

## Impact of the Covid-19 pandemic on air transport

### Original article

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A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical revision of the article, F – Final approval of article

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Received: 2023-01-25

Revised: 2023-04-09

Accepted: 2023-04-11

Final review: 2023-04-09

Peer review:

Double blind

### Keywords:

Safety, crisis situation, risk assessment, aviation sector, Covid-19 pandemic

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### Abstract

**Objectives:** The purpose of this article is to present the impact of the Covid-19 pandemic on the operation of airlines and the aviation sector as a whole. The pandemic forced airlines to make many changes in their operations and greatly affected the entire aviation sector. The operation of the aviation sector during the pandemic period was affected by the administrative closure of flights for months, as well as the regulation banning flights to selected countries.

**Methods:** The study used the method of analyzing statistical data and reports on the aviation sector. The method of analyzing statistical data made it possible to compare data from the aviation sector on, among other things, the number of passengers carried, and the number of flights made.

**Results:** As a result of the development of the Covid-19 pandemic, the aviation sector reduced the number of flights operated, which contributed to a decline in the number of passengers carried and heavy losses for the sector. During the pandemic period, the growth of airlines was sharply halted.

**Conclusions:** Aviation around the world operated for several months in a completely new and highly unpredictable reality. The crisis caused by the Covid-19 pandemic is the biggest crisis in aviation history. The sector needs to define clear rules and messages in crisis situations.

## **Introduction**

The Covid-19 pandemic outbreak was declared by the World Health Organization (WHO) on 11 March 2020. Covid-19 itself is an infectious disease in which the respiratory tract is affected and the attacking virus and it causes acute respiratory distress syndrome. The Covid-19 outbreak poses a serious public health risk, both physically and mentally. The first cases of Covid-19 patients worldwide were registered in late 2019. In February 2020, the first outbreaks of SARS-CoV-2 virus were detected in Europe, with the first such case in Poland on 4 March. At the end of February 2021, there were 113.8 million cases and 2.5 million deaths worldwide due to SARS-CoV-2 (<https://covid19.who.int/table?tableDay=yesterday>). To prevent the spread of the pandemic and limit its impact, countermeasures were taken at global, regional and local scales, the intensity and scope of which depended on the current situation (Konieczny, 2021, p. 53).

The SARS-CoV virus was the cause not only of Covid-19 disease, but also of many side effects, including physical and psychological problems in society. The infectious disease epidemic affected the physical health of those infected, but also the mental health and wellbeing of those not infected (Dymecka, 2021, p. 3).

The pandemic has contributed to changes in the sphere of activity, which has been significantly restricted, including mainly travel abroad. Depending on the period of the development of the pandemic, various recommendations, restrictions or bans were put in place regarding movement and leaving the country's borders. The recommendation to avoid foreign travel, the possible difficulties in travelling, as well as the problems of returning to the country, air traffic restrictions, mandatory quarantine or self-isolation and the need for additional testing significantly reduced the number of travellers. The impact of the measures taken was particularly felt by the airline industry (Konieczny, 2021, p. 53).

The operation of the aviation sector during the pandemic period was significantly affected by the administrative closure of flights for three months, as well as the regulation banning flights to selected countries. These restrictions reduced companies' profits, which affected their liquidity and, in many cases, contributed to financial problems and the need to abandon many investments.

Travelling during the Covid-19 pandemic presented many difficulties for many passengers. Limiting the number of passengers, staying masked during the flight, and fear for their own health and safety. The new threat creates specific states of instability, uncertainty and fear around individual passenger perceptions, requiring non-standard and rapid responses. Airports

have conducted a large-scale information policy to prepare travellers for the new airport situation. Procedures, airport and travel rules in relation to the pandemic were available on websites and in the terminal space. The airline tried to convince customers that it was safe to travel within the scope allowed by current regulations and using the new check-in technology and adopting sanitary rules. Of particular importance was the Airports Council International's initiative to grant airports international Airport Health Accreditation confirming the highest level of measures adopted to counter the crisis caused by the SARS-COV-2 coronavirus (Konieczny, 2021, pp. 61-62).

### **1. Impact of the Covid-19 pandemic on the aviation industry**

The aviation industry is one of the most important economic sectors in many countries, as it enables a country's development. It also plays a special role in the global transport system, as it is used to transport both passengers and goods. The aviation market, like many other economic sectors, has found itself in a difficult situation during the pandemic. The inability to transport passengers is a threat to the aviation sector, as these services are its most profitable. The reduction of flights during the pandemic contributed to a shake-up of the whole industry and the introduction of many changes in its operation.

As the pandemic unfolded, the number of people who directly cancelled flight bookings due to their concerns or restrictions at their destination (e.g. quarantine) increased. It was also particularly important for passengers to be able to cancel their flight and not incur costs. From the point of view of passengers' rights, the Convention's provisions on carrier liability are particularly important. Passengers' fear stemmed from the fear of not being allowed on board the aircraft, as the passenger's body temperature was measured each time before boarding. The restrictions imposed and the frequency of flight cancellations during the pandemic made travel extremely difficult, and the uncertainty of potential restrictions and temporary closures of air routes meant that the aviation sector was particularly affected by the pandemic (Myrczek, 2021, pp. 35-37).

The airline saw its highest profits in 2019 and was the most successful in aviation history. The airline increased the number of routes it regularly operates, connecting more than 22,000 different cities. This increased to almost 1,000 (connections) per-cityes per year, the most in aviation history. In addition, the cost of travel fell by a further 2.3 per cent compared to 2018, with a final total of around 38.9 million flights for all of 2019. This gave an increase of around 700,000 more flights than in the previous year. The reduction in flight costs and the increase

in the number of connections helped to make more flights available to more people ([www.statista.com](http://www.statista.com)).

More than 61.5 million tonnes of goods were transported by air in 2019, a decrease of around 3.3% compared to 2018, where 63.5 million tonnes were transported by air. The main reason for this was the ongoing 'trade war' between China and the US. As a result, the Asian market saw a decline of 5.7%. Significant declines in cargo shipments were also recorded by Middle Eastern, European and North American airlines.

At the beginning of 2020, when isolated cases of Covid-19 virus infections began to appear, we did not anticipate such a development of the pandemic and the introduction of numerous restrictions. Aviation, as an industry heavily dependent on the movement of people, was hit hard by the resulting pandemic. That year, some 16.4 million flights were made and 1.8 billion passengers were carried. Comparing these figures to 2019, we can see a sharp decline and slowdown across the aviation sector. The Covid-19 pandemic caused a very deep crisis. The number of flights and passengers carried in 2020 is significantly lower than in 2019. It can be said that this situation has caused aviation to regress for more than 15 years. This is well illustrated by the number of flights in Europe in 2019 and 2020, although the first two months of 2020 did not herald anything. 2020 saw a drop in flights of nearly 90%, the following months in 2021 were no better. It will take several years for the aviation industry to return to its pre-pandemic state.

Airlines are among those hardest hit by the Covid-19 pandemic, with restrictions in place contributing to a drop of up to 60 per cent in the number of passengers carried in 2020 compared to the previous year. Regular services saw a 69.5 per cent drop in passengers in 2020, or almost 30.5 million fewer passengers served than in 2019. (<http://rada-przemyslu-lotkos.pl/resources/2021/11/2021-11-18-raport-jakosciowa-analiza-rynku-lotniczego-w-polsce-w-okresie-pandemii.pdf>).

A significant drop in the number of passengers carried, but also in the number of flights operated, has resulted in colossal financial losses. According to IATA, from the start of the pandemic until the end of 2021, carriers lost more than \$156 billion. Such a large deficit has hurt airlines. Even so, according to IATA reports, the number of bankruptcies was not as high as one might expect, amounting to around 40. A large impact was made during the initial period of the pandemic. Only small or regional airlines were mainly affected, with the UK's Flybe being an example. Larger airlines tried to cut their costs as much as possible by, among other things, reducing the fleet of aircraft they operated, but also by reducing staff salaries and ultimately making them redundant. There has also been a drop in ticket prices

to encourage people to fly and at least to some extent reduce the losses they have incurred. In 2020, the airlines reduced their costs by almost 46%, while their revenues fell by almost 61%. Ultimately, the carriers lost around \$66 for every passenger carried. Never before has the airline industry seen such a sudden drop in traffic levels (Wowoczny, 2021, p. 204).

The growing pandemic caused by the SARS-CoV-2 virus has led to a global crisis in the aviation market. The timing heavily revised the operations of the entire industry and put the aviation sector into survival mode due to significantly lower traffic and loss of revenue. In 2020, approximately 16.4 million flights were made and 1.8 billion passengers were carried. Comparing these figures to 2019, we can see a definite decline and slowdown in the aviation sector as a whole.

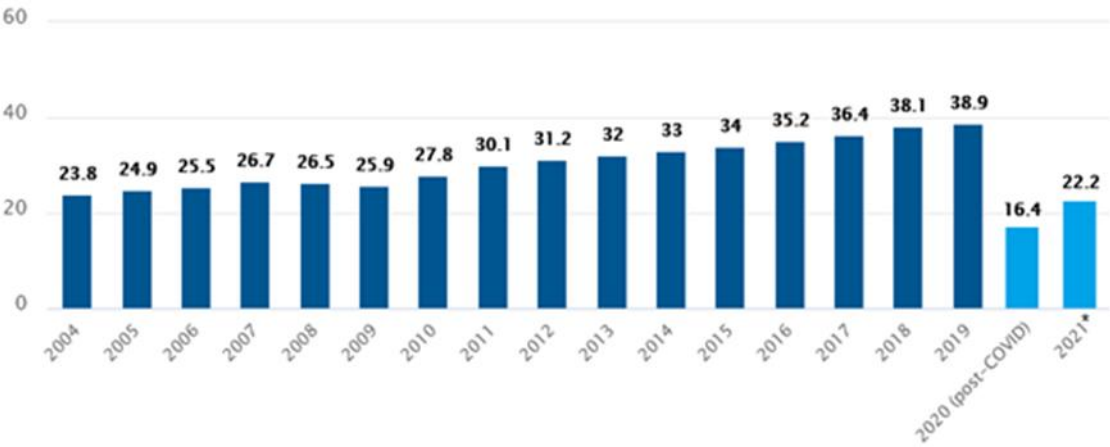


Fig. 1. Number of flights in millions by year  
Source: www.statista.com

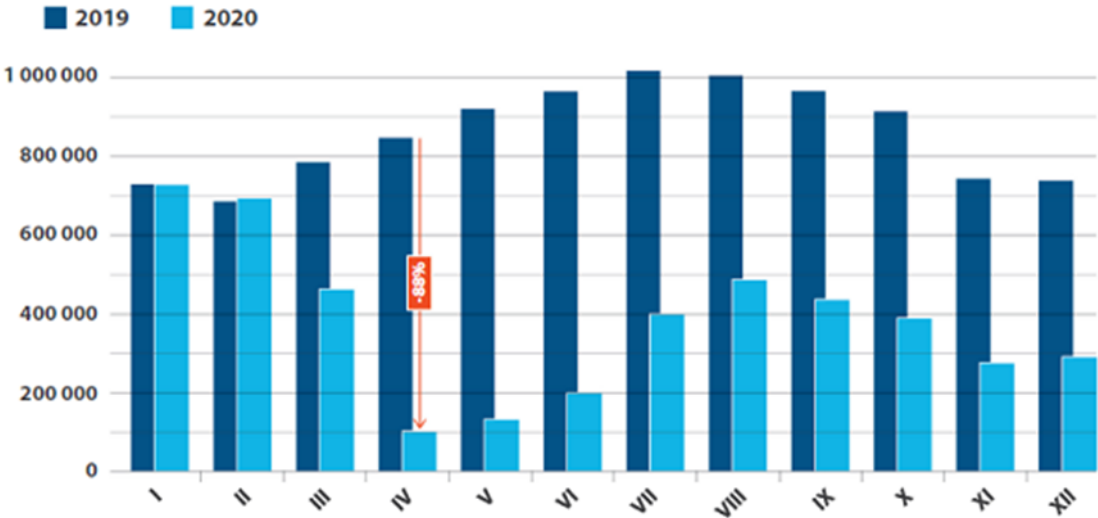


Fig. 2. Number of flights in Europe by month  
Source: European Court of Auditors

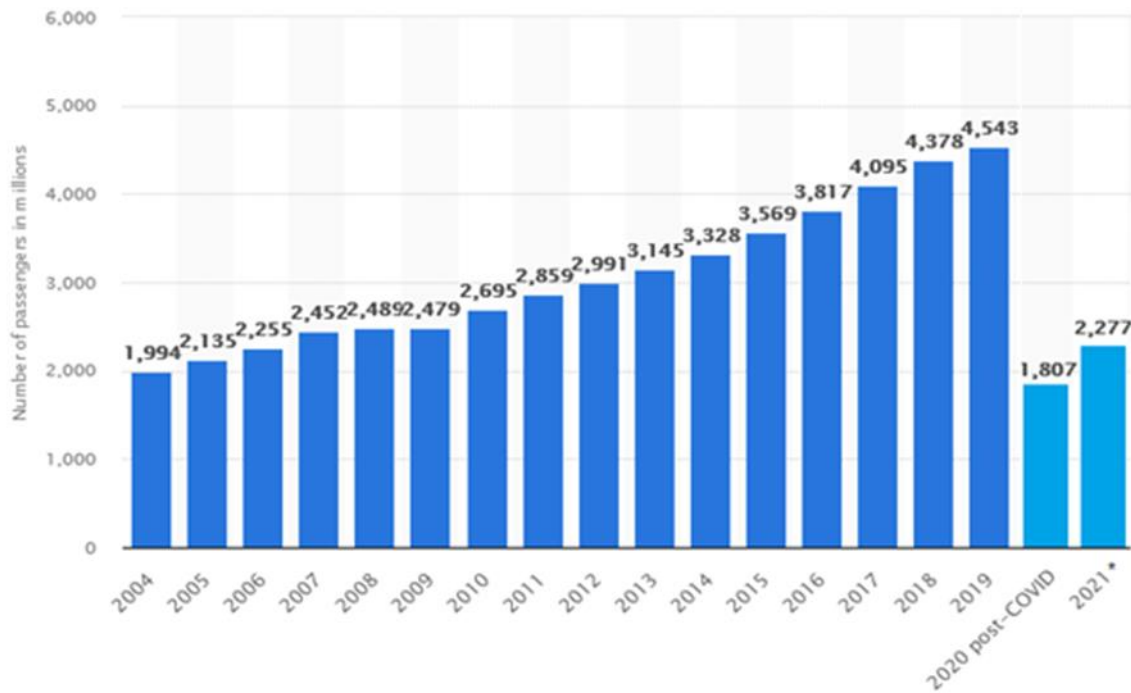


Fig. 3. Number of passengers carried in billions by year  
Source: www.statista.com

The Covid-19 pandemic has caused a very deep crisis in the aviation sector. The number of flights and passengers carried in 2020 is significantly lower than in 2004. It can be said that this situation has set aviation back more than 15 years. The number of flights in Europe has fallen significantly throughout 2019 and 2020, although the first two months of 2020 did not herald anything alarming. The following months saw a significant decline. In April 2020, the number of flights fell by almost 90% compared to 2019.

Pandemic time is not the best time for airlines. The large losses they have suffered, the lack of liquidity, the disposal of aircraft and staff are causing a significant setback for the entire airline industry. In the case of major airlines such as LOT, British Airways and KLM, the lack of transatlantic flights was also a problem, and this also meant the grounding of many wide-body aircraft, which were generating significant losses at the time.

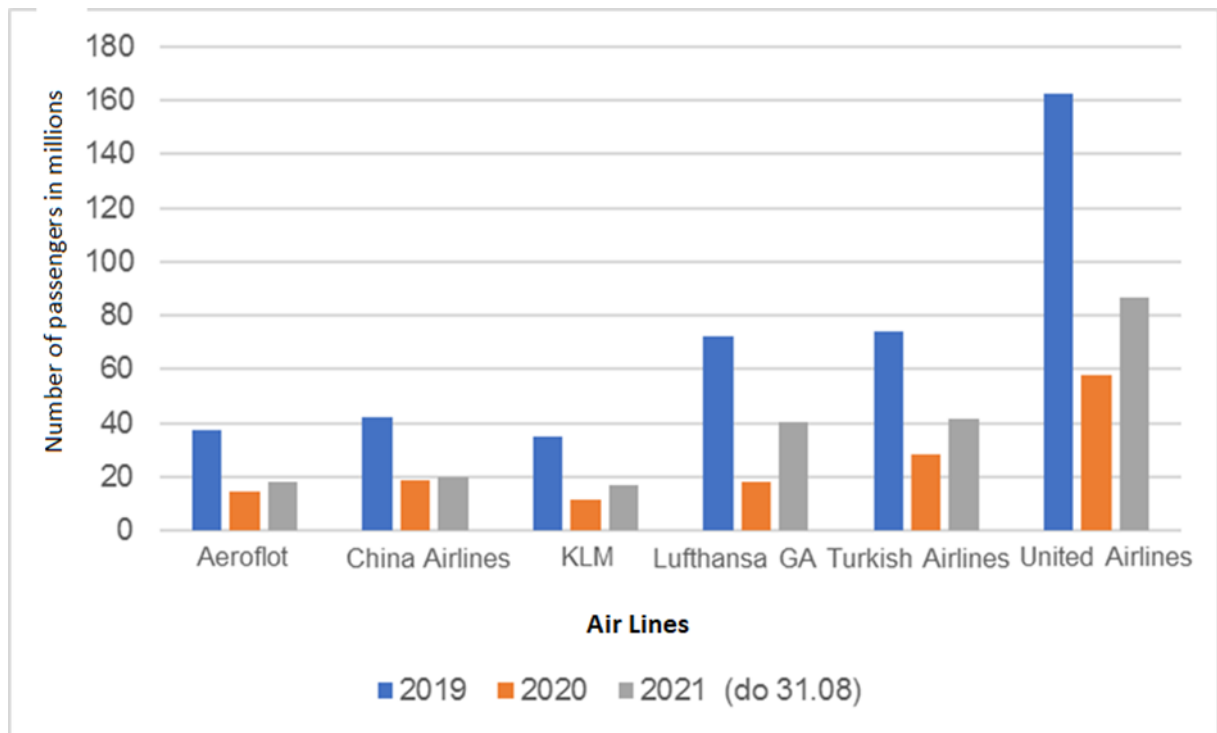


Fig. 4. Number of passengers carried by selected airlines by year  
 Source: www.statista.com

The impact of the pandemic was also felt by low-cost airlines, although here the losses were smaller. This is due to the fact that more short-haul flights are offered, and in a situation where the border was closed or there was a ban on intercontinental flights, the majority of flights are with low-cost airlines, which during the pandemic attracted customers more because of the price. In addition, these airlines also entered this crisis with a much bigger financial cushion than the traditional airlines, and this gave them a little more comfort in making different decisions. Their business model and great flexibility also allowed them to find their way in the new reality caused by the coronavirus, thanks to, among other things, a virtually homogeneous fleet and a greater ability to reduce costs than traditional airlines.

As a result of the pandemic, the number of passengers carried in 2020 and 2021 decreased. This was due to both restrictions, the suspension of airline operations for a period of time, and the introduction of restrictions on passenger numbers. International carriers were negatively affected. Low-cost airlines increased the number of short-haul routes and attracted customers with attractive prices.

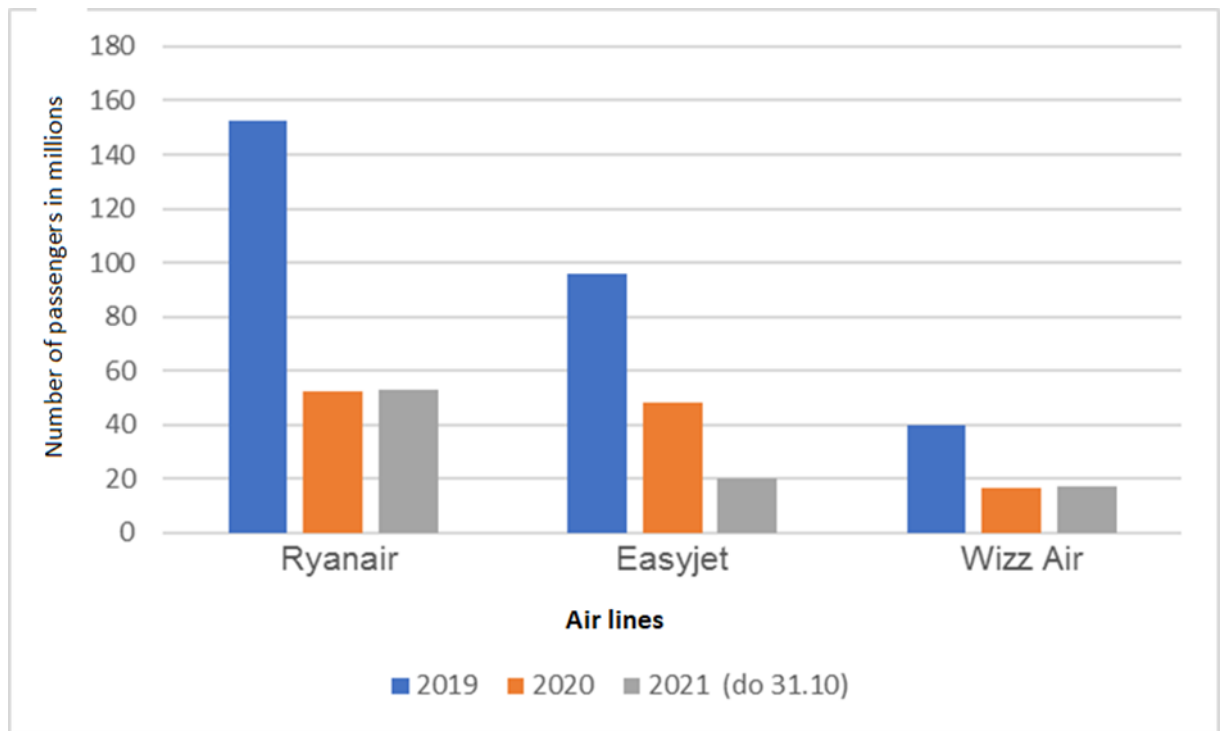


Fig. 5. Number of passengers carried by selected lines by year

Source: [www.statista.com](http://www.statista.com)

The pandemic also affected LOT Polish Airlines. The development of the pandemic contributed to significant changes, including the withdrawal from the acquisition of Condor Airlines. The suspension of scheduled services resulted in an inability to conduct core business. The airline therefore achieved very low financial results. There was a 60% decrease in the number of passengers carried in 2020 compared to 2019 and no significant improvement in 2021.

In 2020, the airline reported a loss of 1 mln PLN.



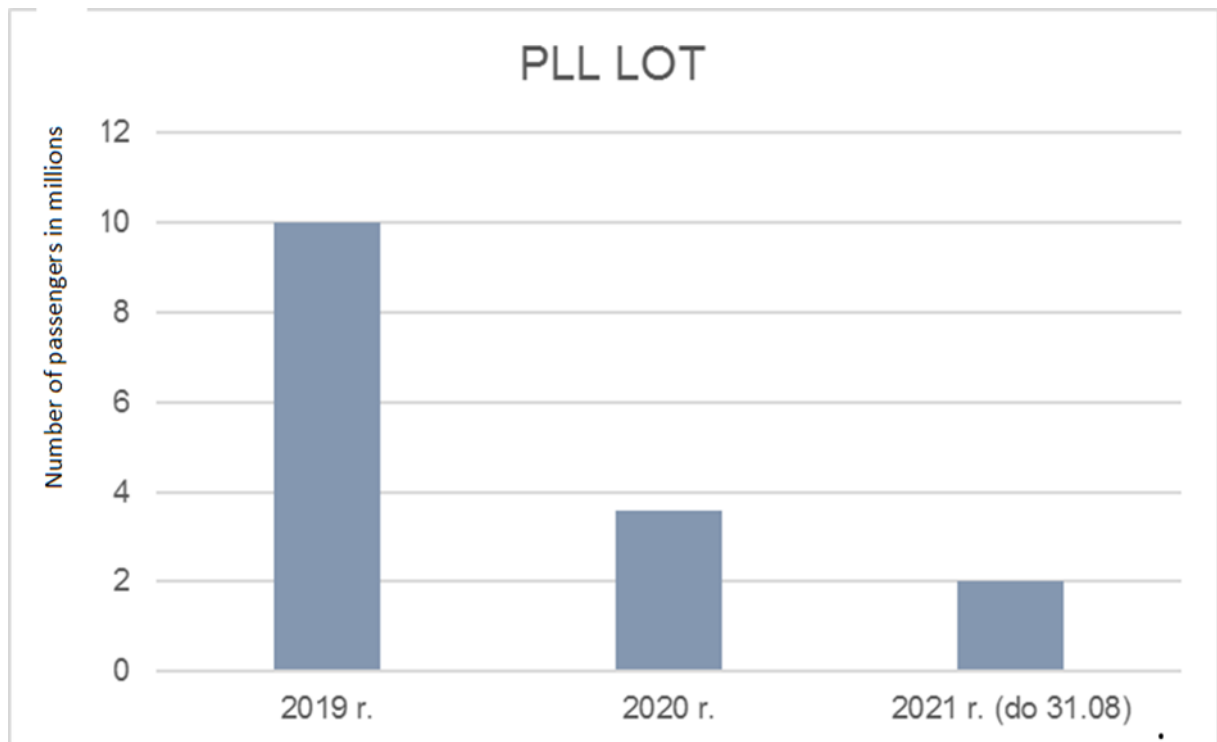


Fig. 6. Number of passengers carried by year  
Source: www.statista.com

During the pandemic period, LOT focused on reducing losses by limiting increased costs. Due to improved aircraft safety, the wearing of masks was mandated and changes were made to cleaning procedures. After the pandemic, the airline wanted to attract as many customers as possible to rebuild its position and attract customers.

Despite a promising introduction to 2020 and the announcement of the purchase of German airline Condor, which was to be finalised by the end of April. The onset of the Covid-19 outbreak caused significant changes and PLL eventually withdrew from its plan to acquire the airline. In addition, the suspension of scheduled services resulted in an inability to conduct core business, which in turn resulted in the airline's very low financial performance. From the information provided by PLL LOT, most of the operational indicators have seen a decline compared to the time before the Covid-19 pandemic, one of which is the number of passengers carried. As we can see in the figure below, 2020 saw a decline of more than 60% in the number of passengers carried compared to 2019, with the airline recording a loss of more than PLN 1 billion in 2020. During the Covid-19 pandemic, LOT focused on reducing losses, mainly by cutting costs or reducing cash inflows.

The pandemic contributed indirectly to the eventual end of production and retirement of four-engine wide-body long-haul (transatlantic) aircraft: the European Airbus A380 and the US Boeing 747. All unfulfilled orders were cancelled, the last 251 A380s were produced

in 2021 after fourteen years of production (the first was flown in 2007, while the market rival Boeing 747 was flown in October 2022 after 1572 aircraft had been delivered, and the last aircraft was the 747-8F cargo version.

Due to the pandemic, European airlines Air France, British Airways and Lufthansa have retired all A-380s in 2020-21, with the remaining 11 users planning to end operations by 2035 (figures from 2022). The oldest examples (15 years old!) are already being disposed of, due to the lack of demand in the secondary or cargo aircraft market. The same is true of the American equivalent, the B 747, although in this case, thanks to the cargo version, the aircraft will remain in service much longer (no cargo version of the A-380 was produced).

These aircraft have, in a way, "lost" the competition on the market to the more economical twin-engine models such as the Boeing 777-300ER, 787 "Dreamliner" or Airbus A350-1000. Twin-engine aircraft are cheaper to operate (less fuel consumption, fewer spare parts), and the ETOPS regulations<sup>1</sup> introduced in the 1980s allow them to operate on long-haul routes previously reserved for four- and three-engine models (Mc Donnell DC-10 and MD-11). The Boeing 747 and A380 were designed on the assumption that, as traffic grew, most airlines would plan routes according to the 'hub and spoke' concept, i.e. with a connecting flight at a major hub and a smaller aircraft 'flying' to the destination (spoke). In contrast, the Boeing 787 and A350, as well as the latest version of the Boeing 777-X, are designed for point-to-point direct flights. The Boeing 787 or A350 are also more flexible and, with a capacity of 220 seats or more, can fly both between hubs and from smaller, lower-capacity airports while remaining cost-effective. Moreover, the advent of a new generation of narrow-body aircraft with extended range, i.e. the Airbus A321LR and Boeing 737 MAX, has also provided the opportunity to open up new low-volume long-haul routes.

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<sup>1</sup> ETOPS (an acronym for Extended Range Twin Operations) - a certificate that allows twin-engine aircraft to fly long-haul routes that were previously unavailable to them essentially due to engine reliability. There are different types of ETOPS certificates, each allowing aircraft to operate on routes a certain amount of time away from the nearest emergency airport. For example, if an aircraft is ETOPS-certified 180 minutes, it can fly any route that is up to 180 minutes away from the nearest emergency airport. ETOPS applies to all routes over land and water. Currently, ETOPS 330 minute certificates are already being issued.



Fig. 7. Utilised Airbus A 380

Source:<https://www.rynek-lotniczy.pl/wiadomosci/smutne-zdjecie-z-rozbiorki-pierwszego-airbusa-a380-air-france--10410.html>,

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## **2. Reducing the impact of the Covid-19 pandemic on air transport**

First and foremost, in the fight against Pandemic, existing aviation law was reviewed and adapted to the prevailing situation at the time. Some rules were suspended and new legislation was introduced to protect passengers or licensing standards were changed.

To increase people's confidence, recommendations have been made to restrict the free movement of people to countries where there is a higher risk of transmission of infection. Airlines have raised cleanliness standards to minimise the risk of infection on board. Appropriate filters contributed to the disinfection of planes and the entire space where people were present. The restoration of air traffic involved adherence to certain standards. The airlines offered a small number of patients to their customers travelling in the region, and the restrictions in place, were not as severe for people. Changes were also made to airports so that they provided more distance for people.

The Covid-19 pandemic caused major financial losses for carriers, which lost liquidity. The timing of the pandemic forced airlines to select aircraft in such a way as to be as efficient and profitable as possible. Due to the low number of passengers carried during this period and the greater amount of cargo carried, carriers needed aircraft with more cargo space. Therefore, they had to be converted. In addition, the route and flight speed had to be adjusted to ensure the lowest possible fuel consumption, which entailed additional savings. New flight procedures and take-off and landing concepts also helped. This has been prepared by significantly reduced air traffic, and the knowledge gained in this way will also be used when the aviation situation returns to normal. The airlines are also looking forward

to the development of technologies in aircraft and their engines that will ensure a reduction in fuel consumption and carbon dioxide emissions. In addition, they are hoping for the production of alternative fuels with similar properties to those used today, while producing less harmful substances and at a lower cost.

In developing new developments, the airlines had to take into account the situation related to the Covid-19 pandemic. The conditions in which they had to operate were not easy, so they had to prepare adaptation strategies as a first step. The airline had financial problems, had to prepare aircraft accordingly, and had to put in place appropriate procedures to ensure the highest safety standards.

The impact of the Covid-19 pandemic is very high and the aviation industry could not be left without adequate support. New procedures were introduced and adapted to the prevailing situations. In addition, new legislation on the protection of passenger rights was developed and recognised, and standards for the carriage of air cargo or the licensing of carriers were changed. For the development of the aviation market, it was important to renew people's confidence in air transport so that they could be sure that they were not in danger on board. Recommendations were also made to restrict the free movement of people to countries where there was a higher risk of COVID-19 transmission, and some countries also introduced quarantines for people who flew into the country to reduce the possibility of transmitting the virus. Governments have also had to respond to protect the revenue generated in the aviation industry. Various programmes such as tax breaks have been introduced, as well as many countries providing financial assistance to local airlines, as well as other companies in the industry.

Airlines also had to focus on different aspects than before the pandemic. In order to protect passengers and respond to their needs, they had to put more emphasis on people's health. Therefore, specific measures were taken to improve cleanliness standards in order to minimise the risk of infection on board. It was also important to install so-called HEPA filters on most planes, which filtered the air during the flight. The purchase of advanced equipment was also important here. These were intended, among other things, to disinfect the planes or the general space in which people were located, but also to limit contact with each other through the use of artificial intelligence. It was also particularly important to ensure that passengers wore masks during flights. At the time, it was important to offer customers travel to new and more interesting destinations, where the number of sick people was low and the restrictions in place were not as severe for people.

Already in the first weeks after the resumption of passenger flights during the pandemic, airlines implemented appropriate measures related to the sanitary regime. Passengers, thanks to the safety-enhancing restrictions introduced, felt safe and were positive about the measures taken by the airlines. The air filters used in aircraft and the sanitary regime introduced by the airlines make aircraft one of the safest means of transport. Many passengers were concerned that they could contract the Covid-19 virus on the plane. While the summer period saw an increase in interest in air travel, the autumn period again saw a decline. Demand for air travel is recovering very slowly (<https://krakowairport.pl/blog/ekonomiczne-skutki-pandemii-covid-19-dla-lotnictwa-cywilnego/>).

The procedures in place are not only designed to protect the life and health of passengers, but above all to ensure the safety of the ground and cabin crew working on site. An infection of one of the staff or crew members could completely paralyse and close the airport, resulting in multi-million dollar financial losses for both the airport itself and the airlines (<http://rada-przemyslu-lot-kos.pl/resources/2021/11/2021-11-18-raport-jakosciowa-analiza-rynku-lotniczego-w-polsce-w-okresie-pandemii.pdf>).

The air exchange in aeroplanes, the lack of direct face-to-face contact between passengers on board and the physical barrier provided by the seat back protect passengers and reduce the risk of SARS-CoV 2 infection. In aeroplanes, fresh air is constantly replenished from the outside and all air inside the aircraft is changed every few minutes. Good airflow is maintained in the cabin, which can also help to reduce the risk of droplet-transmitted infections such as COVID-19. SARS-CoV-2 travel coronavirus infections are caused by passengers congregating close together when boarding and disembarking aircraft and by large concentrations of people in airports (Koniczny, 2021, p. 62).

The airports' actions were aimed at increasing travellers' health security, as well as countering the threat of travel scares resulting from the unstable international situation and frequent changes in local regulations regarding sanitary requirements or border crossing rules. Travellers also felt anxious about impending sanitary risks. A significant problem is the desire to maintain a proper social distance, which seems to be difficult when travelling (Koniczny, 2021, p. 62). Passengers also felt anxious about not being able to return home or having to stay isolated outside the country for long periods of time (Kubas, 2020, p. 169).

## **Conclusion and recommendations**

The Covid-19 virus has affected all sectors of the economy and all aspects of human life. It has caused huge losses in many areas, mainly financial, and has created a great deal

of uncertainty and marasm. The pandemic has very much affected the aviation sector and stopped the positive changes taking place in it. The paper presents the situation before the pandemic and the changes that took place during it. Mitigation measures were taken to ensure the safety of travellers and employees. Airlines and other stakeholders closely associated with the sector had to adapt to the new demands of the pandemic. Airline policies had to be transferred to pandemic situations. The pandemic has had a major impact on air carriers, airports, as well as other aviation-related service providers.

The Covid-19 pandemic, which unfolded in early 2020 in many countries around the world, changed every aspect of life. The rapid spread of the disease, as well as inefficiencies in the healthcare system and numerous constraints, have affected the mental functioning of the population. The measures taken and the development of the disease have also had an impact on the economy, particularly on tourism, catering and aviation.

Carriers and the aviation sector as a whole, due to the changes during the pandemic, were unable to anticipate and develop new strategies that would allow them to return to the market and function normally. During the pandemic, they were looking for new solutions to survive, as government support and loans would not help for long. A complete blockade, grounding the aviation sector and restarting it comes at a high cost. Only international consultation can lead to a solution to such problems, as both large airports and small airports needed support and assistance.

Carriers must adapt and respond to the limitations of regulations related to the protection of customers in relation to increasing greenhouse gas emissions new technologies and revisions must be introduced to stop CO2 emissions and reduce adverse changes in the atmosphere.

The lack of preparedness of the health system, as well as the economy as a whole, for an emergency situation has paralysed many areas of operation. Aviation is the branch of transport most affected by the pandemic. Airports around the world have been operating for several months in a completely new and highly unpredictable reality. The crisis caused by the Covid-19 pandemic is the biggest disaster in aviation history. The pandemic stopped the intensive growth of this economic sector, which affected the economic situation of airports. The Covid-19 pandemic strongly changed the functioning of air transport both in Poland and in other countries.

Ensuring aviation safety requires the cooperation of governments and the aviation industry and the implementation of appropriate regulations and standards for responding to and operating in an abnormal situation. The aviation industry requires the development of emergency response plans. Governments should balance health protection efforts

with economic and social impacts. In the aviation sector, rules need to be defined and clear messages need to be communicated to travellers in such a difficult situation.

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