Schwechat Airport Development Forecast as a Risk Management Tool to Address the Impact of the Covid-19 Pandemic

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Abstract
The Covid-19 pandemic has affected all areas of our society. The pandemic in the economy has affected mainly the development of transport and tourism, but especially air transport. Many airports, not only in Europe but around the world, have experienced a drop in passengers and cargo due to the Covid-19 pandemic. For many airports, this period, which began in 2019, meant huge losses due to a drop in passengers, also due to the collapse of several airlines. Despite the gradually improving situation, the impact of the pandemic is felt and the number of passengers at airports is growing only slowly. The airports thus had to deal with the current situation and adapt their future operation to the current conditions. This current pandemic has not escaped even the leading airport in Central Europe - Schwechat Airport in Vienna. The aim of the article is to evaluate the effects of the COVID19 pandemic on the said Schwechat airport. The article focuses on the analysis of the development of the airport before and during the pandemic up to the present. The article describes the problems that Schwechat Airport had to deal with throughout the period, with the loss of passengers, delays and the collapse of carriers. The article is part of a study aimed at identifying the negative effects of the pandemic on air transport and related industries worldwide. Predicting the development of the airport is a very important aspect, especially for the company's management and should be part of the risk management of every company.
Keywords: air transport, Vienna Schwechat Airport, pandemic, COVID-19, crisis management

1. Introduction

The coronavirus disease epidemic-2019 (COVID-19) has become a global health emergency due to its scale, attributed deaths and tendency to spread worldwide. In fact, on 30 January 2020, the disease was declared a public health situation of international concern due to its rapid spread across international borders and the resulting number of cases. In conclusion, the outbreak of COVID-19 has caused an alarm around the world, as the causative agent of the virus is new in nature. However, strengthening standard infection control procedures and taking precautionary measures for passengers can significantly minimize the threat of further disease transmission.[1]Coronaviruses are new respiratory viruses that are known to cause diseases ranging from the common cold to severe acute respiratory syndrome (SARS).[2] On 30 January 2020, the World Health Organization declared COVID-19 a state of public health of international importance.[3] n the first week of March, a devastating number of new cases were reported worldwide and COVID-19 emerged as a pandemic. As of July 20, 2020,

more than 14 million confirmed cases had been reported in 118 countries and 609,531 deaths.[4] On 20 July 2020, South Africa (SA) reported 364,328 confirmed cases of COVID-19 5,033 deaths. Air mobility during the current COVID-19 epidemic has significantly affected the EU region as well as other parts of the world. Overall, movement is drastically restricted and the global situation is far from common. Passengers are either barred from traveling or discouraged from doing so by restrictions in incoming countries that require quarantine. For the above reasons, travel in these pandemic circumstances is currently mostly limited to business trips. [4]

Given the uncertainty of the further impact of the current situation, it is likely that the aviation business will recover at a slower pace and bring a recovery in the V and U shape, according to the International Civil Aviation Organization's analysis of economic impacts on civil aviation.[5] At present, the capacity of airlines decreased by 70 to 80 percent in April 2020 compared to April 2019, several large airlines have temporarily ceased operations. Nearly 60 percent of the global fleet was terminated in early April 2020, according to a McKinsey report.[6]

This information was the reason why we dealt with the development and effects of the pandemic at one of the largest airports in Central Europe, Schwechat Airport. Schwechat Airport, located near the Austrian capital Vienna, is one of the leading European airports due to its location and size. The airport itself belongs to the Vienna Group consortium and is the largest of all airports in the consortium, ahead of Luqa Airport in Malta and Košice Airport. In 2019, Swechat Airport handled more than 31 million passengers on 266,000 flights. A quarter of all passengers use the airport for transfer to long-distance destinations, which advises the airport as a major transfer hub thanks to diverse destinations around the world. The development of the airport in terms of an increase in the number of passengers handled was slowed down by a pandemic at the end of 2019. In one study, Mr Edib Ali Pehlivanli addressed this pandemic and its implications in air transport, saying that this had not yet happened in modern aviation history. fact has marked people all over the world.[7] This year was still a turning point for the airport, as the year-on-year increase was more than 17% compared to 2018. But after the first two months, the pandemic hit in full and Schwechat Airport, like other airports around the world, felt its strength. They would like to forget all the airports in the world together with the airlines this year. Many airports were limited and those that did not have cargo only served in emergency mode. The aim of this article is to take a closer look at a key airport in Central Europe as it has managed to cope with restrictions and restrictions and eliminate the consequences of a pandemic along with airlines. Every airport in the world must include risk management forecasts when predicting developments. Air traffic and airports are affected throughout the year by various factors such as the effects of weather, airline crashes and unforeseen events. The impact of the COVID-19 pandemic is certainly so. This pandemic has proven to be the worst in decades. Until then, airport risk management did not count on such a variant as they had never encountered it. Therefore, in the future, unpredictable possibilities must be taken into account in their forecasts and included in the risk management forecasts. The immediate suspension and cancellation of several flights was a big blow to the airport. The article itself focuses on the load factor and the average seat capacity, but also on the cargo flights themselves. The sources of information themselves came from the official websites of Vienna Group, Schwechat Airport and its annual reports.

2. Methodology

The database for processing the article consists mainly of information on the performance and operational indicators of Schwechat Airport. It was necessary to use a software tool to process the analysis. MS Excel, available to the general public, was chosen as the simplest, in the

environment of which individual calculations and graphs were created. When creating graphs, the mathematical function Linest was used to create a linear and exponential trend line and display the equation in a reliability graph R^2. The Linest function calculates the statistics for a given line based on the calculation of the course of the line using the least squares method. The line calculated in this way best matches the given data and then returns a field describing this line. The function returns an array of values and must be specified as an array formula. The basic calculations for a line are:

$$y = mx + b \quad [8]$$

$$y = m1x1 + m2x2 + ...+ b \quad [8]$$

These relations apply if there are several ranges of x values, while the dependent values of *y* are a function of the independent values of *x*. In the equation, the values of *m* represent the coefficients corresponding to each value of *x*, where the value of *b* is a constant. R^2 is the coefficient for determining the value. It compares the estimated and actual values of the y-axis and its range from 0 to 1. The value 1 in the graph is an expression of a perfect correlation, where there is no longer any difference between the values of the estimate and reality. The following formula is used to calculate the trend line directive:

$$m = (y2-y1)/(x2-x1) \quad [8]$$

R^2 the reliability value in the graphs is the value of y as an estimate and the actual value of y in the square. The smaller the residual sum of squares with their total sum of squares, the more the value of the given coefficient will be r^2 larger and determine the relationship between the variables.[8] It follows that R^2 will be equal to the regression sum of squares / total. In the graph on the calculation of the load factor values, a formula was used, which is the result of the mileage of passengers compared to the available seats in the aircraft. It's about a relationship [8]:

$$LF = \frac{(\text{flights})(\frac{\text{km}}{\text{flight}})(\text{passengers})}{(\text{flights})(\frac{\text{km}}{\text{flight}})(\text{seats})} =\%. \quad [9]$$

The calculations in the graph use the formula of a simple moving average with a prediction for the calculation of time periods for the period and their average, namely:

$$(passengers\ n + passengers\ n\text{-}1\text{-} ....passengers\ n\text{-}x)\ /x+1. \quad [8]$$

The exponential value of the trend line in the graph expresses a higher emphasis on the last period and is therefore suitable for a more accurate determination in a shorter period. We determine the value for the calculation x = 2 / (n + 1), where n expresses the time period for the calculation. We calculate the exponential value (EMA):

$$EMA = (Ema_{n-1}) + \left[x \cdot \frac{Passengers_n}{Passengers_{n-1}}\right] \quad [10]$$

3. Air transport at Schwechat airport

Schwechat VIE / LOWW Airport, with its designation under the IATA International Air Transport Association and the ICAO International Civil Aviation Organization, is the largest airport in the Vienna Group, providing all services for civil aviation, cargo and general aviation. The airport opened its gates in 1938 and has a long history. Due to its location only 18 km from the capital Vienna, it is a popular airport for a wide area and surrounding countries such as

Slovakia, Hungary and Poland. From the airport, it can reach all continents except Australia without further stopovers. Flights within Europe and especially to the west have the largest dominance, accounting for up to 85% of all flights. Other destinations are flights to the Middle and Far East with less than 10% share. The remaining flights go to America and Africa. In the run-up to the pandemic, 217 destinations were flown from the airport, serving 77 air cariers. From the airport data, the average occupancy of all flights, also called the load factor, was above 77, which is a slight increase compared to previous years. The reason for the increase was also the year-on-year growth of more than 17% compared to the growth of the number of flights by almost 11%, of which there were 266,802 flights in 2019. The airport is the base for the domestic airline Austrian Airlines, which accounts for more than 43% of all flights at the airport. Austrian belongs to the Lufthansa Group together with Lufthansa, Brusells airlines, Eurowings and Swiss and their share in the airport is less than 55%.

Figure 1Vienna airport [11].

Other airlines operating at the airport include mainly low-cost airlines such as Lauda / Ryanair /, Eurowings, Wizz Air and Easy Jet. The aforementioned Eurowings belonging to the Lufthansa Group is the third largest carrier at the airport with more than 2.2 million passengers, which is slightly less than Lauda and with its number of passengers approaching Wizz Air. Lauda and Wizz Air had a year-on-year rocket increase of more than 350%. This is thanks to the announced new routes and the establishment of a base for several aircraft at the airport. They are a lot of competition for traditional airlines and thus increase the competition and the fight for every passenger. Other low-cost companies operating at the airport include Easy Jet and Level. Among the traditional carriers that fly to the airport daily are, in addition to Lufthansa Group, Turkish airlines and British Airways. The already mentioned year-on-year increase of low-cost companies by more than 56% increased their total share of the airport for a third of all flights. It was the arrival and expansion of low-cost airlines that revived the attractiveness and expanded the number of destinations at very low prices, which attracted

many passengers. After Austrian airlines in the number of transported passengers, another 4 seats were occupied by low-cost companies.

Figure 2 Apron at Vienna airport /self picture/[12]

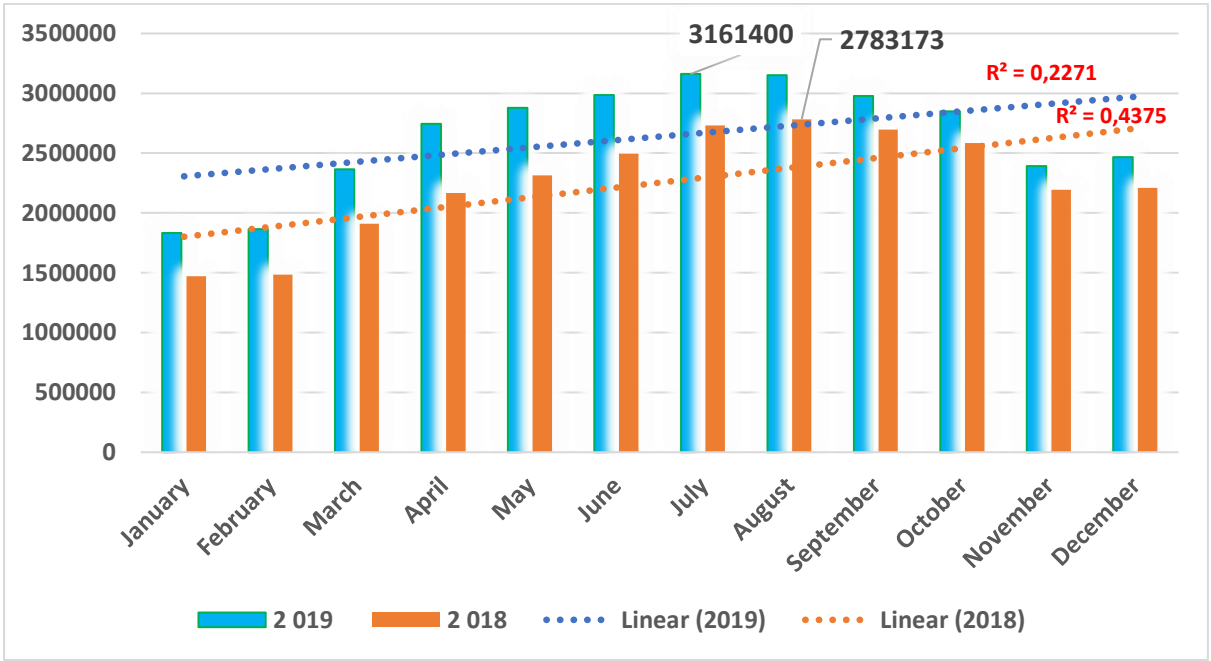

Figure 3 Total number of passengers at Schwechat airport from 2018-2019 (self processing)[14]

In terms of popular destinations, up to a third of all passengers went to Spain, Italy and Greece, mainly by opening new destinations with Wizz Air and Lauda. The already mentioned companies also recorded a double-digit year-on-year increase of more than 21%, together with Austrian airlines with destinations to Romania and Ukraine, where more than 2.7 million passengers flew. The most popular destination in the Middle East was Israel, with an annual increase of 16% and 800,000 passengers. With the opening of new routes to Canada and America by Air Canada and Austrian airlines, interest in long-haul flights has increased by 30% compared to 2018. The most popular western destinations in Europe are London, Frankfurt, Berlin, Paris and Amsterdam. In recalculation, this means that almost every tenth aircraft went to these places.[13]

As for Eastern Europe, the most popular are cities such as Bucharest, Moscow, Kiev and Warsaw. It was the last two named destinations in 2019 that saw a sharp increase in demand. In the case of Kiev up to 88% and Warsaw almost 50%. Of the long-haul flights were popular destinations such as Bangkok, Taipei and Tokyo, which grew by up to 240% year on year. On flights to the Middle East, the top destinations were Tel Aviv, Dubai and Doha. Tel Aviv, among all 217 destinations from Schwechat Airport, ranked 8th in 2019 in the number of passengers carried. The total number of all flights of more than 266,000 increased by almost 11% compared to 2018, also thanks to new routes and the banning of aircraft from new carriers such as Wizz Air and Lauda. On the other hand, freight transport decreased slightly by less than 4% and Schwechat Airport carried 283,806 tonnes of freight. Given the expansion and development of the passengers carried, a similar scenario was expected for freight transport and its decline was a surprise and the airport had to deal with possible further declines in the future. At the beginning of 2020, air traffic was still at the level of previous years, but began to decline gradually in March and this declining trend continued until the end of 2020. For the airport, it was the worst year in 20 years. They were forced to react immediately to the situation and the decline of passengers due to restrictions due to the pandemic and bans on civil flights. [15] The overall decline was not only for passengers, but also for freight, and very few airports were able to cope with the decline. Some airports in the world have been able to maintain or even increase the volume of cargo carried even in times of constraints.

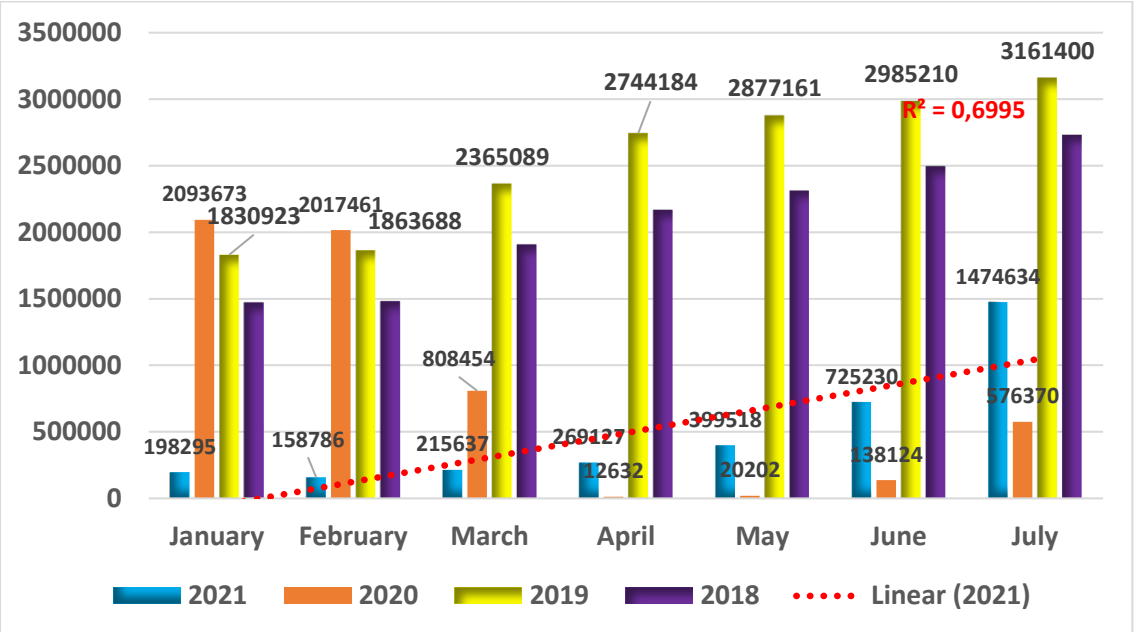

Figure 4 Total number of passengers at Schwechat airport from January to July 2018-2021 (self processing)[16]

As shown in the figure above, the first two months of 2020 were still stable and still meant continuous growth compared to previous years. The turning point came in March, when restrictions and measures began in connection with the Covid-19 pandemic. The worst months came between April and June, when air traffic at the airport almost stopped and the number of passengers was minimal. In April, the airport handled only 12,632 passengers, which was on average only 0.48% compared to the current April in 2019. The airport is still unable to reach the February 2020 period, and 17 months after the decline, Schwechat Airport is only slowly managing to grow in passenger traffic, mainly due to low-cost airlines, which have opened new routes mainly before the summer season. In July 2021, the number of passengers handled was just over 1,474,000. This is more than in 2020, where traffic was very limited. At that time, in July, they handled just over 500,000 passengers. It is still small compared to 2019 and the loss in the number of passengers is 54%. The graph shows that the airport is growing slowly but gradually and only increased by 100% compared to June 2021.
The chart below shows how the airport, in cooperation with airlines, tried to maintain regular flights and the attractiveness of the airport. However, the efforts of both the airport and the carriers were in many cases in vain, and the number of passengers carried and aircraft occupancy fell sharply. It can be seen that in the worst month of April 2020, average occupancy fell to 13 passengers. The equilibrium was only the first 2 months in 2020 compared to 2019. So far, even in 2021, the average occupancy does not reach the value of 2019, although the last two months and especially the month of July are slowly approaching these numbers. The efficiency of all flights is still below the average of standard months and getting to the numbers before the pandemic will be very difficult and it will take several more years for the airport to grow again.

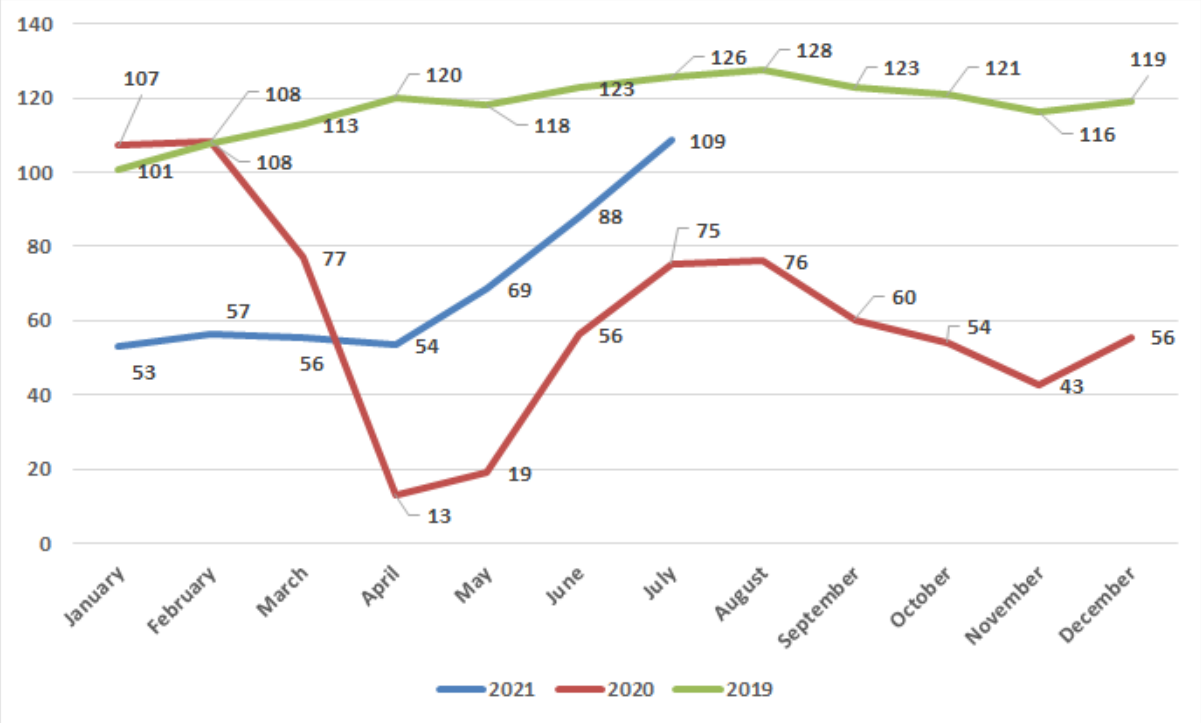

Figure 5 Load factor compared to the number of flights and passengers (self processing)[17]

Freight traffic at Schwechat Airport has been declining since 2018. Until the crisis, the airport had a minimum decline of around 4% year on year. The pandemic exacerbated this loss, even though they fell by only 50% compared to passenger traffic, and freight traffic was expected to keep the airport busier. On the other hand, Luqa Airport, which is part of the Vienna group

consortium, has fallen by only 4% and has found a foothold in the aviation market. The airport finally ended 2020 with a loss of 23% compared to 2019, and freight traffic was expected to grow in 2021 as passenger traffic also revived and began to grow continuously. But the reality in 2021 is complete Although other and freight transport is growing faster than passenger transport, its growth is steady and continuous since the beginning of the year.

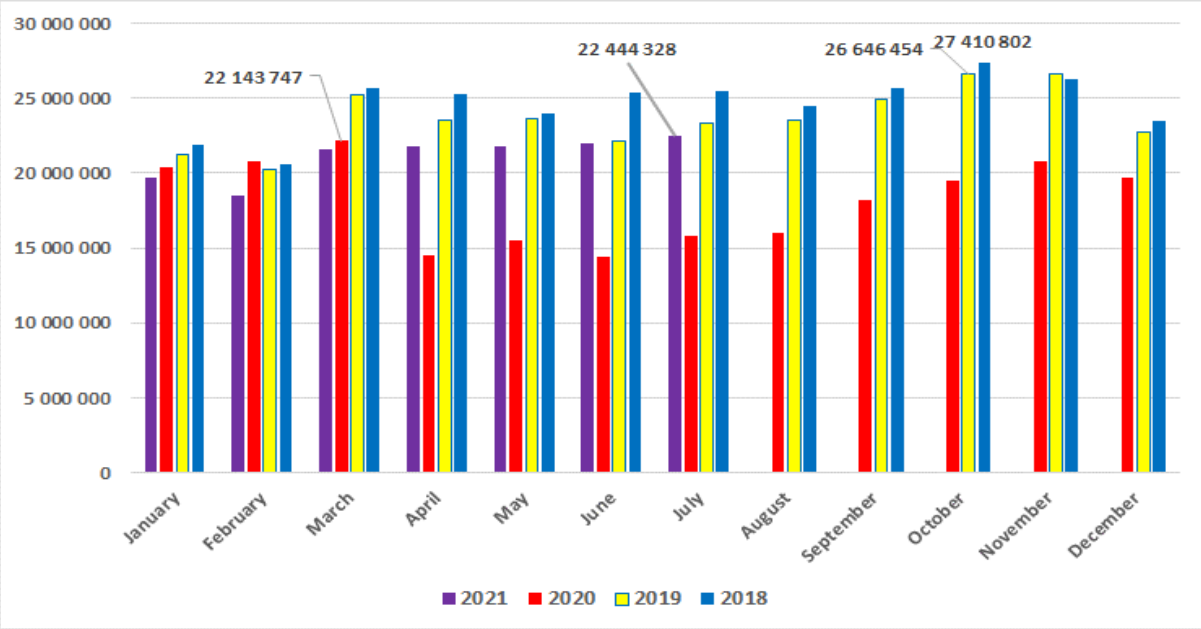

Figure 6 Total Cargo at Schwechat airport since 2018-2021-July (self processing)]18]

The strongest month in 2021 was July. Compared to the previous years 2018 and 2019, it is still only 80% of the total transported cargo. Just as the last month of July passenger transport recorded a sharp growth, so freight transport also grew, but only by a minimum, so it does not copy the growth of passenger transport.

4. Discussion

Based on information and data from the Wien group, of which Schwechat Airport is a part and the largest member in terms of number of passengers and cargo carried, it is clear that the pandemic has hit them and thus avoided the highest declines and losses in civil aviation in history. 2020 was not only the worst for Schwechat Airport, but also for many airports around the world. They fought the pandemic together with the air carriers and were able to manage the situation within the market. On the other hand, they failed to build on the success of Luqa Airport in Malta, which almost managed to maintain the trend of freight traffic and the pandemic did not affect it as much as Schwechat Airport. As the only group in the group, they fell by only 4% year-on-year, compared with 23% at Schwechat Airport and 88% at Košice Airport. On the other hand, as the only airport in the Schwechat consortium, it was able to grow in 2021, and the trend indicates that it will continue to grow. Whereas, for example, Košice Airport did not transport even one kilo of cargo in 2021, which is alarming for an international airport. For Schwechat Airport, the pandemic period has been and continues to be a major challenge, especially for freight, which has been declining for several years in a row and is at the airport to respond to the downturn.

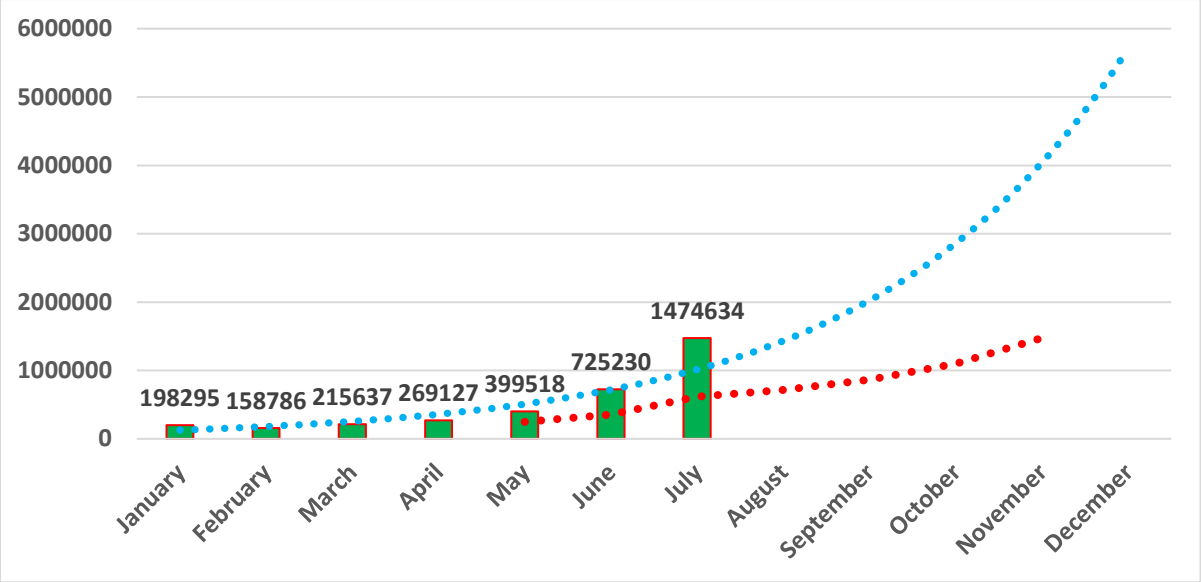

Figure 7 Development of Passengers forecast at Schwechat airport with a 5 month forecast (self processing)]19]

Passenger air transport is expected to grow by the end of the year, as in July, and this trend should continue unless a situation similar to that of 2020 arises. This long 17-month pandemic period has given sufficient scope for the airport together with carriers were better able to respond to critical situations. The emergence of new routes, the banning of more aircraft, gives a clear signal that the airport wants and will grow. [20] To do this, it needs close cooperation with airlines, which also want to continue to grow.

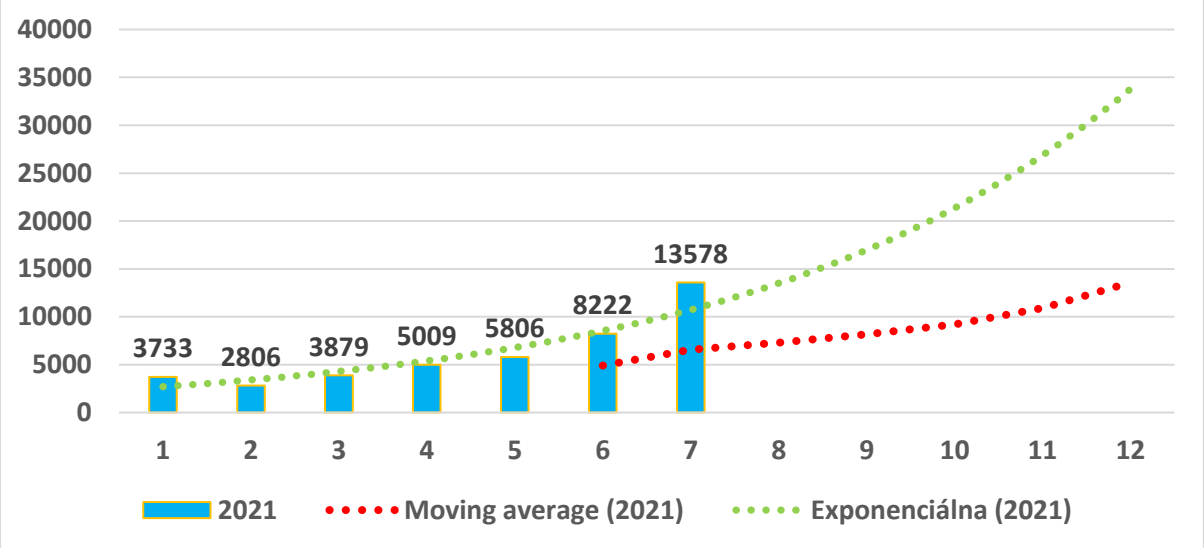

Figure 8 Development of flights forecast at Schwechat airport wit a 5 months forecast /self processing/[21]

A total of up to 68 carriers fly to Schwechat Airport in 2021 and connect the airport with the rest of the world except Australia without a change. According to Eurocontrol IATA and the FAA, the situation is still not improving as expected, and with the arrival of the third wave of the pandemic in Europe, it does not look good in the coming months. This pandemic situation is expected until 2025, when most airports around the world should reach pre-pandemic levels. [22] Everyone hopes that the faster growth during the holidays and the increased demand for travel will be maintained, and that charter flights, which are plentiful in the summer, should

also help. However, the forecast for the next period is cautious and it remains to be believed that the airport will prosper and such a period of more than a year will not be repeated.[23]

Conclusion

Schwechat Airport's data and statistics, as well as the results in the annual report, make it clear that the pandemic has thoroughly inspected the airport and taught the airport to better respond to crisis situations such as the pandemic they have encountered for the first time in modern history. In its predictions, the airport must include unforeseeable cases in risk management that may occur. For two long months, the airport almost completely stopped passenger traffic and, together with the carriers, waited for the situation with the pandemic to develop, and together they looked for ways to revive passenger air traffic, albeit with limited restrictions. The airport expected the decline in passenger traffic to be offset by growth in freight traffic, but it also saw a decline of more than 23%. Although growth has increased in early 2021, it is still slow and continuous and is not expected to grow faster due to the fact that freight traffic at Schwechat Airport has been declining for 4 consecutive years. For a moving average, it is more appropriate to use a simple moving average than an exponential one, which is only suitable for a short comparison period as it is focused only on the last monitoring period and does not look at previous results. Thus, it gives inaccurate data for a longer comparison period. The report issued by the International Civil Aviation Organization (ICAO) also mentions a period of up to 5 years when air transport is recovering from the current pandemic. On the other hand, it envisages faster freight growth over a 2-year horizon, but this will of course depend on each airport individually. [24] After the announced and unexpected falls and crashes of air carriers that also flew to Schwechat Airport, the airport had to fill the free slots with existing carriers, which caused a temporary drop in passengers. The airport, in cooperation with current carriers, which they fly to Schwechat, gradually renewing the canceled routes and at the same time opening new routes that were not available from the airport. Paradoxically, the global pandemic attracted cargo carriers to the airport, most of whom carry medical equipment and respirators, and arrived at Schwechat Airport for the first time. The current pandemic has forced not only Schwechat Airport, but many airports around the world to work more closely with air carriers and join forces to expand cooperation and manage crises.

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