How is Covid-19 Challenging the Airport Industry

And How are Airports Innovating their Passengers' Experience and Processes in Response?

Aviation Industry The covid-19 pandemic had a significant impact on the aviation industry, particularly airports, shifting the customer experience away from traditional methods and conventions. Furthermore, the crisis led to the emergence of numerous new technologies. In this paper, we demonstrate how the covid-19 pandemic has impacted airport financial and operational management, as well as how airports are using innovation to reinvent passenger experiences and restoring public trust. Among the new technologies introduced were touchless technology, iris scanning technology, sensors, and remote processing.

The aviation sector is not spared the economic consequences of the covid-19 crisis for various reasons. Air travel is closely correlated with economic growth. By spring 2020, "international air traffic in Europe was down 95%" compared to 2019 (Elliott, 2020). 2020 all airports combined lost $ 125B in expected revenue (Garbuno, 2021). In addition, even in countries where travel prohibitions or bans have been lifted, post-arrival quarantine restrictions diminished leisure and business travel activities. This development was further fuelled by the heightened risk perception of the public. According to the findings of a conducted research, "air traffic is significantly correlated with the number of covid-19 cases in the early phase of the pandemic" (Chokshi et al., 2021). The recovery process of the aviation industry will need time to recoup to pre-pandemic levels.

Financial Impact

In order to acquire a thorough understanding of the loss in revenue, it is important to understand the source of revenue in the airport industry, which mainly consists of aeronautical and non-aeronautical anchor airlines. Aeronautical revenue accounts for 56% of the total airport revenue, consisting of landing, parking, passenger fees, and transit/transfer fees, while non-aeronautical revenue makes up 40% of airport revenue, with retail concessions, car parking, food and drinks, and advertisement. As traveller numbers de-

creased and thus led to a decline in passenger fees, aeronautical revenue was particularly affected. Non-aeronautical revenue was affected because food areas and leisure malls were closed to prevent the spread of the virus.

Operational Impact

The turnaround time is a decisive element for service quality. Despite a much lower flight load factor, "the minimum turnaround time has changed, with the value increasing by 40% compared to 2019" (Okulicz & Rutkowska, 2021). The increased turnaround time results from a reduction in the number of operations done, as well as recent changes to operating processes during the pandemic (Okulicz & Rutkowska, 2021). "This leads to a significant

delay. More than 60% of the take-off operations were delayed" (Okulicz & Rutkowska, 2021). Additionally, the increased turnaround time is also caused by the imposition of restrictions on long-distance flights, which resulted in a decrease in the num-

Fig. 1: Total Estimated Airport Revenue in 2020 by Region Before & After Covid-19

Quarterly Total Airport Revenues in 2020 by Region
Forecast (pre-covid-19) vs. estiamated under (covid-19) (Million US-$)

	Forecasted (pre-covid-19)	Estimated under (covid-19)	% Change
Africa	4300	2100	-51.2%
Asia-Pacific	49900	20500	-58.9%
Europe	59300	22200	-62.6%
Latin America-Caribbean	10500	5200	-50.5%
Middle East	13200	6200	-53.0%
North America	34700	18300	-47.3%
World	171900	74500	-56.7%

Source: ACI.

ber of operations of this type of aircraft and the longer parking time (Okulicz & Rutkowska, 2021).

To examine the operational impact regarding the development of total departures, scientists analysed the trends of total monthly departure operations, including scheduled departures and performed departures, from January 2019 to May 2020. They found a 5.1% increase in performed departures in January 2020 compared to January 2019, and later a 15% decrease in performed departures in March 2020 compared to March 2019. The worst drop was in April 2020 with 69.6%. The total number of completed departures declined by 73.7% at large hub airports, 72.9% at medium hub airports, 69.4% at small hub airports, 62.2% at non-hub airports, and 39.2% at non-primary airports when comparing May 2020 to May 2019 (Hotle & Mumbower, 2020). The findings reveal that the reduction of departure operations at major airports was greater than at smaller airports.
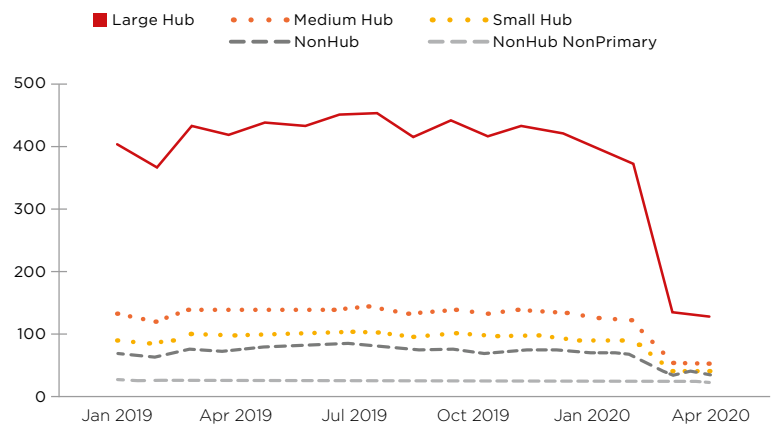
A possible reason for this could be the quickly imposed legal requirements and financial assistance by the governments to protect smaller airports from losing service by imposing minimum service requirements (Hotle & Mumbower, 2020).

Impact on Passengers

With the introduction of the new policies and guidelines to fight covid-19 in airports, passengers' experience has changed drastically. One area that changed is the service section. Many busi-
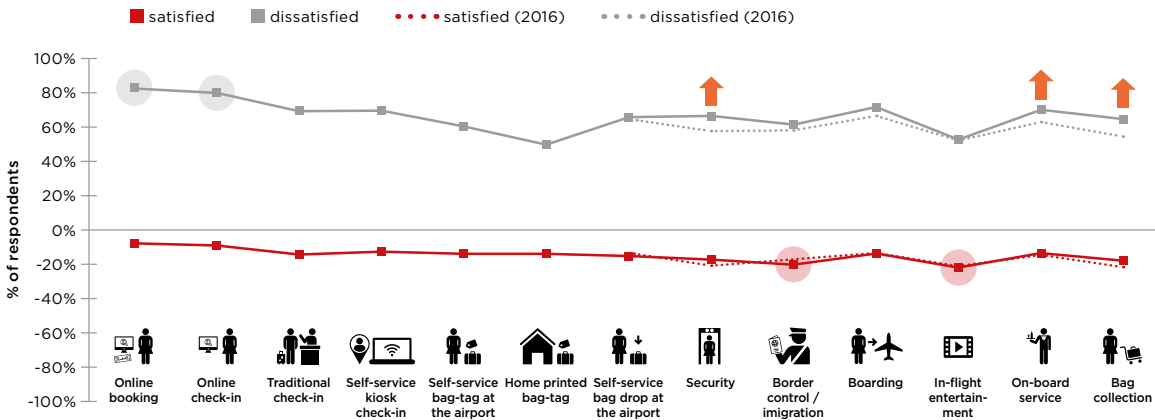
Fig. 2: Performed Departures by Airport Size

January 2019 to May 2020

Source: Hotle & Mumbower, 2020.

Fig.3: Passenger Satisfaction at Airports Before Covid-19

Legend: ■ satisfied ■ dissatisfied • • • satisfied (2016) • • • dissatisfied (2016)

Y-axis: % of respondents (100% to -100%)

X-axis categories: Online booking, Online check-in, Traditional check-in, Self-service kiosk check-in, Self-service bag-tag at the airport, Home printed bag-tag, Self-service bag drop at the airport, Security, Border control / imigration, Boarding, In-flight entertainment, On-board service, Bag collection

Source: CAPA, 2017 November.

nesses inside the airport had to temporarily close or limit the number of customers (ACI, 2021). Another factor is the change of processes, such as the introduction of new technologies, security lines, and health measures. Airports started to rely more on technologies to reduce human interaction, for example, touchless technology, scanning technology, eye-tracking, and self-service (Pitrelli, 2020). Some security lines changed for the good, like when airports allowed booking appointments to pass through security to reduce crowds (Pitrelli, 2020).

On the other hand, the time of completing the customer journey process at the airport increased notably, since there were more rules to abide by, for example, additional questions and checks at check-in and passport control, delayed deboarding and boarding to limit the total number of passengers and to better control the flow of passengers (ARC, 2021). Other examples are social distancing markers, airport guides, as well as closed off check-ins and boarding gates to decrease the density of passengers in certain areas.

New Technologies for the New Passenger Experience

As a response to the new guidelines issued by the government, airports were forced to alter and enhance their airline operating procedures and overall safety, which led to the increased utilization of technology measures. This includes for instance providing an environment that minimizes the number of surfaces passengers must touch and monitoring the safety distance between the passengers.

One of the implemented guidelines was the use of self-service systems. Although this is hardly a revolutionary idea, it was not extensively established before the pandemic. Now video assistance during the self-service process at the entrance of each security lane has been generally adopted by air-

ports. That way passengers are able to reserve a timeslot to proceed through security at their individually preferred time. Furthermore, the airports are convinced that managing the flow of passengers will result in more efficient processing in the long run (ACI insight, 2021). Physical distancing requirements are only sustainable until approximately a third of capacity, thus it is important to prioritize quick and easy processing and walkthroughs using predictive modelling (IATA, 2020).

Another method that is used by airports to reduce physical interactions is remote processing, which reduces passengers' interaction with airport staff and other passengers. This allows passengers to navigate authorization processes and personalize their journey from any location they wish, which reduces the need for queueing at the airport counters (IATA, 2020).

Cameras and sensors are used to detect covid-19 symptoms and ensure compliance with regula-

tions. For example, Etihad Airways which is testing kiosks in Abu Dhabi International Airport monitors body temperatures as well as heart and respiratory rates. The Pittsburgh International Airport is piloting software that shows real-time crowd estimates for areas in the terminal, such as bathrooms, coffee shops, and retail outlets, sending those directly to the passenger's phone.

Touchless technology is another factor of self-service used to smoothen the flow of passengers in airports. In Changi Airport in Singapore, they use fast check and bag drop-in with sensors that can detect movement of the hand without touching the screen. Passengers need to point and hover their hands to make selections (Channelnewsasia, 2020). Algorithms and sensors are used to complete the process seamlessly.

Touchless sensors and technologies are being used to ensure passenger safety from entering the airport to boarding.

Iris scanning technology (eye-tracking) is another technology that was introduced to combat covid-19 in the inner airport areas. Dubai interna-

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tional airport, one of the world's busiest airports, uses iris scanning technology to verify a person's identity in seconds and therefore eliminates the need

for any human interaction and the use of a passport. This is a collaboration between Emirates and the Dubai immigration office. It links the passenger's faces with relevant data such as passports (The CEO Magazine, 2021).

In addition to the points already mentioned, there is also the issue of handling the cargo and luggage. The cargo industry in the airports experimented with different innovative ideas for cargo use, such as machine learning, business intelligence, and blockchain to better cargo processes. Baggage is first disinfected and then sanitized on the recording tape before being put on the plane, while carry-on baggage is quickly disinfected by using UV rays or fog when entering the X-ray security device. Singapore's Changi Airport has already started disinfecting carts, check-in kiosks, and security trays with a long-lasting antimicrobial

coating to reduce the risk of spreading the virus. Countless airports did not only improve overall hygiene but also installing automated hand sanitizing pumps. Some airports even started to experiment with cleaning robots. Hong Kong International Airport for instance was the first to test full disinfection booths and intelligent sanitation robots, capable of killing 99.99% of bacteria and viruses in the air. Cleaning robots are deployed throughout Singapore's Changi Airport, using a misting device to disinfect carpets after vacuuming. Clinically tested disinfection robots have become more common in hospitals as well as laboratories and appear to become increasingly popular in airports as well.

Potential New Airport Technologies

There are three main types of technology that are most likely to enter the airport ecosystem permanently in the future to come, above all contactless technology, such as contactless boarding. Contactless technology has been on the rise for many years now, but covid-19 has further accelerated the trend (Barich, 2020). Contactless technology will enable airport operators to reduce the number of contacts required by staff to handle passengers in many key areas of the airport. This will be done via non-contact processes. Technology vendors that provide contactless registration solutions offer various combinations of the above methods. When reviewing each possible solution, airport operators can consider the following possibilities:

- The use of a single interface to provide services through all channels, such as via airline websites, smartphones, text messages, or check-in at airport self-service check-in counters (EMC, 2021).
- The use of a smartphone to scan QR codes remotely to access the check-in service on the passenger's smartphone (EMC, 2021).
- The use of a health monitoring module that can measure body temperature, heart rate and respiratory rate and automatically notifies the agent, if the health condition exceeds the normal parameters (EMC, 2021).
- Social distance monitoring (EMC, 2021).

Social distance monitoring, such as virtual queuing, is a system that allows passengers to bypass the queuing by giving them a number, booking, or a designated return time. This gives passengers the option to wait in other areas of the airport until they are required to go to the check-in counter, security checkpoint, concession area or boarding gate.

Conclusion

The covid-19 pandemic had an immense impact on the revenue, operational processes, and overall customer experience at airports and within the aviation industry. Because of the imposed restrictions by the authorities to prevent the spreading of the virus, airports have been forced to rethink existing steps of the customer journey as well as background processes to ensure the safety of passengers and working staff. However, the need for innovation and especially the investment in the upgrade and establishment of new technologies hit the aviation industry hard in an existential crisis. The sharp drop in passengers and demand lead to an unpredicted revenue loss, that the aviation industry will probably not fully recover from soon. Further developments and investments in technologies are called for. In doing so airports will be enabled to better accumulate and monitor their resources while guaranteeing safety and satisfying existing and future customer demands at the same time. In addition to the recovery from the financial losses, the aviation industry also needs to address the loss of trust of the public. Only that way the aviation industry will be better prepared for facing future crises.

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