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## Article

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## Article

# The Safety-Hygiene Air Corridor between UK and Spain Will Coexist with COVID-19

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**Abstract:** *Background:* The main goal of this case study is to analyze the air traffic, air cargo, and the safety-hygiene air corridor between UK and Spain, in airports managed by MAG Group (UK) and AENA Group (Spain). *Methods:* To review the specific paradigm of research which discusses, investigates, and analyses the air traffic, air cargo, and the safety-hygiene air corridor between UK and Spain at airports managed by MAG (UK) and AENA (Spain). *Results:* The air traffic that airlines project onto the UK-Spain corridor has decreased due to the pandemic, but the result of this research shows that in the medium term, to implement the new Safety-Hygiene Air Corridor (SHAC) will return to economically nurture airlines, airports and destination thanks to vaccines, the digital COVID-19 certificate that will give more confidence to passengers to travel, and with new COVID-19 safety regulations at airports and airlines. Furthermore, the results of the research show the need to create Safety-Hygiene Air Corridor Elements (SHACE) to improve the air activity of these countries. *Conclusions:* The study contributes towards providing solutions such as those we propose in this study, the UK-Spain SHAC and SHACE will guarantee the value of corridors between countries, reduce the uncertainty of airlines, organizations, and passengers, to restore the tourism and aviation industries.

**Keywords:** airports; airlines; air corridor; tourism; air cargo; digital COVID certificate; travel insurance



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## 1. Introduction

Tourism and aviation industries have been badly affected by the COVID-19 pandemic. Airports and airlines were also forced to undertake radical internal reform in operability and efficiency terms, due to the imposition of domestic and international travel bans by governments worldwide, leading to the reduction in the number of passengers at airports and on airlines. 'The international spread of COVID-19 is in public transport like airplanes, buses, and trains' [1], due to the rapid spread of the infection in closed spaces [2]. The prevention and control measures by governments at airports are not enough to contain this pandemic worldwide [3], and these insecurity and instability situations and the adoption of political positions are seriously affecting airports and airlines management in terms of revenues and costs [4].

Chatterjee et al. [5] suggest that governments must implement multiple air corridors for departure and arrival of aircrafts during the pandemic. Indeed, it would be necessary to establish travel corridors and their efficient maintenance would be a challenge for decision-makers such as airport operators [6]. The air corridor is a tube or band-shaped piece of airspace that connects congested airports and high-demand city areas. The effectiveness of a safe corridor is being explored in Japan, China, US, UK, and Spain by organizations, aeronautical engineers and researcher in aviation and tourism [7].

As stated by Dayour et al. [8], there were many impacts of the COVID-19 crisis on businesses (e.g., airports, retail companies, catering companies, amongst many others), while those relating to airlines included shutdowns, lay-offs, revenue drops, booking cancellations, and airlines that have filed for bankruptcy; in fact, 'some governments have questioned their need to financially support airport operations' [9].

This study seeks to contribute to improving safety-hygiene air corridors between countries with the ‘Digital COVID Certificate’, as long as governments implement efficient real-time disease safety controls. Airlines and airports urge Member States to develop online national portals to process and verify passengers’ DCCs digitally, from home ‘off airport’ [10]. According to IATA [11], the EU Digital COVID Certificate (DCC) is a digital proof that a person has either been vaccinated against COVID-19, received a negative test result, or recovered from COVID-19. Every country must suspend air corridors with those countries with the highest incidence, provided health authorities have an increase in the incidence of COVID-19. Muna et al. [12] indicate that air corridor design specifications are specific to each country and are defined by its respective federal aviation authority. The new Covid-19 variant named Omicron is a living proof of this, as governments are closing borders to protect their citizens and domestic markets. According to Amaro and Pound [13], and *The Guardian* [14] reported that European, Asian, and UK nations suspended flights from southern Africa due to the Omicron virus raising concerns. Indeed, air cargo has suffered a less severe depression than airlines’ passenger traffic because safety-hygiene measures in aviation were mainly targeted at air passengers [15].

A critical literature review is necessary to examine the impact of COVID-19 in the aviation industry. There are not many publications yet that provide a focused examination of this topic. To fill this gap, the main challenge of this paper is to analyze the air traffic, air cargo, and the safety-hygiene air corridor between the UK and Spain, in airports managed by MAG Group (Manchester, UK) and AENA Group (Madrid, Spain). We must point out that most of the airports in the UK are private, compared to Spanish airports, which have a government majority ownership and are managed through a Spanish government authority, but this study focuses on international business relations between them, with the aim of clarifying the aviation sector in these two countries inherently linked in commercial and touristic terms.

London Stansted, Manchester, and the East Midlands are managed by Manchester Airports Group (MAG). MAG’s ownership structure comprises a blend of public and private shareholders, including Manchester City Council, IFM Investors, and the Greater Manchester local authorities [16]. On the other hand, Spanish airports are managed by a central authority named AENA, a government-owned company. The centralized management forbids airport operators from deciding commercial policies. The airports’ charges are decided by AENA rather than by the airport managers [17]. This study focuses on four Andalusian airports: Málaga, Seville, Jerez, and Granada-Jaén. Andalusia is the most populated autonomous community in Spain, with 8,414,240 inhabitants at the end of 2019, representing 19.91% of Spain’s total population. The capital of Andalusia is Seville, and this region has eight provinces (Málaga, Seville, Granada, Almería, Cádiz, Córdoba, Huelva and Jaén) [18]. The two main airports in tourist arrivals are Málaga and Seville. Málaga airport is traditionally seen as the ambassador of tourism destinations in Andalusia.

To address the challenge, this study highlights current knowledge regarding the use of air corridors in aviation and tourism sectors and its subsequent analysis. Is it necessary to implement air corridors between the UK and Spain? Second, to tackle the literature review about this topic, triangulation, and logic models are used to strengthen validity. Thirdly, this paper investigates the role of Spanish and UK airports to analyze passengers’ arrivals, air traffic, air cargo, and the safety-hygiene air corridor between UK and Spain [19,20]. The result of this research shows that in the medium term, to implement new Safety-Hygiene Air Corridor (SHAC) will economically nurture airlines, airports, and tourist destinations, as well as create Safety-Hygiene Air Corridor Elements (SHACE) to improve the air activity between UK and Spain.

## 2. Literature Review

### 2.1. United Kingdom and Spain: An Eternal Commercial Relationship

A literature review article shows a global vision of the topic, method, and synthesizes prior studies to strengthen the foundation of knowledge [21]. Based on this introduction and

situation surrounding COVID-19, Abate et al. [22] suggest that air transport connectivity improves the local economy, tourism, and aviation sectors at destinations. For instance, one of air cargo carriers' key strengths is the transportation of perishable products around the world, in distance–time terms [23,24]. Managing international operations is a critical component of many firms' strategy nowadays [25]. The aviation sector needs to improve competitiveness and provide customers with enriched shipping quality, service, and better predictability. For this reason, airline operations and good connections between airports are very important for air cargo connectivity [26]. A case study based on air corridor data within 150 miles of Edwards Air Force Base in Los Angeles (California) revealed that air corridor and traffic flow characteristics improve the operational architecture of the corridor's locations; in fact, airport and airlines operators might make better decisions in terms of space and time to design new air corridors [27].

The European Union [28] introduced and promoted the Green Transport Corridor concept as a cornerstone for the development of integrated and sustainable transport solutions based on trans-nationality, multi-modality, and a high involvement of public and private stakeholders, including at the political level [29]. The air corridor of Akara-Fukue stretches 515 km (320 miles) from the Chinese ICAO designated-area called Akara on its eastern coast to Japan's Fukue Island. This air corridor improved the air connectivity between Incheon airport and Shanghai airport and reduced the risk of aircraft collisions. [30]. The definition of an air corridor is flexible in nature, and it is an integral part of the advanced air mobility infrastructure, which is utilized to carry passengers and freight [12].

This research makes a first attempt to design air corridors with this new concept named Safety-Hygiene Air Corridor (SHAC), an air route from point A to point B, where governments control and supervise all passengers and goods, and airline processes under safety and hygiene standards that guarantee free-virus infection travel. In this research, we focus on UK-Spain SHAC, because both countries have a high dependence on tourist flows, tourist spending, air cargo, and airlines that operate in both destinations. For example, in 2019 there were 40.9 million visits to the UK, 1% up on visits in 2018. Those inbound visitors spent £28.4 billion in 2019, up 7% on inbound spending in 2018, setting a new record for inbound spending. The top ten inbound markets for the UK in terms of number of visits during 2019 accounted for three in five visits (60%). In 2019, 2.3 million Spanish tourists visited UK, a 6% increase over the previous year, that is, Spain occupies a fifth-place ranking as a main tourist source country to the United Kingdom [31].

Meanwhile, FRONTUR [32] reported that in 2019 Spain received 18 million tourists from United Kingdom, significantly fewer English tourists: −8.22% compared with 2018. As stated by Florido-Benítez and del Alcázar [33], 75% of tourists visiting Spain arrive by plane. Managers of airport, airlines, and Destination Marketing Organization 'DMO' must adapt to new circumstances, be efficient, and plan their resources according to demand. The potential ripple effect upon employment and the English and Spanish economies are evident.

According to European Aviation Safety Agency EASA [34], airports of origin and destination, together with the airlines covering the flights, must form part of the Voluntary Monitoring Program of the Implementation of the EASA Operational Protocol for COVID-19 or have implemented the recommendations by the time flights depart. These companies should also report the maximum number of seats they plan to fill each day. The cornerstone of pandemic recovery is the vaccine and COVID-19 certificate; after that it will be open SHAC in all countries around the world. From the health authorities' point of view, the vaccines that have received European Medicines Agency (EMA) and US Food and Drug Administration (FDA) Emergency Use Authorization (EUA) provide reasonable defense against the variants of concern identified to date, but the COVID-19 certificate does not ensure the immunity against the virus [35]. Recently, the UK Department of Health and Social Care [36] reported that passengers need the digital COVID-19 certificate to travel abroad and domestically in England. DCCs have facilitated activities in the area of health, educational, occupational, and travel sectors during the pandemic period [37].

Let us take the Spanish Government as example. The Ministry of Industry, Trade and Tourism has reached an agreement with the regional governments of the Canary Islands and the Balearic Islands on a protocol to establish travel corridors with European countries. The agreement has been established to allow the mobility of travelers to reactivate tourism in the two Spanish archipelagos without putting the public at risk [38]. The tourism corridor protocol is a method based on the implementation of measures that will safeguard public health and minimize the risks associated with tourism mobility. These measures will ensure tourism can be restored in a safe way and eliminate fears in source countries regarding overseas travel amongst citizens. Tourism is a heterogenous market and is driven by product quality, profit margins, and country of origin associations [39].

## 2.2. Safety-Hygiene Air Corridor (SHAC) to Minimize the Risks of COVID-19

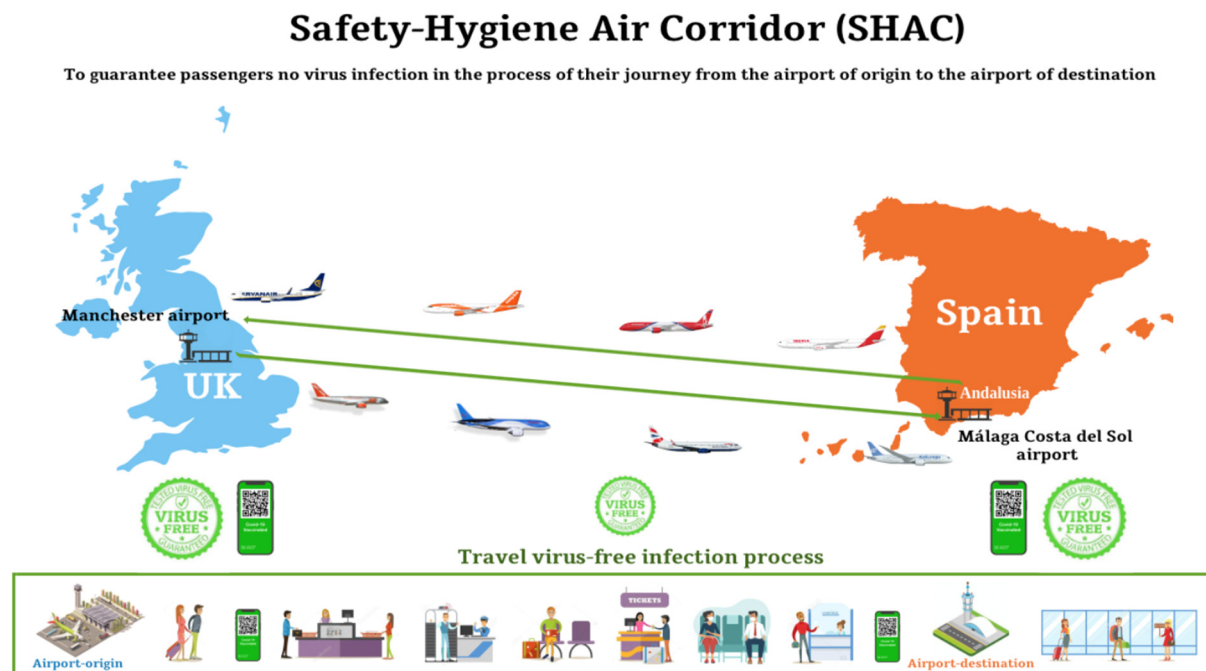
Organizations and researchers are carrying out studies about air corridors or flow corridors to cope with increasing air traffic demand [40–44], and connecting high demand cities and areas [45,46]. The literature on the conceptualization of air corridor is not very extensive in the scientific community, but most researchers define it as a narrow and long tube with parallel trajectories in the vertical and horizontal plane intended for the use of aircraft, to travel safely and efficiently from point A to point B without interference from other air traffic [47,48].

An air corridor is a good option when we want to maintain safe air routes between countries with a low incidence of COVID-19, but in this present paper the concept of SHAC will not affect the operation of air traffic control (ATC), it will only affect the safety and hygiene protocols of the route that the airline operates from point A to B. Within this concept we contemplate the concept of the airport corridor; in fact, airports are part of the safety and hygiene protocols that passengers receive, and airlines operate at these airports. ‘Air corridor is an airspace concept to optimize operational efficiency of flights inside it. Although, this could sometimes a great problem for aircraft flying outside it’ [40].

Following Florido-Benítez [49], we suggest that if researchers analyze the impact of airport on tourism industry, they must also review the impact of airlines in origin and destination countries to get a better global vision of these two sectors (tourism and aviation). Researchers Schaafsma [50] and Van der Blonk et al. [51] were the initiators of the concept of the airport corridor. It stands for a planned and integrated real estate development between the city and the airport. The air corridor is focused on a planned and integrated real estate development between the city and the airport [52].

To operate within SHAC, airlines and airports must guarantee the EASA Operational Protocol for COVID-19, ICAO Guidance for Air Travel through the COVID-19 Public Health Crisis recommendations, COVID-19: Resources for Airlines & Air Transport Professionals IATA recommendations, and the health and safety regulations of each country. Safety and hygiene are the cornerstones of air corridors, that is, safety-hygiene will safeguard public health and minimize the risks associated with tourism mobility. The safety-hygiene air corridor (SHAC) is defined in this study as an air route operated by an airline that implements official safety and hygiene measures, to guarantee passengers no virus infection in the process of their journey from the airport of origin to the airport of destination (see Figure 1). For this reason, it is important to have a database of passengers, with the aim of adding effective rules of prevention [53]. Nevertheless, tourists should review the exclusions of their policies and be prepared for catastrophic risk events that may leave them stranded and/or with out-of-pocket expenses. The COVID-19 pandemic may influence the selection of tourist destinations depending on safety-hygiene rules applied by governments [54].





**Figure 1.** Safety-Hygiene Air Corridor (Travel virus-free infection process). Source. Own elaboration.

### 2.3. The Impact of COVID-19 at ENGLISH and Spanish Airports and Airline

ACI EUROPE [55] warned of such fundamental risks to business continuity that an estimated 193 airports could face insolvency between 2021 and 2022. Following EUROCONTROL [56], the Spanish economy has been the most affected in Europe by the pandemic, with a GDP drop of nearly 12% in 2020 and job losses amounting to 0.7 M up to September. Air traffic remained below −90% until mid-June 2020. During the pandemic, Spain has lost 150 million passengers and 1 million flights. Airlines such as Ryanair, Vueling, Iberia, Binter, amongst many others, have been seriously affected in this period. ‘As a result of the accessibility that they provide, airports in geographical peripheries have important wider impacts, for instance, on regional economic and social development’ [57]. Nizetic [58] revealed that the reduction in the number of flights is over 89% for the EU region. On the contrary, cargo flights have risen during the COVID-19 pandemic. For this reason, Florido-Benítez [59], and Suau-Sanchez et al. [60] revealed that the air connectivity depends on the types of airlines operating at an airport, the scale and geographic scope of their network [61].

Indeed, in the context of COVID-19, a frontline employee is exposed to many more people than an individual passenger, increasing their likelihood of being infected as well as the chance that they will infect others [62]. There are no one hundred per cent safe spaces, the risks exist, and we must prevent them [63]. The financial horizon looks uncertain, especially for Spanish tourism and airline industry. The main Spanish tourist destinations such as the Canary Islands, the Balearic Islands, the Costa del Sol in Málaga, Alicante, Barcelona, among others, are being affected by many airlines such as Ryanair, EasyJet, KLM, Vueling, Norwegian, or Jet2 who announced that they had cancelled all flights to mainland Spain with immediate effect due to coronavirus until October 10. The impact caused by the COVID-19 pandemic will affect the air sector for a long time and risk aversion and self-imposed social distancing will modify current trends in aviation demand and user travel processes. In this respect, Serrano and Kazda [64] suggest that the uncertainty instilled in the aviation industry forces organizations to plan different scenarios to continue operating at airports in a safe and sustainable manner. Possibly there will be fewer airlines, and this implies less seating capacity and reductions in direct connections. In a free market, legacy carriers survive thanks to government intervention, and these will benefit from reduced competition, but bearing higher costs and fewer operations [65].

Let us take Norwegian Air Shuttle for example. This airline warned it was facing a ‘very uncertain’ future after Norway’s government turned down the low-cost airline’s request for additional support to survive the coronavirus crisis. In this line, Iselin Nybo, Norway’s minister for trade and industry, said that Norwegian had asked for billions of kroner of support and that the government considered it was not a ‘sound use’ of taxpayers’ money. Nevertheless, Jacob Schram, Norwegian’s chief executive did not agree with the decision made by the Norwegian government, since this airline brings millions of tourists to the country every year [66]. Conversely, in Spain the Spanish government returned to rescue Globalia Holdings, and its airline Air Europa with 235 million euros [67]. The first rescue by the Spanish government to the airline Air Europa was 475 million euros [68]. In the short and medium term, airlines and unprofitable routes may disappear, and these will be replaced by new operators when the market and the economy stabilize [22]. We can’t return to normal; we must commit to sustainable tourism after the pandemic passes [69]. Governments must support tourism and aviation industries, which will build the confidence of the tourists and businesses during the pandemic period [70].

#### *2.4. Living with COVID-19 for the Next Five Years ‘Flying or Driving’*

The major challenge of tourist destinations and organizations is to maintain the air connectivity and routes to support the regional economy [65]. Obviously, the pandemic will change the paradigms established in the tourism and airline sector. Many tourist destinations will suffer a considerable drop in income from tourism, due to the reduction of frequencies of air routes and volume of seats. On the contrary, if we approach it from a positive point of view, this pandemic is a great opportunity to contribute to the quality of the tourist offer, forget the mass tourism that so many public resources consume, design personalized products that generate greater benefits and, above all, redesign the air and tourism sector in three terms: safety, efficiency, and greater added value in the tourist experience. Clearly, the news about Pfizer, Janssen, and Moderna vaccines is good news, but the pharmaceutical industry will carry out many difficulties in the next 5 years, due to new variants. The restoration to normality will not be easy, because people want guarantees of traveling without infection, airlines will have to encourage passengers to travel with low ticket prices and airports will seek new business models to reduce the dependency of the airlines.

All of us have to find a purpose and a goal to end this crisis [71]. There is much evidence that air transport creates opportunities as well as risks. While the former accrues to businesses and individuals, risks are imposed on society [72]. With the flow of international and domestic travelers stopped, cities, airports, airlines, and companies see considerably reduced their profits [73]. In the future, tourist destinations must adapt more effectively to the resources available [74].

Obviously, the population is learning to live with COVID-19, knows its limitations and its plans to travel abroad when the vaccine eliminates the virus. The car is the most comfortable and safe alternative for traveling around your region and planning your trip. Following Florido-Benítez [75], passengers who are familiar with digital media and their own smartphones move more efficiently and comfortably during the pandemic. These users are called ‘HuMobAp’, Human-Mobile-App. Humans move according to the needs and incentives that applications report to them, such as flight apps (Delta Airlines, Atlanta, GA, USA), travel app or OTA or online travel agencies (Rumbo, Chiasso, Switzerland), review information (TripAdvisor), hotel reservation app (Hilton Hotels, McLean, VA, USA), and supermarkets apps (Walmart, Bentonville, AR, USA). In this same line, Chatterjee and Dsilva [76] indicate that the evolution of the internet has empowered the tourism and aviation sectors.

### **3. Methodology**

The classic case study consists of an in-depth inquiry into a specific and complex phenomenon, set within its real-world context. To arrive at a sound understanding of the

case, a case study should not be limited to the case in isolation but should examine the likely interaction between the case and its context [20]. On the contrary, Paul and Rialp [21] reflect on types of reviews of literature where a case study may be a type but not exclusive. The argument relating to the dating of research is that much of tourism research is clearly context- and time-related. From this perspective, the dates when the research was being undertaken can significantly matter in the future [77]. Validity and generalization continue to be challenging aspects in designing and conducting case study evaluations, especially when the number of cases being studied is highly limited, even limited to a single case [20]. The aim of the case study adopted here is to review the specific paradigm of research which discusses, investigates, and analyses the air traffic, air cargo, and the safety-hygiene air corridor between UK and Spain at airports managed by MAG (UK) and AENA (Spain). The literature related to airports, airlines, air traffic, air cargo, air corridors, and cities is very extensive, and this paper is focused on these variables (see [21,27,47,48,50,53,59,72,78,79]). The literature provides evidence that aviation industry has re-emerged to make local economy and tourism more important to destinations, especially between airport's hinterland and cities [80].

This study was enriched notably as regards its theoretical and practices from scientific journals that have addressed the impact of airports on the tourism industry and tourist destinations such as: *Tourism Geographies*, *Journal of Transport Geography*, *Journal of Air Transport Management*, *Tourism Review*, *International Journal of Tourism Cities*, among many others. Data were collected from journals using University of Málaga databases and verified with reference to the Social Sciences Citation Index (SSCI) of Clarivate Analytics' Web of Science [81] and Google Scholar searches. Many researchers and academics tend to select perhaps the most well-known bibliographic database from SSCI of WOS, which list academic journals for identifying potential sources for reviewing [21,82,83].

From the macroeconomic point of view, we show the variables related to passengers arrived, aircrafts movements and air cargo' data at UK and Spanish airports, from 2010 to 2021 and how these variables are highly influenced by airports' and airlines' activities (see Figure 2 and Tables 1 and 2). This study has implemented air cargo data due to the important role that this activity plays in the e-commerce and logistics sectors at airports during the pandemic. The pandemic crisis has shown that airports and tourist destinations must implement and diversify through new business models, to reduce seasonality and explore new avenues of income generation to relieve financial constraints. Secondary data analysis is a form of research in which the data collected and processed in one study are reanalyzed in a subsequent study. These are a part of best practice, which can provide a valuable data source for further research studies [84]. Moreover, this research also uses secondary data from IATA, AENA, EUROCONTROL, EASA, ICAO, ACI, CAA, MAG, FRONTUR, INE, IECA, UNTWO, among others. Therefore, the scope of this research project has been international, collecting data and patterns of success that support the objectives of this research.

Furthermore, the accessibility index may be easily partitioned to examine other regional groupings of airports and assess their attractiveness as access points to regional, continental, or global aviation networks [85]. The data collected in Figure 2 and Tables 1 and 2 show passenger arrivals, aircraft movements, and air cargo at UK-Spanish airports from 2010 to 2021 to calculate interannual rates and analyze the evolution of tourist arrivals to these two countries, due to the impact of COVID-19 in tourism and air sectors. We acknowledge the limitations of using capacity data in this analysis, given the fact that government agencies and airport managers are reluctant to give information on current statistics, possibly due to poor economic and health results. These data represent quantitatively the basic core of why airports are the gateway to UK and Spain countries and their importance in the accessibility of tourists and companies on the territory. 'This topic is worthy of attention, especially during the time of crisis where tourism activity may help to stimulate the economy' [86].



#### 4. Results of Research

##### *The Complicated Situation of Airports, Few Passengers and Airlines Operating*

With fears of a new recession and financial collapse, governments, airports, and airlines must guarantee the connectivity of the cities. It is necessary to implement an economic development plan by types of sectors and that these are sustainable in the long term [87]. Most countries have imposed restrictive safety-hygiene measures against the COVID-19 pandemic, but these measures have a negative socioeconomic impact in the medium term [88]. Airports are essential infrastructures in the strategic and marketing plans of Spanish destinations, but we are aware that every tool has a mathematical and social divergence. In the case of Spanish airports, these have been the gateways of the Spanish tourist destination, but at the same time they have become the controller of the future of many Spanish tourist destinations, in which they condition the economy, urban planning, and the labor and social scenario of the natives of that territory [89].

The UK's quarantine requirement on travelers from Spain is seriously affecting the air and tourism sector. This quarantine requirement started on 26 June 2020, and since then both governments have not provided solutions to open UK-Spain SHAC and generate confidence in passengers. For instance, in order to reactivate tourism in Spain and establish safe trips between European countries and the UK, the Spanish Ministry of Tourism promoted the slogan 'Travel Safe' [38]. Furthermore, these safe corridors will focus on Andalusia and Balearic and Canary Islands. These tourist corridors with UK and European countries allow for the mobility of travelers while minimizing the public health risk. In the same line, the UK Government also created 'Travel Corridors' which will support the restart of the air sector. A priority for the UK government should be to resume the number of flights and minimize the spread of the coronavirus [90].

The reality of English and Spanish airports and airlines are not aligned with the promises of both governments. Next, we compare and analyze data from Spanish and English airports, to support the creation of UK-Spain SHAC. The United Kingdom and Spain interact and there is mutual feedback in economic terms, both in passengers and airlines that operate in a multitude of tourist destinations in these two territories. We must point out that Bournemouth airport ceased to belong to MAG in 2018. To examine the impact of COVID-19 on the UK and Spanish airports and airlines, Figure 2A–F display passengers arrived, aircraft movements, and air freight at UK and Spanish airports and how the bankruptcy of some airlines, closure, and reduction of the frequency of air routes by airlines, COVID-19 measures at airports by governments are affecting the air and tourism sector. Data were collected from 2010 to 2021 in the next Panel. The COVID-19 disease has taken an unprecedented toll on travel and tourism, lives, and livelihoods [78]. The pandemic can be expected to have far-reaching impacts on tourists' consumption behavior [91]. Nakamura and Managi [92] suggest that flights must be minimized, and politics should play a significant role in restricting travel to benefit individual countries as well as global health. An airport's zone of influence is a key factor in tourism flows, the establishment of companies in its hinterland, and creating employment [93,94].

According to results of research (see Figure 2A,C), Manchester Airport has received 147 million passengers between 2015 and 2021, London Stansted 143 million, followed by East Midlands with 25 million, and Bournemouth with 4 million passengers. London Stansted experienced the highest growth in passenger percentages terms between 2015 and 2019 with 35.9%. Between 2020 and 2021, we can observe the COVID-19 pandemic and its impact in all airports and aircraft movements, the number of passengers arrived at English airports fell dramatically with an average of  $-76.8\%$  in 2020, and  $-77.1\%$  in 2021 among the four airports with respect to 2019, that is, 94 million passengers in two years, too many lost tourists for an English economy that depends mainly on the business and tourism sectors. In 2019, the contribution of travel and tourism to GDP for the United Kingdom was 10.9%. It fell gradually from 14.4% in 2000 to 10.9% in 2019. The top ten inbound markets for the UK in terms of number of visits during 2019 accounted for three in five visits, or 60% (USA, France, Germany, Irish Republic, and Spain with 2326 million

tourists), while the number of Spanish visits was up 6% year-on-year. Looking at spending by inbound visitor, Spanish tourists spent around one billion pounds in the UK [31], a not inconsiderable amount of money for a country that has just left the European Union and faces an uncertain future.

In the same line, the aircraft movements in these four airports plummeted to levels never seen before, and in 2020 dropped a  $-52\%$  and a  $-51\%$  in 2021 on average between the four. This information becomes more significant when we compare these two years with the data obtained in 2019. These data are more worrying than the financial crisis of 2008. Aircraft movements will determine the future of airlines, such as airlines that declare bankruptcy, airlines that request financial help from governments, and airlines that will reduce aircraft fleet and workers. On 8 December 2020, the UK National Health Service NHS began the mass vaccination that protects against COVID-19. In Spain, Spanish Health will begin in early January. There might be some light at the end of the tunnel, and it is the moment for UK and Spain to reach an agreement to develop SHAC to reactivate the tourism and air sector. We cannot allow tens of thousands of businesses to enter bankruptcy for another year.

On the other hand, East Midlands airport facilitates the vast majority of air freight volumes with 2,391,633 tons between 2015 and 2021, London Stansted with 1,636,562 tons and Manchester airport with 663,847 tons (see Figure 2E). Bournemouth Airport does not show data about air cargo, probably due to the low levels of air cargo movement. In 2019, the East Midlands Airport was the second and London Stansted third in air cargo of the UK; the first place is still maintained by Heathrow Airport.

Air cargo activity is a great opportunity to diversify airport business models, as well as an alternative to reduce the high dependency that airports have on passengers. According to Harry [79], the UK's East Midlands Airport (EMA) increased the number of cargo aircraft movements by 10%. This airport has been a strategic point to keep supply chains moving during the coronavirus pandemic. The UK's East Midlands Airport experienced the smallest drop in flight numbers compared with other European airports [56].

As for Spanish airports research, Figure 2B,D,F show the real situation of the air and tourism sector so considerably weakened, the implications of which cannot be overlooked. Spain is highly dependent on tourism for its economy and the coronavirus crisis has severely affected the Spanish travel sector. The sector is experiencing devastating effects, especially in tourist destinations such as Balearic and Canary Islands, Andalusia, Barcelona, and Valencia. Tourism in the country amounts for more than 15% of the economic output. According to European Commission 'EC' [95], in Spain the impact of the confinement in the first half of 2020 was worse than expected, it was the European Union member state most affected economically by Covid-19, and EC estimates that the Spanish GDP will fall by 10.9% in 2020. Although recent data show an improvement in Spanish GDP, in that it rose 16.7% between July and September, it has fallen 8.7% year-on-year, that is, Spain was the second EU country that grew the most, while the first was France with 18.2% [96].

Figure 2B shows the Málaga Costa del Sol Airport as an ambassador Andalusian tourist destination. This airport received 102.6 million passengers between 2015 and 2021, while Seville Airport received 33.7 million, Jerez Airport 5.7 million, and finally Granada-Jaén 5.6 million passengers. Seville experienced the highest growth in passengers in percentage terms between 2015 and 2019 with 71.8%, followed by Granada-Jaén with 70% and Jerez with 41.3%. Málaga airport is the fourth busiest in Spain, and until December 2020 saw just 5,161,243 passengers pass through its terminal, a drop of  $-74\%$  year-on-year, and a  $-51\%$  in 2021 compared to the data for 2019, that is, 27 million passengers stopped coming to the city of Málaga. These results are very detrimental to the Málaga economy, since it is highly dependent on the tourism sector.

AENA [97] has confirmed that restrictions on international air travel have been a great impact on the number of passengers passing through the Málaga Costa del Sol Airport. Seville Airport is an aerodrome with an open business model, in order to combine passengers and air cargo, and above all it offers aeronautical companies and airlines

logistical support. It has diversified its airport business model excellently and this is now achieving good results. Seville Airport is the core of Airbus' military transport assembly line. Furthermore, this airport serves as a base for the low-cost carriers Vueling and Ryanair. Spain's number one airline is finishing C-check maintenance hangar at Seville Airport. Up to December 2020, Seville airport reached its lowest with  $-65.8\%$  by passengers and is suffering with less impact from COVID-19, thanks to its sectoral strategies [98].

In short, the effects of the pandemic at Spanish airports have been alarming, especially in passengers' arrivals with a mean drop of  $-72.8\%$  in 2020, and a  $-55.6\%$  in 2021 among the four airports. These data are of considerable concern if we compare these two years with the data obtained in 2019. In the last two years (2020–2021) 39 million passengers did not come to Andalusia through these four airports. However, in March 2022 airports of AENA group have reached 15.5 million passengers, a recovery of  $78.1\%$  compared to the data for the same month of 2019 [99]. These data suggest the obligation of the Andalusian government to change its business model based mainly on tourism. We are among many researchers who are advising the Andalusian and Spanish governments to diversify the economy, especially in sectors that guarantee stability in the medium and long term, such as the automotive, agri-food, and technological industries. Tourism and the airline sectors are very unstable in periods of political instability, distrust of markets, pandemics, social events, geopolitical and health uncertainties, etc. We cannot forget that these sectors are linked to leisure and travel activities, and in the times of crisis that we are experiencing, these services are not essential for the population, a population that is suffering daily job layoffs, and thousands of companies closing down because they have no income and cannot stop taxes.

As in all disaster situations, the first step we must take is design a contingency plan, which includes decisive and efficient actions, directed by a disaster management team in this period of emergency, with the purpose of making difficult decisions, command, and operations without partisan interest, only the common good of the citizens and the sector they represent. Most of the world's airlines are in a pre-bankruptcy situation. IATA [100] claims that 'the airline industry was severely hit by the COVID-19 crisis with an average demand decrease of about  $64\%$  which triggered already several bankruptcies of airline companies all over the world'. If we focus this problem on the main airlines operating in Spain and the UK, most of them have tax domiciles in British Isles, some in Irish Republic, such as Ryanair, or Norwegian, and others in the UK such as EasyJet, British Airways, or Jet2 airline. This is the first reason why the UK and Spain must reach an agreement, in order to maintain the flow of passengers in both countries and not allow the airlines to declare bankruptcy. If travel and vacations were democratized in the twentieth century, it was partly thanks to airlines that made the Earth more accessible.

For instance, the Figure 2D shows aircraft movements in Spanish four airports plunged in 2020 with an average between the four of  $-46.3\%$  with respect to the total year 2019, a situation in which not even the worst predictions of airlines, airports, and governments contemplated or anticipated in their worst nightmares. In 2020, the airlines operating in these four airports lost 156,609 operations, more than half the operations compared with 2019. Obviously, these results confirm a considerable reduction in revenues in the annual balance sheets of the airlines, airports, and the business microenvironment inside and outside the airport terminals. Nonetheless, in 2021 aircraft movements had slightly higher evolution compared to the preceding year, except for Málaga's airport which achieved a  $54.6\%$  year-on-year increase in aircraft movements.

According to air freight in the four Spanish airports (see Figure 2F) in 2019, Seville airport is the first by volume of cargo in Andalusia and eighth in Spain with 64,518 tons (from 2015 to 2021), followed by Málaga airport 15,922 tons. Jerez and Granada-Jaén do not show data due to their lower cargo rates; these regional airports are more focused on tourism. The importance of freight is too often under-estimated, yet one-quarter of the output of the airline industry, measured in tonne-kms, is generated by freight rather than passengers and for some airlines it is considerably more than this. Although the revenue

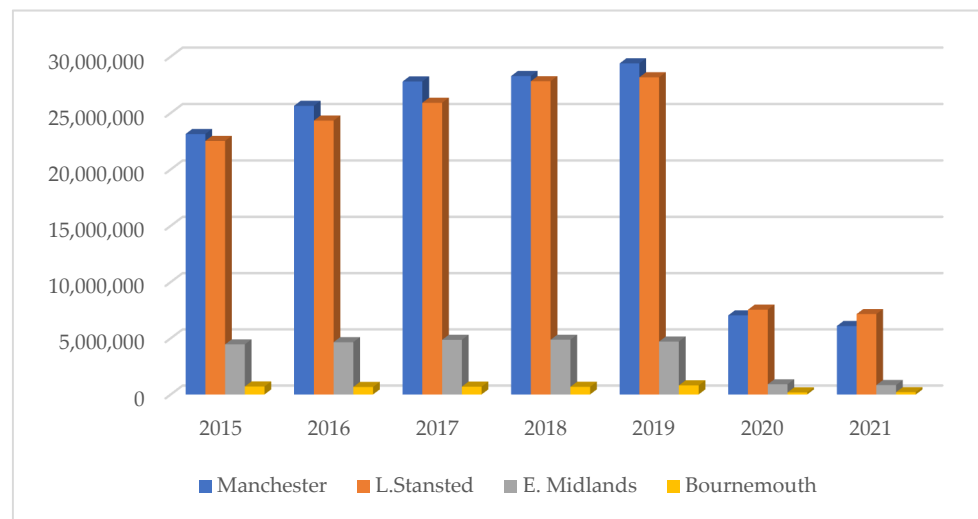
contribution of freight is much less, generating only around 8% of total revenue, it makes a significant contribution to the profitability of many services. Air cargo is a source of income for passenger airlines, but in the case of low-cost airlines, air cargo is not a priority, as they are focused on ancillary services [101]. The diversification of the corporate sector in Málaga city has improved the local economy of this city, thanks to air transport and its airport with two runways, particularly in the export of Málaga products and services, which have increased by 36.6% in the last six years, according to data from IECA [102].

From another point of view, Tables 1 and 2 show data from 2010 to 2021 for MAG and AENA. Our intention with this data is to show the importance of airlines and airports in a country or region. The accessibility and new markets offered by airlines with the opening of new air routes guarantees and diversifies business opportunities and improves the local and regional economy. For instance, MAG received 534 million passengers and AENA 241 million passengers in the last ten years, that is, airports are the cornerstone of regional connectivity. In 2019, IATA [103] showed a slowdown compared to 2018's annual growth of 7.3% and marked the first year since the global financial crisis in 2009 when passenger demand fell below the long-term trend of around 5.5% annual growth. Full-year 2019 capacity climbed 3.4%, and the load factor rose 0.7 of a percentage point to a record high of 82.6%. The previous high was 81.9% set in 2018.

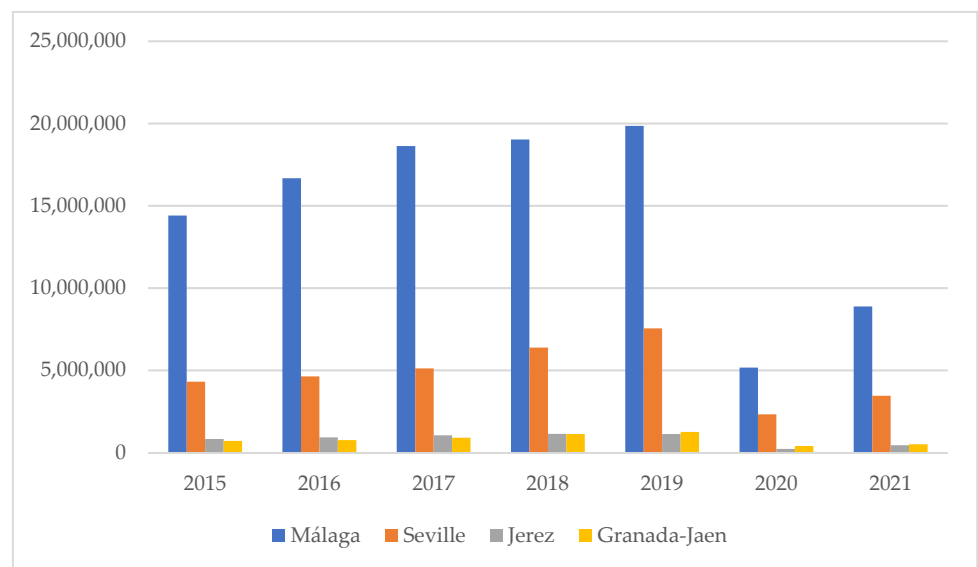
Consequently, airlines operations are related to airports and destinations. Although we take the data for 2021 as a break due to COVID-19, in the years from 2010 to 2021, airlines have been the main connector between tourists and tourist destination. MAG aircraft movements were 5,077,851 million and AENA 2,577,028 million operations. The airline industry must take preventive and proactive actions that guarantee its operability in the short and long term. 'The main goal of carriers is to reduce costs' [104]. The actual COVID-19 impact will depend on the degree of consumer confidence for air travel, economic conditions, and the duration of the pandemic crisis. Its estimated impact on lost international revenue will be 92 billion dollars [105]. For this reason, in response to the increasing ubiquity of information, improved consumer choice, and technological progress [106], the interaction between companies and customer help to improve the quality of services and consumer's experience [107].

The operation of air cargo in some airports makes a big difference over those that are only promoted as tourist airports. Let us take Hong Kong, Memphis, and Shanghai Airports as example. While some researchers such as Zhang [108] and Doganis [101] claim that the growth of trade and the GDP of the countries is linked to air freight, these are interdependent in a globalized economy. Airports that are highly dependent on air cargo tend to benefit from a central location within networks of cargo airlines [109]. In this study, East Midlands, London Stansted, and Seville are airports with air cargo and passenger profiles, which offers a competitive advantage over competitors and diversifies the business model to generate more income. For example, MAG moved 7,581,328 tons in the last twelve years (see Tables 1 and 2), positive figures that benefit the entire productive and economic chain of airports, airlines, and cities where they operate. The four Spanish airports of AENA moved 124,333 tons, a figure not comparable to the MAG of UK. Obviously Spanish airports must implement strategies that improve air cargo figures and generate higher revenues in this air activity.

As stated by Florido-Benítez [59], as COVID-19 continues to reduce air travel and airline capacity, airports, and cities lose income, companies, employees, and the ability to act to develop stimulus actions that keep the regional economy alive. Indeed, a report by UNWTO [110] reported that most countries have adopted economy-wide stimulus packages (fiscal and monetary measures) along with job support measures.



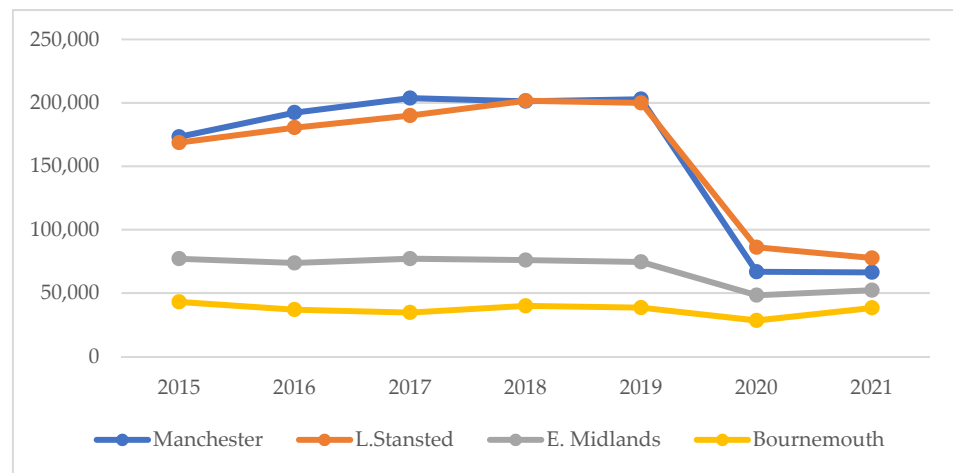
(A)



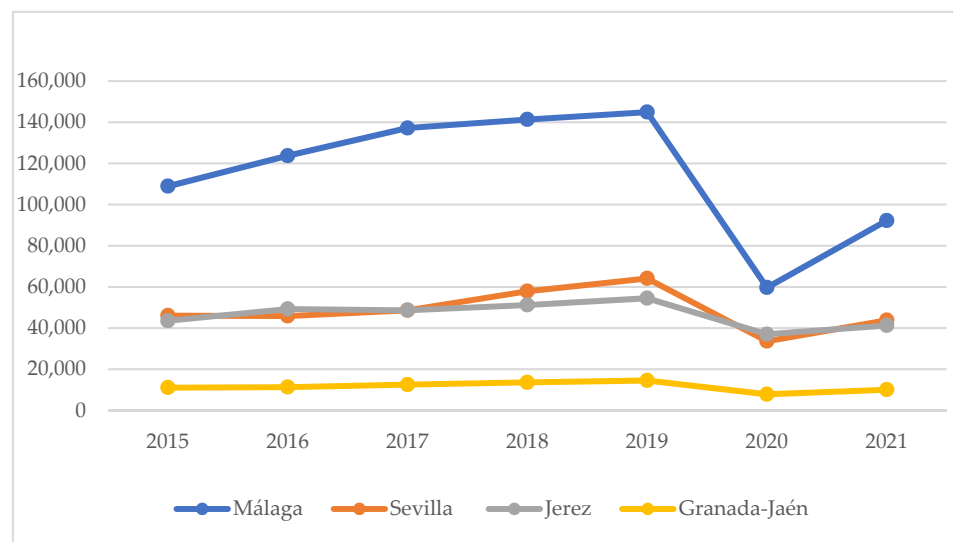
(B)

Figure 2. Cont.

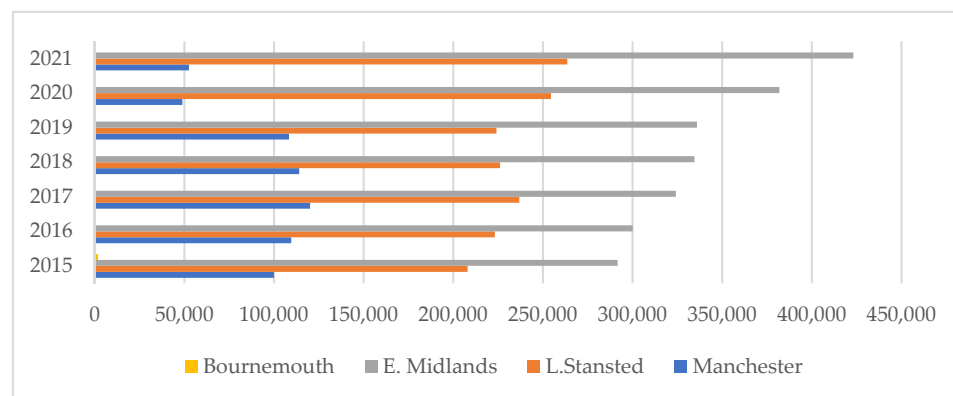




(C)

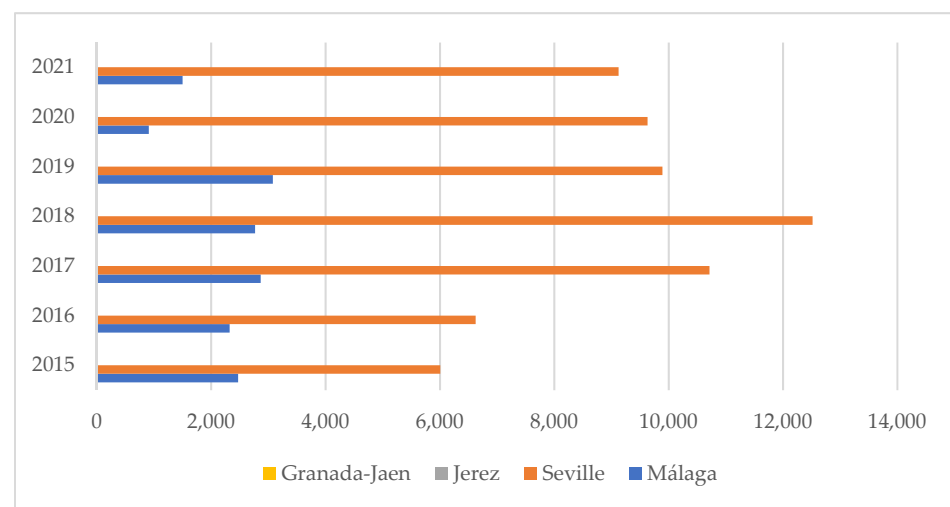


(D)



(E)

Figure 2. Cont.



(F)

**Figure 2.** Passenger arrivals, aircraft movements, and air freight at UK and Spanish airports. (A) Passenger arrivals at four MAG airports; (B) Passenger arrivals at four AENA airports; (C) Aircraft movements at MAG airports; (D) Aircraft movements at AENA airports; (E) Air cargo at MAG airports (Tons); (F) Air cargo at AENA airports (Tons). Source. Own elaboration based on data MAG [111], CAA [112] and AENA [97].

**Table 1.** MAG passenger, aircraft, and cargo movements (2010–2021). Source. Own elaboration based on data MAG [111], CAA [112] and AENA [97].

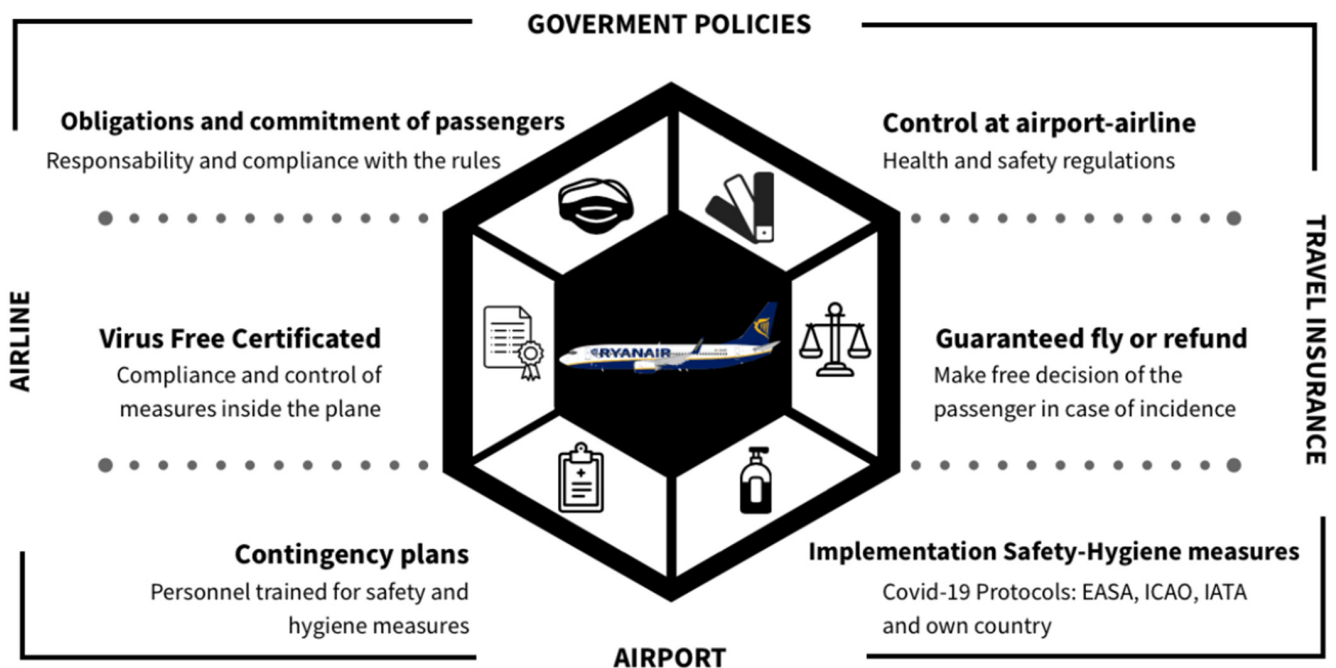
MAG			
Year	Passengers	Movements	Tons
2010	41,197,439	439,104	592,133
2011	41,767,354	442,725	574,590
2012	41,977,924	438,085	576,395
2013	43,598,363	439,558	577,111
2014	47,126,903	447,604	577,492
2015	50,812,863	461,867	601,271
2016	55,275,357	483,334	632,934
2017	59,245,425	505,316	681,289
2018	60,954,836	478,874	674,795
2019	62,266,701	477,383	668,469
2020	15,561,689	229,502	685,465
2021	14,266,472	234,499	739,384
<b>Total (2010–2021)</b>	<b>534,070,472</b>	<b>5,077,851</b>	<b>7,581,328</b>

**Table 2.** AENA passenger, aircraft, and cargo movements (2010–2021).

AENA			
Year	Passengers	Movements	Tons
2010	18,310,656	207,371	8697
2011	19,687,721	218,273	8207
2012	18,515,786	200,759	7546
2013	18,062,645	196,773	7772
2014	19,043,261	199,346	8177
2015	20,243,481	209,650	8488
2016	22,966,658	230,154	8956
2017	25,683,914	247,005	13,585
2018	27,663,020	264,078	15,286
2019	29,773,440	278,064	12,972
2020	8,083,699	138,167	8905
2021	13,260,119	187,388	15,742
<b>Total (2010–2021)</b>	<b>241,294,400</b>	<b>2,577,028</b>	<b>124,333</b>

The results of the research previously shown imply the need to implement SHAC to improve the air activity of these countries. Figure 3 shows Safety-Hygiene Air Corridor Elements ‘SHACE’, elements provided by governments, travel insurance, airports, and airlines. These tools will guarantee the value of SHAC, reduce the uncertainty of passengers and companies, and establish a roadmap to restore the air and tourism sector. For instance, a study conducted by Bayram et al. [113] revealed that employee participation in health and safety issues depend on safety-hygiene measures. Ensuring employees’ participation in safety-related processes is critical in creating a healthy and safe working environment [114]. Standardizing clinical care process specifications ensures computer interpretability, with the aim of exchanging and validating public health status records [37,115].

The design of air corridors, traffic rules in air corridors, safety requirements, and performance specifications are still evolving [12], and the COVID-19 certificate has been one of the EU’s first safety and hygiene proposals, which paves the way for safer and free international travel [116]. There is an urgent need for Standard Operating Procedure (SOP) on preventive measures to control the spread of COVID-19 worldwide by including the vaccine certificate for domestic travel between cities and states [117]. On the contrary, the COVID-19 certificate creates inequalities in terms of passenger’s nationality and origin [118].



**Figure 3.** Safety-Hygiene Air Corridor Elements ‘SHACE’. Source. Own elaboration.

Passengers should follow all the instructions ruled by the air carriers in line with ICAO, IATA, EUROCONTROL, EASA, ACI, and UNTWO rules to prevent the transmission of COVID-19. Furthermore, these organizations must attempt to unify all legislation and regulations related to the provisions of air navigation and air transport to confront the renewed changes that may be imposed by health and economic conditions [119–124]. There has been little co-ordination between countries in the safety-hygrines measures being applied [11,124].

On the other hand, the insurance companies must describe and identify issues related to the tourism sector in terms of travel insurance adaptation to Covid-19 conditions [125]. Recent events due to COVID-19 will reduce the perceived coverage and value of travel insurance [54]. Travel insurance must include travel insurance services related to the COVID-19 pandemic [126]. According to ICAO [105] and IATA [11,124], three urgent measures by governments are suggested. First, free access for fully vaccinated passengers;

second, implementation of digital solutions for the processing of health credentials; and third, the application of proportionate, risk-based COVID-19 measures with a continuous review process.

## 5. Conclusions

We urge universal support for vaccine access and vaccination efforts around the world. Most developed countries are vaccinating the population considered most at risk. This does not mean that we will return to normality until the entire population is vaccinated (including the poorest countries which suffer the most under the burden of a consumer society that lacks community values) and the tourism and air sectors will have to continue applying safety and hygiene measures against COVID-19. Therefore, it would be advisable to implement UK and Spain SHAC, with the aim of restoring the old normality in the next four or five years. The reality is that English and Spanish airports and airlines are not aligned with the promises of both governments.

This research analyzed the air traffic, air cargo, and the safety-hygiene air corridor between UK and Spain in airports managed by MAG Group (UK) and AENA Group (Spain), and this study found that these two countries have had a considerable reduction in passengers due to the impact of the pandemic. This has provoked a massive loss of income at airports and airline companies. Although the data show a significant increase of passengers with 67% in 2021 on average between four Spanish airports (Málaga, Seville, Jerez, and Granada-Jaén). On the contrary, in 2021 UK airports (Manchester, Stansted, East Midlands, and Bournemouth) saw a drop of  $-8.3\%$  of passengers at airport's terminal over the previous year. Furthermore, this study suggests that East Midlands and London Stansted Airports have potential as airports of cargo. It would be interesting to invest in new business models related to air cargo like logistics, e-commerce companies, international trade, amongst many others, to reduce the seasonality at airports and tourist destinations, and explore new avenues of income generation to relieve financial constraints at this time of economic crisis.

These results show that the effect of the pandemic crisis is affecting UK airports more negatively, possibly due to the restrictive health and safety protocols and measures by the UK's government and airports. This study suggests that governments, airports, and airline operators must ensure uniformity in health and safety restrictive protocols in a manner that addresses passengers' fears and concerns. In these times of difficulty and uncertainty, because of the pandemic, Brexit, and Ukraine war, the future of tourism and aviation industries lies in stressing the value of unified 'joint strategies' among these two industries. British government must manage more efficiently economic and political resources to introduce new business models and tourist projects to reactivate tourism and aviation activities at airports and cities.

The result of research has shown the effects of COVID-19 in all airports, aircraft movements and the dramatic drop in passenger arrivals. Particularly, Málaga's airport has a heavy dependency on mass tourism, and above all to British tourists, this is one of the main reasons why this airport has experienced a considerable negative impact through loss of passengers during the COVID-19 pandemic. We cannot let tens of thousands of businesses enter bankruptcy another year. Governments, DMOs, and stakeholders must seek immediate solutions for this economic drain. It is no longer the time for discourse, it is time to provide solutions like this that we propose in this study, the UK–Spain SHAC and SHACE will guarantee the value of corridors between countries, reduce the uncertainty of passengers and companies, and establish a roadmap to restore the air and tourism sector. At least, these two tools provide stability to aviation and tourism sectors of policies providing additional cover to passengers and airlines. Indeed, this study has demonstrated that passengers, air cargo, aircraft movements, safety and hygiene indicators are linked to each other and mutually reinforcing at airports. The potential benefit of the air corridor was evaluated by Takeichi et al. [42] and they demonstrated that even a small number of flights operated inside the air corridor achieves total operational cost reduction.

The population is learning to live with COVID-19, and governments must normalize safety and hygiene measures in the world population. If governments and airlines continue without providing solutions, the sky will likely lose the rainbow of airlines and the most intense colors will predominate, that is, the legacy carriers. As stated by Tan and Caponecchia [54] in this period of crisis and uncertainty caused by the pandemic, the role of travel insurance will be more important than ever, and they must provide the necessary information to consumers regarding product coverage, value, and risk. In this study, we suggest implementing new air corridors (passengers and air freight) between countries, and that these air corridors must be supported by prevention and control measures, Digital Covid Certificate, and health and safety protocols at airports and airlines. In the future, air corridors can improve the air transport connectivity, the efficiency of Air Traffic Management (ATM), and providing airport customers an enriched shipping quality, service, and better predictability. Indeed, air corridors can represent an added value for an airport against its major competitors.

Finally, we would like to point out that data suggest the obligation of the Andalusian government to change its business model based mainly on tourism. It is necessary to diversify the economy, especially in sectors that guarantee stability in the medium and long term, such as the automotive, agri-food, and technological industries. The tourism and airline sectors are very unstable sectors in periods of political instability, distrust of markets, pandemics, social events, geopolitical and health uncertainties, amongst many others. Airports and airlines not only bring passengers, but these infrastructures are also drivers of productive synergies. Destinations must see airports as a market where you can exchange, send, and receive the products and services that you produce. 'Many cities have experienced a high loss of air connectivity with other destinations' [127]. That is why it is necessary to emphasize the importance of airports at cities, they provide air connectivity at destinations and improving the regional economy.

### *5.1. Theoretical Implications*

The paper contributes to aviation and tourism literature in several areas. First, this research demonstrates a way to analyze the air traffic, air cargo, and air corridor in UK and Spain based on real information and examples at different destinations firmly grounded in empirical data, to lay out new safety-hygiene rules and commercial strategies at aviation and tourism sectors by researchers and airports and airlines operators. Second, the trade-off between ensuring connectivity and maintaining competition after the COVID-19 pandemic is a challenge with several political and economic dimensions [22]. Third, this study employed updated studies and data and spatial analysis, to deal with the data in the most comprehensive way. The findings of this study can help practitioners and researchers to understand the air corridor tool as a competitive advantage over other airports, airlines, and destinations. 'One of the key challenges for air cargo is limited capacity, which means reinstating air connectivity is critical not only for passenger but also for cargo traffic' [103].

### *5.2. Practical Implications*

Apart from the above rich theoretical contributions, this research has fruitful practical implications for tourism and air transport practitioners and government agencies. This study has shown new operational concepts like Safety-Hygiene Air Corridor (SHAC), and Safety-Hygiene Air Corridor Elements (SHACE) can improve the air activity at airports and countries. According to Tian et al. [46], in order to enable a substantial increase in airspace capacity to meet future demand for air travel while maintaining safety, many countries and regions are undergoing the air transportation system transformation. Moreover, airports and airlines operators could encourage to governments to implement new safety and hygiene rules aligned with a fluctuating demand.



### 5.3. Limitations and Future Research

This study has contributed to expanding knowledge about air corridors at airports and empowers airports and airlines in this pandemic period. However, this study has some limitations that need to be addressed. First, this is a case study focused mainly on UK and Spanish airports. Second, government agencies and airport managers are reluctant to give information on current statistics. Third and last, this research analyzes UK and Spanish airports, but airport and airline operators did not show interest in participating in this study. Kamal et al. [128] indicate that the routes to which aircraft are restricted to fly are called air corridors. These flying routes could be inside constructed air corridors where the Unmanned Aerial Vehicles (UAVs) would be allotted to fly, such as the air corridors of commercial aircraft. Future research should be focused on identifying these air corridors for UAVs to fly in their respective corridors to avoid such mishaps. 'By combining previous knowledge and adding new research, this study provides a framework that can be used in future studies' [129].

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