanwings	LCC
15	Iberworld Airlines S.A.	Regular and Charter flights
16	Lagun Air S.A.	Regional flights
17	Excel Airways	Regular and Charter flights
18	Braathens SAFE	Charter flights
19	Hapag-Lloyd Flug	LCC
20	Futura International Airways*	Charter flights
21	Mytravel airways	Charter flights
22	Sterling Airlines	LCC
23	Bmibaby LTD	LCC
24	Britannia Airways LTD	Charter flights
25	GB Airways	Charter flights
26	Clickair S.A	LCC

27	Andalus Líneas Aéreas S.A	Charter flights
28	Flybe Ltd	LCC
29	Helitt Líneas Aéreas*	Charter flights
30	Primera Air	Charter flights
31	Level Europe GmhB	Charter flights
32	Flyr AS	LCC
33	Air Antwerp	Regional and charter flights

Source. Own elaboration. Note. * Futura International Airways and Helitt airlines are in arrangement with creditors. All these airlines operated at Andalusian airports.

4.2 Andalusian airports provide economic and tourism stability at tourist destinations.

When commercial LCC and legacy carriers improve the number of operations at airports, it indicates that inputs and outputs are increased in the airport's operational activity and its hinterland [69], particularly in regional and tourist airports, which are highly dependent on accessibility, connectivity, frequency, sustainability of air routes, and travel demand by LCCs. The correlation between the number of passengers and tourism demand in cities, or hotel occupancy rate, has been proven by authors like [70, 71]. Figure 3 presents the hotel occupancy rates in Andalusian tourist destinations from 2004 to 2022. These results are aligned with airlines' operations at airports because Andalusian tourist destinations are dependent on-air transport, and 75% of tourists visiting Andalusia arrive by commercial airlines. The number of tourists in Andalusia is highly related to the number of national and international passenger arrivals in Andalusia airports through commercial airlines. Indeed, to regain Andalusian economic and tourism stability, it requires the active involvement of commercial airlines and airports to stimulate tourism demand. Carter et al. [72] note that hotel occupancy rates plunged during the pandemic, due to the reduction of airlines' operations and passenger numbers.

In Figure 3, we can observe that the COVID-19 pandemic crisis has had a more significant impact on hotel occupancy rates than the global financial crisis in 2008. This a due to the fact that the pandemic crisis affected the health and safety of citizens, and the recovery of the economy, air transport, and tourism activities was faster than the financial crisis because when most people were vaccinated around the world, all bans were unlocked, and all of us returned to normal life. Nonetheless, the global financial crisis had a direct impact on the global economy and citizens' pockets, therefore, tourism and leisure consumption were unfortunately reduced, and the recovery of tourism (hotel occupancy rate) and air transport (airlines operations) activities was slower in time (2008-2014) as we can see in Figures, 3, 4, and 5.

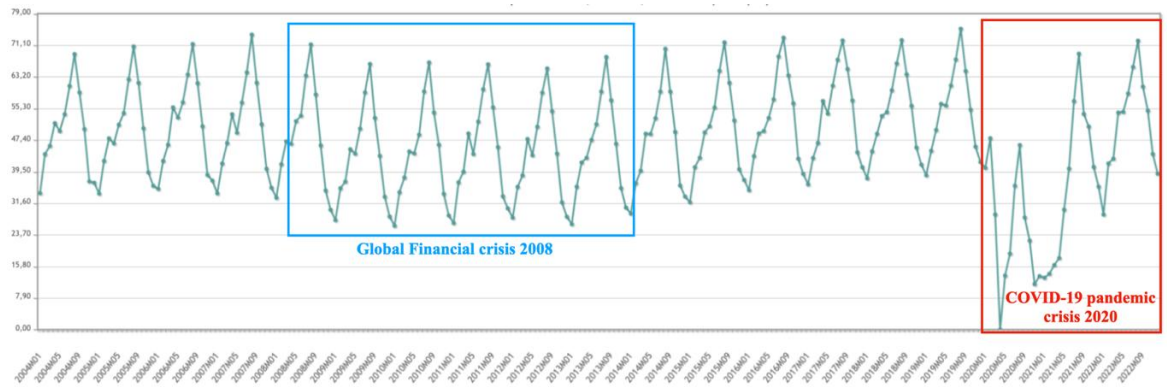


Figure 3. Hotel occupancy rate in Andalusia (2004-2022).

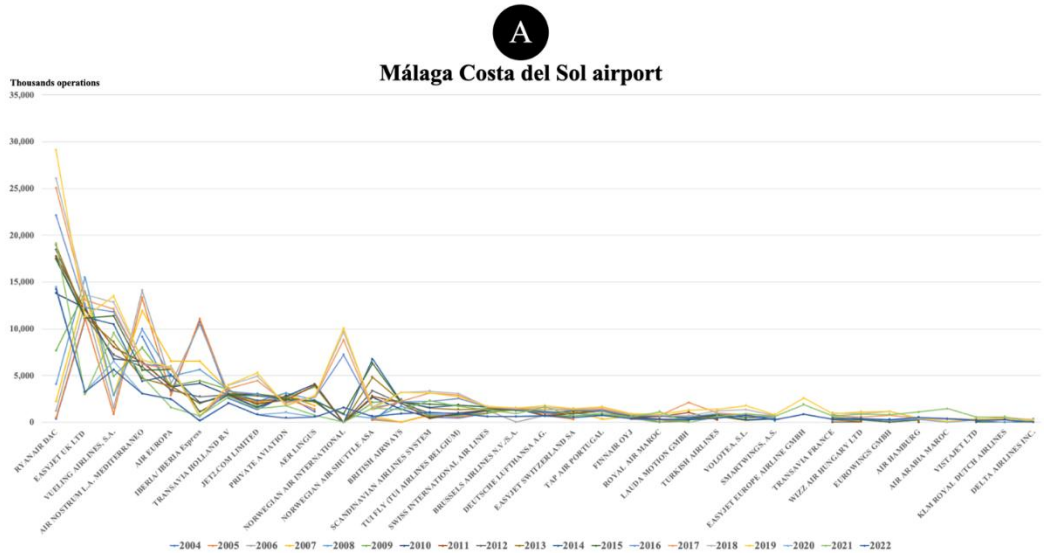
Source. Own elaboration from the National Statistics Institute (INE) [73].

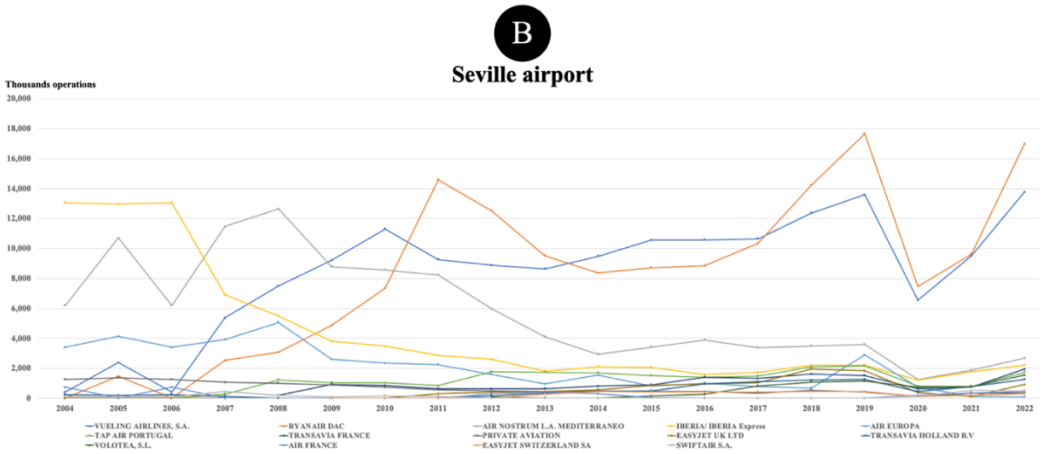
4.3 The sustainability of commercial airline operations in airports

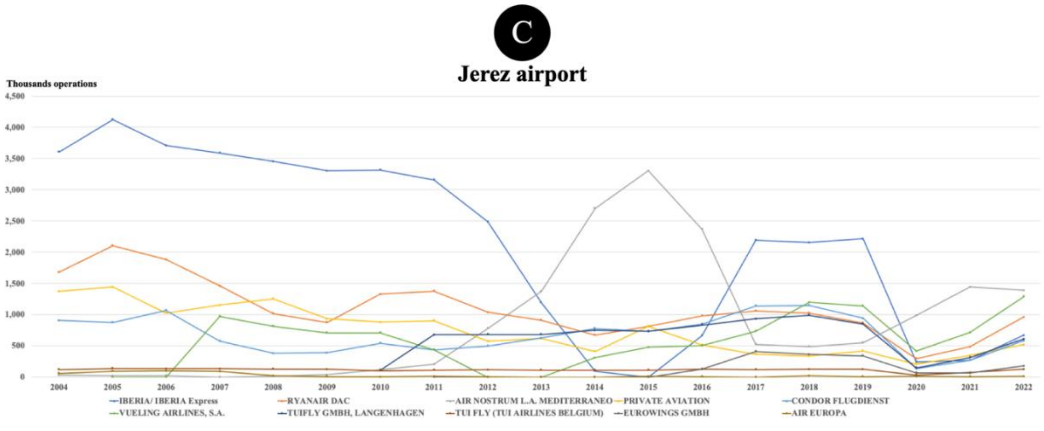
Regarding Figure 4, we will start analysing the top selected airlines at Málaga Costa del Sol airport according to the number of airlines' operations (see Panel A of Figure 4) and which are currently operating (not including ceased airlines). Ryanair airline is the number one by number of operations at AGP airport, with 270 thousand from 2004 to 2022; thus, this LCC had more operations than GRX airport (253 thou-sand operations), and LEI (258 thousand operations) in the period analysed in this study. This staggering figure of 270 thousand operations by Ryanair allows it to negotiate with airport operators the best possible operational and commercial conditions to maximize its benefits in Andalusia and the rest of European airports and tourist destinations. This company operates 84 air routes from Málaga airport thanks to its operating base, which allows Ryanair to offer cheap and direct flights throughout Europe. Denying the evidence of Ryanair's power at Andalusian airports and tourist destinations in terms of accessibility, connectivity, frequencies, passengers, and operations would not be objective on our part.

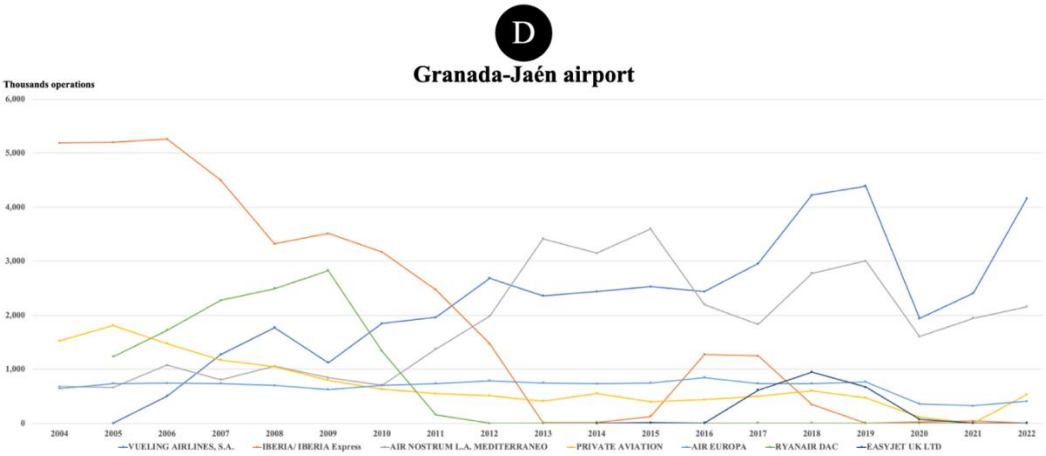
Second place is occupied by EasyJet airlines, with 207 thousand operations. This LCC also has a stable operating base at Málaga airport, which and favours operational stability and the increase in EasyJet operations. Vueling with 138 thousand operations, Air Nostrum with 137 thousand operations, and Air Europa airlines with 81 thousand operations follow in third, fourth, and fifth place. Iberia Express (66 thousand), Transavia Holland (58 thousand), Jet2.Com (47 thousand), Private Aviation (43 thousand), Air Lingus (42 thousand), and Norwegian Air international airlines with 41 thousand operations completed the top-eleven by number of operations at Málaga airport. The Málaga airport's operations share is mainly dominated by Ryanair, EasyJet, Vueling, Air Nostrum, and Air Europa low-cost carriers. These airlines provide mass tourism to the city of Málaga, which conditions the tour-ism demand and supply at the destination. Mass tourism remains a huge problem in the city of Málaga in terms of water resources, rental housing (gentrification), new infrastructure, and means of public transport during the summer season. Water resources are scarce in the city of Málaga, and the significant increase in floating population that tourism brings in the summer is a great problem for providing water for the population, agricultural, and industrial uses.

Regarding the private air companies, these business models have in-creased their presence on Andalusian airports thanks to the implantation of multinational companies and the Marbella tourist destination localised in the city of Málaga, where people with high purchasing power reside, such as actors/actresses, film directors, presidents, CEOs of large companies, the Emirate, and Dubai royal families, amongst many others. Private air companies are also a distinguishing element of the Málaga city to attract a tourism of quality and business, which improves the sustainability of airlines' operations at Andalusian air-ports and provinces. Overall, Málaga Costa del Sol is the airport that receives the greatest number of passengers, and airlines' operations at Andalusian airports. Airport facilities and services play a significant role in the overall satisfaction of passengers travelling through an air-port and the number of tourist arrivals in the cities [7]. Indeed, tourist destinations and airport operators must promote efficient and sustainable development to create public value within the destination and to be more competitive [55].


A
Málaga Costa del Sol airport
Thousands operations
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
RYANAIR DAC
EASYJET UK LTD
VUELING AIRLINES, S.A.
AIR NOSTRUM L.A. MEDITERRANEO
AIR EUROPA
IBERIA/ IBERIA Express
TRANSAVIA HOLLAND B.V
JET2.COM LIMITED
PRIVATE AVIATION
AER LINGUS
NORWEGIAN AIR INTERNATIONAL
NORWEGIAN AIR SHUTTLE ASA
BRITISH AIRWAYS
SCANDINAVIAN AIRLINES SYSTEM
TUI FLY (TUI AIRLINES BELGIUM)
SWISS INTERNATIONAL AIR LINES
BRUSSELS AIRLINES N.V./S.A.
DEUTSCHE LUFTHANSA A.G.
EASYJET SWITZERLAND SA
TAP AIR PORTUGAL
FINNAIR OYJ
ROYAL AIR MAROC
LAUDA MOTION GMBH
TURKISH AIRLINES
VOLOTEA, S.L.
SMARTWINGS, A.S.
EASYJET EUROPE AIRLINE GMBH
TRANSAVIA FRANCE
WIZZ AIR HUNGARY LTD
EUROWINGS GMBH
AIR ARABIA MAROC
VISTAJET LTD
KLM ROYAL DUTCH AIRLINES
DELTA AIRLINES INC.
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022


B
Seville airport
Thousands operations
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022
VUELING AIRLINES, S.A.
RYANAIR DAC
AIR NOSTRUM L.A. MEDITERRANEO
IBERIA/ IBERIA Express
AIR EUROPA
TAP AIR PORTUGAL
TRANSAVIA FRANCE
PRIVATE AVIATION
EASYJET UK LTD
TRANSAVIA HOLLAND B.V
VOLOTEA, S.L.
AIR FRANCE
EASYJET SWITZERLAND SA
SWIFTAIR S.A.


C
Jerez airport
Thousands operations
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022
IBERIA/ IBERIA Express
RYANAIR DAC
AIR NOSTRUM L.A. MEDITERRANEO
PRIVATE AVIATION
CONDOR FLUGDIENST
VUELING AIRLINES, S.A.
TUIFLY GMBH, LANGENHAGEN
TUI FLY (TUI AIRLINES BELGIUM)
EUROWINGS GMBH
AIR EUROPA


D
Granada-Jaén airport
Thousands operations
6,000
5,000
4,000
3,000
2,000
1,000
0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022
VUELING AIRLINES, S.A.
IBERIA/ IBERIA Express
AIR NOSTRUM L.A. MEDITERRANEO
PRIVATE AVIATION
AIR EUROPA
RYANAIR DAC
EASYJET UK LTD

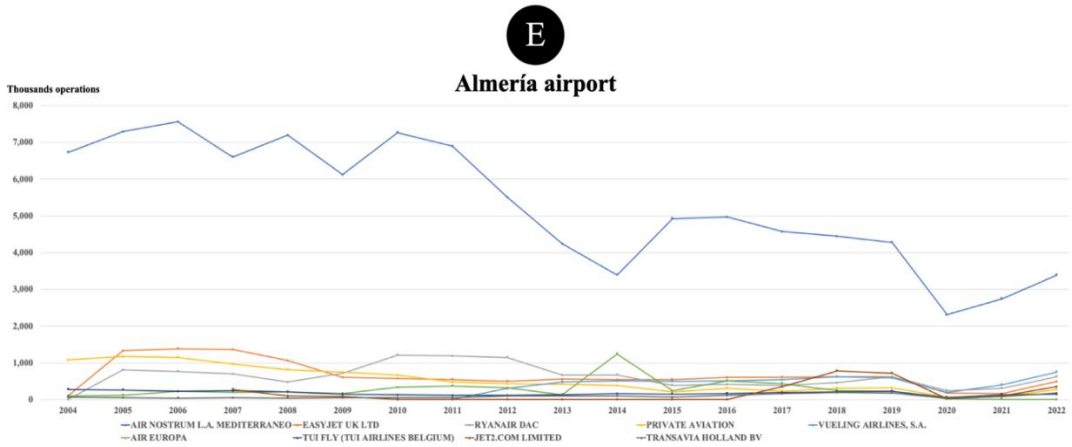


Figure 4. Number of operations by airlines at Andalusian airports (2004-2022).

Source. Own elaboration from [32].

Note. Airlines that were operating in the period analyzed (not included airlines that ceased operations or went bankrupt).

In Seville airport, Vueling airlines is the first operator with 160 thou-sand operations. This LCC has an operational base in this aerodrome. The main commercial strategy of this commercial airline is to operate in southern Europe and the Mediterranean arc from Seville airport and increase the number of air routes to the rest of Europe. Ryanair obtains second place with 158 thousand operations; like Vueling, Ryanair also holds its operational base in SVQ airport and its own aircraft maintenance centre. Air Nostrum with 109 thousand operations, Iberia Ex-press with 83 thousand operations, and Air Europa airlines with 38 thousand operations follow in third, fourth, and fifth place (see Panel B of Figure 4). Private aviation occupies the 9th position in the SVQ air-port. These results show us that private air companies also provide excellent accessibility and connectivity to the city of Seville and im-prove the number of airlines' operations at the airport.

As regards the Jerez airport, Iberia Express is the first airline by number of operations (40 thousand) at this airport. Iberia Express is a low-cost carrier created by IAG in 2012, and from 2004 to 2011, it was Iberia airline which operated in Andalusian airports. Like in Seville airport, Ryanair occupies the second place with 20 thousand operations, followed by Air Nostrum (16 thousand operations), Private Aviation (14 thousand operations), Condor Flugdienst airline (13 thou-sand operations), Vueling airline (10 thousand operations), and in seventh place, TUIfly Gmbh with 8 thousand operations (see Panel C of Figure 4). The rest of airlines' operations are below 2,500, but these offer very good connectivity to other European destinations. We should not forget that the sustainability benchmarking of airlines' operations at airports offers essential information related to the management of airlines and airport operators. Upham and Mills [74] claim that benchmarking airline operations in the aviation sector is useful for future marketing and business strategies.

With respect to the Granada-Jaén airport, Vueling airline has evident supremacy over operations at this aerodrome, its 40 thousand operations provide good accessibility and connectivity to the Granada and Jaén provinces. This LCC is owned by IAG and operates in the main European tourist destinations from Andalusian airports. The second airline operator is Iberia Express with 37 thousand operations, followed by Air Nostrum (25 thousand operations), Private Aviation (13,5 thousand operations), Air Europa (12,7 thousand operations), Ryanair (12 thousand operations), and

EasyJet UK with 2,3 thousand operations. As we can see from Panel D of Figure 4, Ryanair is not in the top five by number of operations because there is not a good commercial relationship between Granada and Jaén's DMOs and the Irish LCC. In 2011, Granada town hall refused to pay financial incentives to Ryanair because this airline cancelled 28 weekly flights in 2010, and that same year, the director of GRX airport reported an almost 20% drop in passengers in 2010 [75].

The findings have consistently shown that LCCs provide more operations than legacy carriers in Andalusian airports. For instance, Air Nostrum is the first airline with 100 thousand operations in Almería airport. This regional airline is owned by Iberia airline. It is the leading Spanish regional aviation company and operates around 350 flights a day. EasyJet ranks second on the list with 12,5 thousand operations, followed by Ryanair with 12 thousand operations, Private Aviation (10 thousand operations), Vueling (5,5 thousand operations), Air Europa (5,1 thousand operations), TuFly Belgium (3,3 thousand operations), Jet2.Com (2,8 thousand operations), and Transavia Holland airlines with 1,7 thousand operations. Although the predominance of LCCs at Andalusian airports and their large number of operations also have disadvantages, because the business relationship (airline-airport) is sustained over the short term, as soon as an airline reduces its benefits, the airline operator seeks the opportunity cost in another airport where this can maximize its benefits, like Ryanair, Jet2.com, or TUIfly airlines.

Furthermore, if an airport has a high dependence on LCCs, this may jeopardise the operability and effectiveness of the airport's accessibility and connectivity at tourist destinations. When Air Berlin and Monarch airlines ceased operations in 2017, and Thomas Cook in 2019, these airline operators destabilized and committed the operation of the airport systems of some Andalusian, Catalan, Canary, and Balearic airports. Airport operators need to guarantee the long-term stability and sustainability of commercial airlines' operations at airports to harmonize the joint commercial interests and economic benefits of airports, airlines, and DMOs. Niemeier and Forsyth [76] claim that there is competition between airports for LCC traffic, airport charges, and better connections to increase the number of passenger arrivals, or even to transfer passengers to other international airports [77].

5. Summary and conclusion

Findings have revealed that Andalusian airports are highly dependent on LCCs' operations and that these commercial operations might also turn out to be a double-edged sword for Andalusian airports and tourist destinations. The establishment of new low-cost airline operators at airports and the increase in airlines' operations benefit airport opera-tors, airlines, and DMOs in passenger, revenue, economic, tourist, stability, and sustainable terms. On the contrary, the drawdown of air-lines' operations by LCC and legacy carriers at airports affects the stability of airport operators and the accessibility of the tourist destination, as in the case of the financial and pandemic crises or when Air Berlin, Monarch, and Thomas Cook airlines ceased operations. Inevitably, whereas airlines and airport operators are suffering the effects of the pandemic crisis and Russia's invasion of Ukraine, these circum-stances will condition future entries and exits of airlines in the air transport sector.

Figure 5 illustrates the main airlines that have been operating at Andalusian airports by the number of operations in the period ana-lysed (2004-2022). The predominance of Ryanair's operations at air-ports means that this company has

a stronger bargaining position with airport operators than the rest of the airlines. The Irish LCC is the leader in operations and passengers at AGP airport, and this implies that the AENA operator and DMO provide better commercial and operational opportunities to Ryanair in the city of Málaga to stimulate passenger and tourist demand. For example, the sustainability and in-crease of airlines' operations at Andalusian airports in the period established revealed that was highly related to hotel occupancy rates. Indeed, from 2004 to 2022, airlines' operations and passenger arrivals at airports and hotels occupancy rate developments followed the same pattern in the Andalusian territory. Another aspect to be highlighted has to do with Ryanair and EasyJet LCCs; both airlines are ranked in the top ten places due to the United Kingdom being the largest issuer of tourists in Andalusian tourist destinations, according to the Junta de Andalucía [78].

Main airlines of Andalusian airports	Málaga Costa del Sol		Seville		Jerez		Granada-Jaén		Almería	
	Rank	% total operations	Rank	% total operations	Rank	% total operations	Rank	% total operations	Rank	% total operations
Ryanair DAC	1º	7.8%	2º	1%	2º	1%	6º	0.3%	3º	0.1%
EasyJet UK LTD	2º	1%	10º	0.1%	Not Predetermined	0.01%	7º	0.1%	2º	1%
Vueling Airlines S.A	3º	0.8%	1º	6.7%	6º	0.3%	1º	1.1%	5º	0.1%
Air Nostrum L.A Meditarraneo	4º	0.5%	3º	0.9%	3º	0.5%	3º	0.9%	1º	2.5%
Air Europa	5º	0.5%	5º	0.5%	10º	0.04%	5º	0.3%	6º	0.05%
IBERIA/ IBERIA EXPRESS	6º	0.3%	4º	0.7%	1º	20.2%	2º	1%	Not Predetermined	0.01%
Private Aviation	9º	0.2%	9º	0.1%	4º	0.4%	4º	0.4%	4º	0.1%
Total operations from 2004 to 2022	2,110,999		937,207		816,830		258,633		253,416	

Figure 5. The main airlines that were operating at Andalusian airports from 2004 to 2022.

Source. Own elaboration from [32].

Note. Airlines that were operating during the period analyzed. EasyJet airlines in Jerez airport, and Iberia/Iberia Express airlines in Almería airport do not have a specific rank because these two airlines provide a low ratio of operations.

EasyJet, Vueling, Air Nostrum, Air Europa, and Iberia Express low-cost airlines are also part of the prevalence of these business models at Andalusian airports due to their tourist and regional categories and reduction in airport taxes. Graham [79] notes that commercial airlines exploit the advantage of offering air connections to obtain subsidies or discounts on airport rates from DMOs and airport operators. Possibly, Vueling, Air Nostrum, Iberia Express, and Air Europa Spanish carriers are better placed in the award of slots by AENA Group to be a company with Spanish capital at Andalusian airports, through public tenders or the allocation of the grandfather rule. These operational strategies allow airport operators and airlines to improve the income for slots and routes with high demand. In addition to this, legacy carriers such as Iberia, British Airways, Air France, Lufthansa, or KLM companies have a lower level of operations and presence at Andalusian airports because they prefer to operate in Madrid-Barajas and Barcelona-El Prat hub airports, and their subsidiary airlines operate in regional and tourist airports for the enhancement of operations, reduce costs, and maximize the benefits of companies. For this purpose, the three main global airline alliances were created: Oneworld, SkyTeam, and Star Alliance.

The research's results reveal that LCCs promote market competition in Andalusian airports, but we must be aware that Vueling, Air Nostrum, Iberia Express, and Air Europa airlines are subsidiaries of Iberia airline, and this actually

reduces and distorts a fair competition for slots and the opening of new routes by other airlines. LCC and legacy carriers and airports have been the cornerstones of the accessibility of Andalusian territory economic and tourism improvement of tourist destinations in the last 20 years.

Over the last 20 years, private air companies have become extremely important at aerodromes and their air operations, and these have earned the top positions in Andalusian airports by number of operations. We are aware that ethical and environmental perspectives are not correct in terms of reducing substantially CO2 emissions and decarbonization in the private aviation industry, but we expect that the use of alternative fuels in the near future will improve citizens' perceptions of the image of the public and private aviation industry. Private airlines encourage the local and regional economies at cities, as well as attract a tourism of quality and business, which improves the sustainability of airlines' operations at Andalusian airports. For instance, reducing flight delays and optimising airlines' slots and air traffic management by airport operators helps to reduce considerably CO_2 emissions [80].

Commercial airlines mark the operations, economic, and tourism rhythm at airports and tourist destinations. The more airlines' operations and passenger arrivals at airports, the better for tourist destinations and their economies. Figure 6 presents the main negative and positive impacts on airlines' operations at Andalusian airports and provinces.

This research model will help us understand the importance of airlines' operations in the operability of airports and passenger arrivals in Andalusian provinces. Negative variables such as an increase in oil prices, rising taxes, a lack of liquidity by airlines, or even a financial and pandemic crisis may have negative effects on airlines' operations and therefore in airports and cities. Conversely, joint promotion campaigns by airports, airlines, and DMOs, low aviation taxes, operational base, and aircraft maintenance at airports, new commercial alliances, or even currency depreciation in destination positive variables improve the sustainability of airlines' operations, as well as increase the number of operations and connections with other airports. To stage the negative and positive impacts in airlines' operations may also help airline operators optimize in terms of use of airplanes, aircraft model, seating capacity, fixed and variable costs, and number of crew.

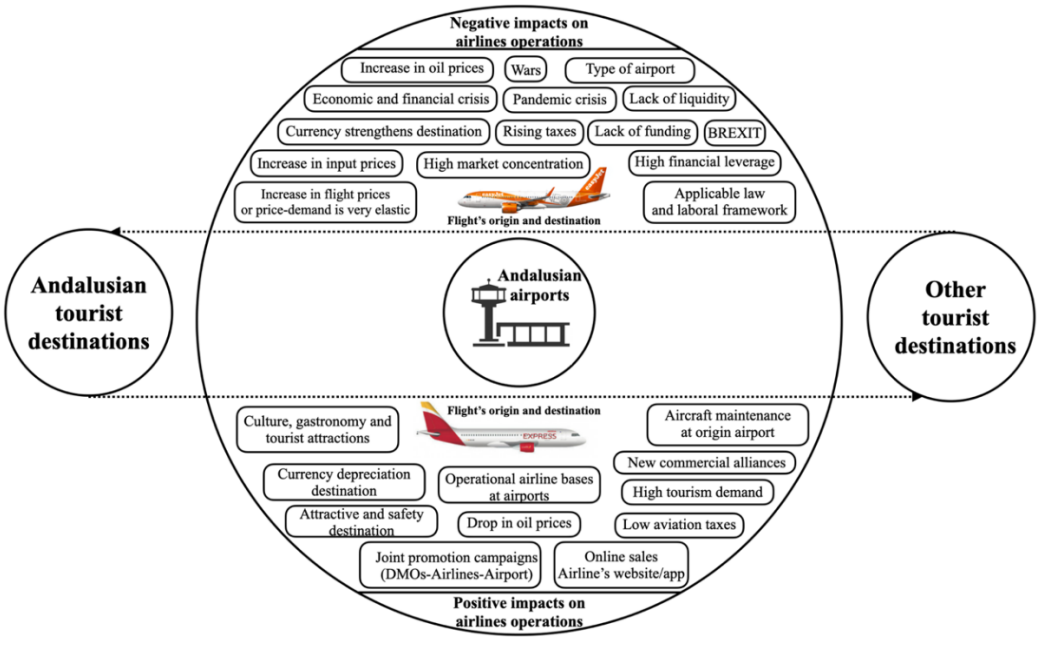


Figure 6. The main negative and positive impacts on airlines' operations.

Our findings have important business, operational, and marketing implications for Andalusian airports and tourist destination development. First, airport operators, airlines, and DMOs need to establish effective and binding agreements to solve the infringement of the relevant service obligations on the part of some airlines, as we have seen in this research. Second, airport operators and DMOs must develop contingency plans for each type of hazard likely to be experienced at airports, such as a reduction of airlines' operations due to economic or pandemic crises, wars, bankrupt national and international airlines., amongst many others. The third and last, airport operators, airlines, and DMOs should design joint marketing and promotion campaigns to improve the stability of airlines' operations, increase the number of passengers at airports, and stimulate tourism demand at tourist destinations.

Furthermore, further research may be required in order to tackle legacy carriers' operations in European capital cities and why these airlines have incentives to operate in hub-and-spoke airports after the pandemic crisis. Lastly, the sustainability of legacy carriers' operations at large hub airports is almost always guaranteed at airports; future research should focus on the conclusion of public procurement contracts (slots) by private and public organizations to analyse and compare the allocation of slots in the European countries and provide necessary conditions for equality in airline participation and representation.

Finally, this research has several limitations. It is really difficult to obtain data from LCC and legacy carriers and AENA operators in terms of the rentability of air routes, slot awarding, break-even points of flights for LCC and legacy carriers, and trade agreements between airlines and DMOs, amongst many others. Similarly, we needed to collect other relevant data, like why some LCCs ceased operations or filed bankruptcy, and justify the true motives because most commercial airlines did not cease operations during the pandemic crisis. Indeed, knowing this data helps us understand the real impact of ceased operations by some airlines at Andalusian and Spanish airports and develop better operational and commercial strategies to tackle future crises in uncertain times. Despite the increased future uncertainty brought on by geopolitical events like the wars between Israel and Hamas, Russia and Ukraine, and the imposition of steep protective tariffs by US President Donald Trump that are having a negative impact on the global economy, post-pandemic passenger trends showed how resilient aviation and airports are when recovering from the effects of major crises [81, 82].

Acknowledgements
The author would like to thank anonymous reviewers and editors for providing valuable suggestions and comments.
Ethics approval and consent to participate
Not applicable
Consent for publication
Not applicable
Author contributions
The only author of this article is Lázaro Florido-Benítez, fb@uma.es
Conceptualization, L.F.-B.; L.F.-B.; methodology L.F.-B.; review, L.F.-B.; validation, L.F.-B.; formal analysis, L.F.-B.; investigation, L.F.-B.; resources, L.F.-B.; data curation, L.F.-B..; writing—original draft preparation, L.F.-B.; writing—review and editing, L.F.-B..; visualization, L.F.-B.
Funding

This research received no external funding.

Data availability

The data used in this study were obtained from the following datasets: the the National Sta-tistics Institute (INE) https://www.ine.es, the Spanish Airports and Air Navigation (AENA) from https://www.aena.es/es/estadisticas/inicio.html, and Junta de Andalucía https://multimedia.andalucia.org/saeta/emisores_extranjeros_ene-sep20.pdf. All relevant datasets can be accessed through these links.

Declarations

Competing interests

The author declares no competing interests.

Clinical trial is not applicable

References

1. UNWTO. International Tourism Highlights, 2023 Edition–The Impact of COVID-19 on Tourism (2020–2022). https://www.e-unwto.org/doi/10.18111/9789284424986
2. European Council. Impact of Russia's invasion of Ukraine on the markets: EU response 2023. https://www.consilium.europa.eu/en/policies/eu-response-ukraine-invasion/impact-of-russia-s-invasion-of-ukraine-on-the-markets-eu-response/
3. Bhattacharjee A, Sidana N, Goel R, Shukre A, Singh T. Cross-border ripples: investigating stock market responses to Israel-Hamas conflict in trading partner nations using event study method. J Eco Stu. 2024; 52(4): 803–823. https://doi.org/10.1108/JES-05-2024-0291
4. Florido-Benítez L. The effects of COVID-19 on Andalusian tourism and aviation sector. Tour Rev. 2021; 76(4): 829–857. https://doi.org/10.1108/TR-12-2020-0574
5. Florido-Benítez L. The impact of tourism promotion in tourist destinations: A bibliometric study. Inter J Tour Ci. 2022; 8(4): 844–882. https://doi.org/10.1108/IJTC-09-2021-0191
6. Akhgarnusch A, Voß S, Ge L. Mystery shopping: Improving quality assurance of public transport services for people with restricted mobility using a prototypical mobile application. Proceedings of the 57th Hawaii International Conference on System Sciences, 2024; 1618–1627. https://hdl.handle.net/10125/106581
7. Florido-Benítez L. Airport marketing strategies: aviation and tourism perspectives. Emerald Limited. London. 2024.
8. Chen Y, Hou M, Wang K, Yang H. Government interventions in regional airline markets based on aircraft size—Welfare and environmental implications. Trans Res P A Po Pra. 2023; 169: 103593. https://doi.org/10.1016/j.tra.2023.103593
9. Foong, J.J., O'Connell, J.F., Warnock-Smith, D., & Efthymiou, M. (2023). A product and organizational architecture analysis of the performance of Southeast Asian airlines. J A Trans Mana. 2023; 107: 102358. https://doi.org/10.1016/j.jairtraman.2023.102358
10. Nerja A. Can parallel airline alliances be welfare improving? The case of airline–airport vertical agreement. Trans Res P A Po Pra. 2023; 167: 103559. https://doi.org/10.1016/j.tra.2022.11.019
11. El Zein M, Karimipanah T, Ameen A. Airports—Energy and Sustainability Perspectives. Energies. 2025; 18(6):1360. https://doi.org/10.3390/en18061360
12. Leal Filho W, Ng AW, Sharifi A, Janová J, Özuyar PG, Hemani C, Heyes G, Njau D, Rampasso I. Global tourism, climate change and energy sustainability: assessing carbon reduction mitigating measures from the aviation industry. Sus Scie. 2023; 18(2): 983–996. https://doi.org/10.1007/s11625-022-01207-x
13. Papatheodorou A. A review of research into air transport and tourism: Launching the Annals of Tourism Research Curated Collection on Air Transport and Tourism. A Tour Res. 2021; 87: 103151. https://doi.org/10.1016/j.annals.2021.103151
14. Yen H-P, Chen P-C, Ho K-C. Analyzing Destination Accessibility From the Perspective of Efficiency Among Tourism Origin Countries. Sage Open. 2021; 11(2): https://doi.org/10.1177/21582440211005752
15. Budd L, Ison S, Graham A. Factors affecting the cessation of commercial air services at English regional airports. J Trans Geo. 2024; 118: 103922. https://doi.org/10.1016/j.jtrangeo.2024.103922
16. Dileep MR, Kurien A. Air transport and tourism: Interrelationship, operations and strategies. Routledge. London. 2021. https://doi.org/10.4324/9781003136927
17. Hao J, Zhang L, Ji X, Wu X, Liu L. Investigating the accessibility between civil airports and tourist locations in

tourist cities in Yunnan province, china. Sustainability. 2020; 12(10): 3963. https://doi.org/10.3390/su12103963
18. 18. Zieba M, Johansson E. Sustainability reporting in the airline industry: Current literature and future research avenues. Trans Res P D Trans Envi. 2022; 102: 103133. https://doi.org/10.1016/j.trd.2021.103133
19. Kiraci K, Tanriverdi G, Akan E. Analysis of Factors Affecting the Sustainable Success of Airlines During the COVID-19 Pandemic. Trans Res Re. 2023; 2677(4): 350–379. https://doi.org/10.1177/03611981221104462
20. Gualini A, Martini G, Porta F. Are low-cost carriers airfares still lower? A comparison with full service carriers in Europe. J Air Trans Res Soc. 2024; 2: 100012. https://doi.org/10.1016/j.jatrs.2024.100012
21. Halpern N, Graham A. Airport Marketing. Routledge, Abingdon, Oxon. 2022.
22. Abdi Y, Li X, Càmara-Turull X. How financial performance influences investment in sustainable development initiatives in the airline industry: The moderation role of state-ownership. Sus Dev. 2022; 30(5): 1252–1267. https://doi.org/10.1002/sd.2314
23. Buhalis D, Leung XY, Fan D, Darcy S, Chen G, Xu F, Wei-Han Tan G, Nunkoo R, Farmaki A. Editorial: Tourism 2030 and the contribution to the sustainable development goals: the tourism review viewpoint. Tourism Rev. 2023; 78. 293–313. https://doi.org/10.1108/TR-04-2023-620
24. Florido-Benítez L. The location of airport an added value to improve the number of visitors at US museums. Ca Stu Trans Po. 2023; 11: 100961. https://doi.org/10.1016/j.cstp.2023.100961
25. Mahesh S, Calvert SC. Decarbonizing airport access: A review of landside transport sustainability. Trans Res P D Trans Envi. 2025; 140: 104625. https://doi.org/10.1016/j.trd.2025.104625
26. Liasidou S, Garanti Z, Pipyros K. Air transportation and tourism interactions and actions for competitive destinations: the case of Cyprus. Wo Hos Tour The. 2022; 14(5): 470–480. https://doi.org/10.1108/WHATT-07-2022-0079
27. Shang Y. Destination Competitiveness and the High Speed Railway in Seville. In 2019 5th International Conference on Information Management (ICIM). IEEE. 2019; 341–345. https://doi.org/10.1109/INFOMAN.2019.8714653
28. Durán-Román JL, Pulido-Fernández JI, Rey-Carmona FJ, Margarita Núñez-Tabales J. Willingness to Pay by Tourist Companies for Improving Sustainability and Competitiveness in a Mature Destination. Lei Sci. 2022; 47(4): 630–651. https://doi.org/10.1080/01490400.2022.2123072
29. IATA. Global Outlook for air transport. Times of turbulence. https://www.iata.org/en/iata-repository/publications/economic-reports/airline-industry-economic-performance---june-2022---report/
30. Florido-Benítez L. English, German, and French Tourists Are Key to the Success of Andalusian Destinations (Spain). Sustainability. 2023; 15(16):12521. https://doi.org/10.3390/su151612521
31. Fernández XL, Coto-Millán PC, Díaz-Medina B. The impact of tourism on airport efficiency: The Spanish case. Uti Po. 2018; 55: 52–58. https://doi.org/10.1016/j.jup.2018.09.002
32. AENA. Statistics of air traffic. https://www.aena.es/es/estadisticas/inicio.html
33. AENA. Destination of airport. https://www.aena.es/es/malaga-costa-del-sol/aerolineas-y-destinos/destinos-aeropuerto.html
34. Lin PC. The propagation of European airports' on-time performance and on-time flights via air connectivity prior to the Covid-19 pandemic. J Air Trans Mana. 2023; 109: 102382. https://doi.org/10.1016/j.jairtraman.2023.102382
35. Eugenio-Martin JL, Perez-Granja U. Quantifying the net impact and redistribution effects of airlines' exits on passenger traffic. J Air Trans Mana. 2022; 101: 102206. https://doi.org/10.1016/j.jairtraman.2022.102206
36. Zhang L, Hou M, Liu Y, Wang K, Yang H. Measuring Beijing's international air connectivity and suggestions for improvement post COVID-19. Trans Po. 2022; 116: 132–143. https://doi.org/10.1016/j.tranpol.2021.11.015
37. Lenaerts B, Allroggen F, Malina R. Air connectivity and regional employment: a spatial econometrics approach. Re Stu. 2023; 57(3): 560–575. https://doi.org/10.1080/00343404.2022.2059069
38. Boynton C. Spirit Airlines Emerges From Chapter 11 Bankruptcy 'More Focused'. 2025. https://aviationweek.com/air-transport/airlines-lessors/spirit-airlines-emerges-chapter-11-bankruptcy-more-focused?elq2=2d020b6aa076489d803a863c6f63399f&sp_eh=baa8a77687521002b8cf9be61fdeed412a2f055610d6fd767395b43e38d3b46d&elq2=2d020b6aa076489d803a863c6f63399f&sp_eh=baa8a77687521002b8cf9be61fdeed412a2f055610d6fd767395b43e38d3b46d&utm_campaign=52326&utm_emailname=AW_News_AirTransportDigest_NL_03132025&utm_medium=email&utm_rid=CPEN1000065657346
39. Agrawal A. Sustainability of airlines in India with Covid-19: Challenges ahead and possible way-outs. J Re Pri Mana. 2021; 20: 457–472. https://doi.org/10.1057/s41272-020-00257-z
40. Singh J, Rana S, Abdul Hamid AB, Gupta P. Who should hold the baton of aviation sustainability? So Res J. 2022; 19(7): 1161–1177. https://doi.org/10.1108/SRJ-05-2021-0181
41. Doganis R. Flying off course. Airline Economics and Marketing. Routledge, UK. 2019.
42. Gualini A, Zou L, Dresner M. Airline strategies during the pandemic: What worked? Trans Res P A Po Pra. 2023; 170: 103625. https://doi.org/10.1016/j.tra.2023.103625

43. Kim S, Kim J, Choi Y. Airline communication message strategies during crisis. Tour Rev. 2023; 78(6): 1452–1465. https://doi.org/10.1108/TR-08-2022-0388
44. Francis G, Dennis N, Ison S, Humphreys I. The transferability of the low-cost model to long-haul airline operations. Tour Mana. 2007; 28(2): 391–398. https://doi.org/10.1016/j.tourman.2006.04.014
45. Avogadro N, Malighetti P, Redondi R, Salanti A. A tale of airline competition: When full-service carriers undercut low-cost carriers fares. J Air Trans Mana. 2021; 92: 102027. https://doi.org/10.1016/j.jairtraman.2021.102027
46. Kaffash S, Khezrimotlagh D. US network and low-cost carriers' performance in response to COVID-19: Strictness of government policies and passengers' panic. Res Trans Bus Mana. 2023; 46: 100835. https://doi.org/10.1016/j.rtbm.2022.100835
47. Silveira L, Santos N, Moreira CO. The Liberalisation of Air Transport and the Impacts on Travel and Tourism: The Case of the Azores Archipelago. Sustainability. 2023: 15(5): 4488. https://doi.org/10.3390/su15054488
48. Alsharari NM. The impact of low-cost carriers on high-quality producers in the aviation industry: cost-benefit analysis. J Mo Bu. 2024; 4(1): 107–120. https://doi.org/10.1108/JMB-11-2023-0064
49. Ng KT, Fu X, Hanaoka S, Oum TH. Japanese aviation market performance during the COVID-19 pandemic-Analyzing airline yield and competition in the domestic market. Trans Po. 2022; 116: 237–247. https://doi.org/10.1016/j.tranpol.2021.12.006
50. Manello A, Scotti D, Volta N. Air connection dropouts and isolation risks across European regions. Re Stu. 2022; 56(3): 447–458. https://doi.org/10.1080/00343404.2021.1947483
51. da Silveira Pereira D, de Mello, JCCS. Efficiency evaluation of Brazilian airlines operations considering the Covid-19 outbreak. J Air Tra Mana. 2021; 91: 101976. https://doi.org/10.1016/j.jairtraman.2020.101976
52. Evler J, Asadi E, Preis H, Fricke H. Airline ground operations: Schedule recovery optimization approach with constrained resources. Transportation Research Part C: Eme Tech. 2021; 128: 103129. https://doi.org/10.1016/j.trc.2021.103129
53. Liasidou S. Examining Cross-Industry Clusters among Airline and Tourism Industries. Tour Hos. 2024; 5(1): 112–123. https://doi.org/10.3390/tourhosp5010008
54. EUROCONTROL European aviation overview. https://www.eurocontrol.int/publication/eurocontrol-european-aviation-overview
55. Florido-Benítez L, Morrison AM, Coca-Stefaniak, JA. Aerotainment – merging airport and theme park experiences. A Tour Res. 2025; 110: 103881. https://doi.org/10.1016/j.annals.2024.103881
56. Weekx S, Buyle S. The effect of airline dominance on airport performance: Empirical evidence from medium-sized European airports. J Air Tra Mana. 2023; 107: 102317. https://doi.org/10.1016/j.jairtraman.2022.102317
57. Reuters. IAG agrees to buy 80% stake in Air Europa for 400 million euros. https://www.reuters.com/business/aerospace-defense/iag-agrees-buy-80-stake-air-europa-400-mln-euros-2023-02-23/
58. Reuters. Lufthansa, Air France-KLM eye Flybe landing slots, report says. https://www.reuters.com/business/aerospace-defense/lufthansa-air-france-klm-eye-flybe-landing-slots-report-2023-02-04/
59. Reuters. Air France-KLM interested in Portugal's TAP. https://www.reuters.com/markets/deals/air-france-klm-interested-portugals-tap-says-smith-2023-02-17/
60. Coto-Millán P, Casares-Hontañón P, Inglada V, Agüeros M, Pesquera MÁ, Badiola A. Small is beautiful? The impact of economic crisis, low cost carriers, and size on efficiency in Spanish airports (2009–2011). J Air Tran Mana. 2014; 40: 34–41. https://doi.org/10.1016/j.jairtraman.2014.05.006
61. Gil R, Kim M, Zanarone G. Relationships Under Stress: Relational Outsourcing in the U.S. Airline Industry After the 2008 Financial Crisis. Mana Sci. 2021; 68(2): 1256–1277. https://doi.org/10.1287/mnsc.2021.3970
62. Milioti C, Odoni AR. Airport "level" and market concentration in Europe. J Air Tra Res So. 2024; 2: 100007. https://doi.org/10.1016/j.jatrs.2024.100007
63. Azadian F, Vasigh B. The blurring lines between full-service network carriers and low-cost carriers: A financial perspective on business model convergence. Tra Po. 2019: 75: 19–26. https://doi.org/10.1016/j.tranpol.2018.12.012
64. Martín JC, Román CA. Benchmarking Analysis of Spanish Commercial Airports. A Comparison Between SMOP and DEA Ranking Methods. Networks and Spatial Economics. 2006; 6: 111–134. https://doi.org/10.1007/s11067-006-7696-1
65. Karanki F, Bilotkach V. The impact of Airport business practices and governance forms on excess capacity. Eco Tran. 2024; 38: 100353. https://doi.org/10.1016/j.ecotra.2024.100353
66. Cheung TK, Wong CW, Lei Z. Assessment of hub airports' connectivity and Self-Connection Potentials. Tran Po. 2022; 127: 250–259. https://doi.org/10.1016/j.tranpol.2022.09.003
67. FAA. Airport Categories. https://www.faa.gov/airports/planning_capacity/categories
68. Florido-Benítez L. How Málaga's airport contributes to promotes the establishment of companies in its hinterland and improves the local economy. Inter J Tour Ci. 2022; 8(2): 393–411.

https://doi.org/10.1108/IJTC-04-2021-0059
69. Florido-Benítez L. Malaga Costa del Sol airport and its new conceptualization of hinterland. Tour. Cri. 2021; 2(2): 195–221. https://doi.org/10.1108/TRC-05-2021-0010
70. Mazzola F, Cirà A, Ruggieri G, Butler R. Air transport and tourism flows to islands: A panel analysis for southern European countries. Inter J Tour Re. 2022; 24: 639–652. https://doi.org/10.1002/jtr.2527
71. Forbes SJ, Kosová R. Does Competition Benefit Complements? Evidence from Airlines and Hotels. Mana Sci. 2022; 69(8): 4733–4752. https://doi.org/10.1287/mnsc.2022.4568
72. Carter D, Mazumder S, Simkins B, Sisneros E. The stock price reaction of the COVID-19 pandemic on the airline, hotel, and tourism industries. Fi Res Le. 2022; 44: 102047. https://doi.org/10.1016/j.frl.2021.102047
73. INE. Andalusian hotel occupancy rate. https://www.ine.es/dyngs/INEbase/en/operacion.htm?c=Estadistica_C&cid=1254736177015&menu=resultados&idp=1254735576863
74. Upham PJ, Mills JN. Environmental and operational sustainability of airports: Core indicators and stakeholder communication. Be Inter J. 2005; 12(2): 166–179. https://doi.org/10.1108/14635770510593103
75. Keely A. Granada say no to Ryanair. https://www.theolivepress.es/spain-news/2011/02/14/granada-say-no-to-ryanair/
76. Niemeier HM, Forsyth P. European Airport Reform: Slots and the Implicit Contract Between Airlines and Airports. In: Forsyth, P., Müller, J., Niemeier, HM., Pels, E. (eds) Economic Regulation of Urban and Regional Airports. Advances in Spatial Science. Springer, Cham. 2023; 215–244. https://doi.org/10.1007/978-3-031-20341-1_9
77. Adler N, Brudner A, Galloti R, Privitera F, Ramasco JJ. Does big data help answer big questions? The case of airport catchment areas & competition. Trans Re P B Metho. 2022; 166: 444–467. https://doi.org/10.1016/j.trb.2022.10.013
78. Junta de Andalucía. Main figures foreign tourist markets in Andalusia. https://multimedia.andalucia.org/saeta/emisores_extranjeros_ene-sep20.pdf
79. Graham A. Airport privatization: a successful journey? J Air Tra Mana. 2020; 89: 101930. https://doi.org/10.1016/j.jairtraman.2020.101930
80. Wang Y, Ni Y. Airport slot allocation with low-carbon consideration. Trans Re P E Lo Tran Re. 2025; 196: 104009. https://doi.org/10.1016/j.tre.2025.104009
81. Hiney N, Efthymiou M, Morgenroth E. Adapting to Uncertainty: Black Swans, VUCA Challenges and Airport Resilience Strategies. J Air Tra Res So. 2025; In Press: 100068. https://doi.org/10.1016/j.jatrs.2025.100068
82. Contractor FJ. Assessing the economic impact of tariffs: adaptations by multinationals and traders to mitigate tariffs. Re Inter Bu Stra. 2025; 35(2/3): 190–213. https://doi.org/10.1108/RIBS-01-2025-0013