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COVID-19 pandemic and prospects for recovery of the global aviation industry

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ARTICLE INFO

Keywords:

Aviation
COVID-19
Recovery
Health and safety protocols
SDGs
Rating downgrades

ABSTRACT

The COVID-19 pandemic ushered a wave of economic decline across the world due to disruptions in the supply and demand chain for the travel market. This study examines potential recovery pathways from the global aviation industry following the severe negative impacts of the COVID-19 pandemic. Using archival and secondary data mainly from Flightradar24, ICAO, IATA and EUROCONTROL, the study found that the pandemic inflicted a heavy toll on global aviation, which resulted in ratings downgrades, liquidation and bankruptcy of several airlines and airports due to severe cash burn instigated by travel restrictions. Although the industry is opening up, the recovery process seems much slower than anticipated, which could see more jobs and airlines failing in the absence of relevant support. The study recommends that as the sector opens up, it does so in a responsible manner, which puts measures that protect travellers, reduce costs, increase efficiency, and ensure a quality customer experience anchored on employees' health and customer safety. Recovery should also occur with the view to build back better in line with the provisions of the Sendai Framework for Disaster Risk Reduction and at the same time responding to the dictates of Agenda 2030 on sustainable development goals (SDGs).

1. Introduction and background

The aviation industry has witnessed a steady growth over the past couple of years, owing mainly to the growth in tourism and cargo demand across the world. Consequently, in many regions, the aviation industry has been a crucial developmental sector contributing to social development and economic growth. The aviation sector employs millions of skilled and semi-skilled people directly and indirectly across the sector's value chain (Dube and Nhamo, 2020; Tretheway and Markhvida, 2014). The sector remains a crucial part of the tourism economy providing rapid transportation of tourists, cargo such as medical supplies, food and other essential goods globally. Regardless of the sector's global critical role in facilitating human and goods movement (Fung et al., 2006; Tretheway and Markhvida, 2014), evidence shows that the sector is sensitive to stresses such as economic downturns, natural disasters, political instability and pandemics (Sadi and Henderson, 2000).

Sadi and Henderson (2000) and also Chung (2015) reveal that several events in history had demonstrated the vulnerability of the global aviation sector to various catastrophes. Amongst these have been the sector's vulnerability to diseases and pandemics such as the Severe

Acute Respiratory Syndrome (SARS) outbreak in 2003, the avian influenza H5N1 in 2006, and the swine influenza H1N1 pandemic in 2009. Other crises that challenged the aviation industry include the oil crisis in 1973, the Iran-Iraq War in the early 80s, the Gulf Crisis in the early 90s, the Asian Financial Crisis in 1997, the 9/11 terrorist attacks, and the financial crisis of 1998 and 1999 (International Air Transport Association, 2020).

Regardless of the industry's vulnerability to various shocks, the industry's capacity and resilience to deal with the crisis remain low in many respects. Hall (2011), questions the ability and capacity of the tourism and travel sector to deal with biosecurity threats that seem to be frequently recurring. The travel and tourism sector is also viewed as a significant transmission pathway, which aids the spread of various diseases across the world through the mobility of infected persons. Sun et al. (2020) note that although the aviation sector was one of the worst affected economic sectors by COVID-19, it also played a central role in spreading the disease in the early days of the pandemic.

Studies of previous diseases outbreaks by Sharp et al. (1995) and Grout et al. (2017) point to the possibility of onboard disease transmission of certain diseases. Given this understanding, the aviation

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industry had to adopt health and safety protocols such as the disinfection of aircraft to destroy onboard vectors such as mosquitoes. However, in some instances, vectors were found to be humans, making the situation complex (Gratz et al., 2000; Leitmeyer, 2011). The formation of the Collaboration Agreement for the Prevention and Management of Public Health Events in Civil Aviation (CAPSCA) aimed to manage health-related issues within the aviation industry. According to Chung (2015), the aviation industry's rapid growth paved the way for the rapid proliferation and spreading of diseases through people movement, which placed a demand on the sector to take appropriate protective measures to protect the global economy.

Regardless of initiatives to ensure the aviation industry's capacity to deal with threats to its business, the industry often buckles under pressure from various shocks, resulting in airlines' collapse, liquidations and in some instances some airlines requiring government bailouts. Bailey (2002) highlights that after the September 11th bombing (9/11), many airlines in the USA sought state intervention to remain afloat. The 9/11 attacks led to a plunge in passenger numbers, which saw the state passing a bill in congress to offer aviation loans and guarantees to ensure industry viability (Vig, 2004). Voltes-Dorta and Pagliari (2012) estimate that the 2007–2009 economic recession resulted in airport cost efficiency of about 5.8%, which translates into US\$5.5 billion and left many airlines grossly compromised and vulnerable. Turner and Lim (2015) note that shocks from fuel prices can also severely impact airlines' profitability. The aviation industry has moved forward in terms of having advanced computer models capable of simulating sophisticated patterns of epidemics and pandemics spreading through the airline transportation network across airports worldwide (Bobashev et al., 2008; Nicolaidis et al., 2012). However, regardless of these advances, one issue that becomes clear is that the industry has generally not mastered the development of adequate financial resilience to deal with the ever-recurring costs imposed by disasters and other internal and external shocks.

There was general anticipation that the global aviation sector would see another year of robust growth in 2020 across the sector globally. This was against the backdrop of industry-wide years of successive growth in cargo, passenger numbers and revenue in recent past. With this background, many airlines have been investing and buying new aircraft, which propelled aircraft manufacturers such as Airbus and Boeing, thereby leading to a considerable backlog in the delivery of new aircraft. The International Air Transport Association (IATA) reported in January 2020, before the outbreak of the coronavirus that the aviation sector expected an increase of revenue passenger kilometres' (RPKs) growth of 4.1% and a freight tonne-kilometres' (FTKs) increase of 2.0% in 2020 (IATA, 2020). However, IATA revised projections for the industry several times as it became clear that COVID-19 would severely impact aviation industry growth.

COVID-19 triggered broad sector challenges caused by border closures and restrictive measures as countries battled to contain and better prepare to deal with the pandemic's fallout. Earlier assessments show that the pandemic's impact on the air transport and other sectors of the tourism industry was rapid and significant across the world (Dube et al., 2020; Gössling et al., 2020; Suau-Sanchez et al., 2020). Therefore, given the unprecedented and fickle nature of the impact of COVID-19 on the global economy, there is a need to continuously track and monitor the pandemic's impact on various sectors of the economy to provide insights necessary for policy and practice. Understanding how the pandemic is evolving is crucial as industries across the world prepare to work during a pandemic or the 'new normal.' Such understanding allows for the adoption of measures that ensure the operational sustainability of various economic sectors. There is a general view that the pandemic has made various global economies reset, promoting a fresh start on a new sustainable, and more resilient trajectory (Ateljevic, 2020; Haywood, 2020; Brouder, 2020). Stakeholders believe the new economic future must be responsive and aligned to the ideals sought by the SDGs coming out of the 2030 Agenda for Sustainable Development (United Nations,

2015) and the Sendai Framework for Disaster Risk Reduction (United Nations Office for Disaster Risk Reduction, 2015).

With the preceding, this paper sets out to document how the global aviation industry and its value chain are recovering from the impact of COVID-19. The study also highlights some of the practices being adopted by the aviation industry to ensure customer safety and security. The paper further offers insights into how airlines can realign their businesses in the new era to protect the aviation economy from imminent collapse and chat a resilient and more sustainable sector going forward. The importance of studies such as this one is supported by Gallego and Font (2020), who pointed out that such studies provide knowledge for decision making by various stakeholders.

2. Materials and methods

The study adopted a mixed-method approach that used archival data from authoritative industry sources such as the Flightradar24 database to track traffic volumes for the study period. Flightradar24 is a global flight tracking company that provide real-time air traffic situations. It has the largest Automatic Dependent Surveillance-Broadcast (ADS-B) network globally with over 20,000 connected receivers and tracks over 180,000 flights daily with their data and services used by over two million people a day. Similar studies have recently utilised data from these sources (Nhamo et al., 2020a&b; Iacus et al., 2020; Maneenop and Kotcharin, 2020). Data from American Airlines and EUROCONTROL was also utilised to analyse daily traffic and revenue movement for the aviation sector in Europe. Additional data was sought from Airlines for America. Secondary data in the form of reports from other regulatory authorities such as airport companies, IATA, CANSO, the International Civil Aviation Organization (ICAO) and other entities were also interrogated. Content and thematic analyses were used for qualitative data as guided by the steps outlined by Nowell et al. (2017).

3. Results and discussion

The coronavirus's announcement at the end of December 2019 and the declaration of COVID-19 as a pandemic on March 11, 2020 had a debilitating impact on the aviation industry. Fig. 1 shows the number of commercial flights that were tracked by Flightradar24 between February and December 2020. The study found that over this period the highest flow of commercial flights (commercial passenger flights, cargo flights, charter flights and some business flights) was observed in February, with the highest number of tracked daily flights being observed on 14 February, where a total of 109,400 flights were recorded. Post this date, the number of flights declined drastically, predominantly as a result of measures that were put in place that included airport closures and those that impacted the tourism industry in general, such as the closure of borders and key regional and global tourists' destinations across the world as governments sought to better respond to the COVID-19 pandemic. This occurred at a time when the number of infections was also rising.

On March 11, 2020, COVID-19 was declared a pandemic by the World Health Organization (WHO). On the same day, 102,116 commercial flights were flying across the world. Within three days, flights tracked plunged to below 100,000, with 14 March marking the beginning of a cliff fall in the number of flights. By the end of March, there were slightly under 40,000 tracked flights. The decline continued in April, with the lowest tracked daily flights observed on 26 April, which had a total of merely 24,049 flights. In May a snail's pace of growth is observed throughout the entire month up to mid-June 2020. This snail's pace of growth continued, and on June 19, 2020 tracked flights surpassed the 50,000 mark, reaching a peak of 60,046 on July 3, 2020. By December traffic had made some significant improvements with traffic surpassing the 80,000 marks and urging closer to the 2018 level on December 18, 2020. However, the recovery seems to have stalled amidst travel restrictions and uncertainties caused by the second and third

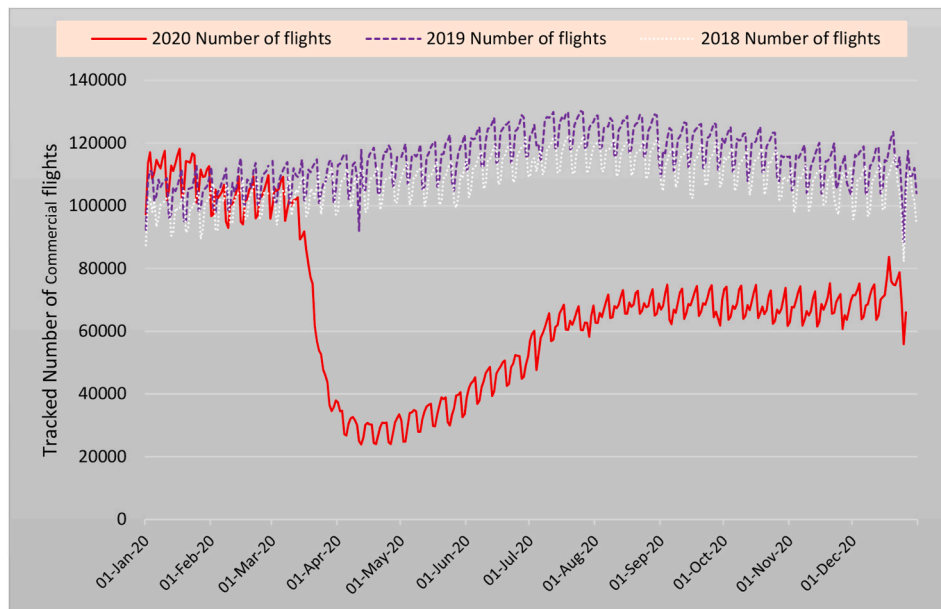


Fig. 1. Tracked number of commercial flights globally between January and December (2018–2020).
Source: Authors, Data from Flightradar24 (2020).

waves, and fears of a new COVID-19 variant, known as 501.V2 that broke out in the United Kingdom. Another COVID-19 variant was also reported in South Africa. Daily traffic improvements in November and December 2020 could be attributed to vaccines' announcements by various countries worldwide and their warp-speed regulatory approvals. By the time of finalising this paper, the Pfizer-BioNTech and Moderna COVID-19 vaccines had been granted emergency use authorisation in the United Kingdom, USA, Canada and the European Union amongst other regimes. Other factors that could have promoted some modicum of recovery is the Christmas holiday travel demand and some level of confidence in adopted safety measures put in place by the aviation industry. The much easier to administer (transported at room temperature) COVID-19 vaccine from the Oxford University-AstraZeneca was at the verge of getting regulatory approvals in the United Kingdom and India, opening up flood gates of inoculations in the low- and middle-income countries.

The data shows that the pandemic had a substantial negative impact on flight volumes for a prolonged period; this had a massive knock-on effect on global business and travel and tourism. Uncertainty and prolonged travel restrictions resulted in significant financial losses for the airlines, which were mostly grounded. IATA, which represents 290 airlines in 120 countries, reported that cargo tonne-kilometres (CTKs) fell by as much as 15,3% year on year for the first three months of the year that ended in April and plunged 16,9% quarterly (Fig. 2). In general, the first quarter performed poorly in terms of CTKs, which can be attributed to industry closures, resulting in a decline in demand for raw materials and finished products for both imports and exports as global markets were disrupted. During the first half of 2020, many countries shut down industries as a COVID-19 containment measure with the economy opening in the second half of the year. As a testimony to the decline in business and industry productivity, global carbon emissions significantly declined in the first two quarters of 2020 (Le Quéré et al., 2020).

Consequently, a significant recovery can be seen in CTKs being witnessed on a quarter-to-quarter basis in the last two quarters of 2020. The second half of the year's growth was primarily driven by increased belly cargo and dedicated freighters as nations and industry started to open amidst the pandemic. The opening up of the industries amidst demand for distribution of medicines and protective equipment and increased global business confidence can be the primary driving force

behind the growth in CTKs for the second half of 2020. With the vaccines' ongoing warp speed regulatory regimes and announcements, it is anticipated that this will further boost business confidence and raise demand for CTKs. The aviation industry has an equally crucial role in distributing vaccines globally and will further buttress cargo traffic demand worldwide. This should help some airlines to improve their cash flow standing. Preliminary evidence shows several airlines are involved in the distribution of COVID-19 vaccine. The demands for temperature control and quick delivery of these vaccines make aviation the only viable transport solution. Nonetheless, given that the demand for CTKs is unevenly distributed across the aviation geographic regions cash burn is expected to increase but a declining rate which means there is still a demand for incentives and government support for the aviation industry to remain sustainable. Such support must be region and customised to respond to regional and national needs of the sector.

3.1. Impact of COVID-19 on airlines

Data from IATA shows that the pandemic's advent resulted in a significant decline in airline share prices. The most significant share price declines were experienced between February and April (Fig. 3). This is expected to have a significant impact on shareholders and the global airline industry's capital value. The pandemic had a devastating impact of share prices for North American, European, Asian Airlines and other global airlines. The Asian airlines were the first to take a knock in January as there was jitteriness already about the pandemic after China announced the disease's outbreak at the end of December 2019. The Asia region in particular China was the origin and first epicentre of the pandemic. China was the first country to have gone under hard lockdown, which contributed to the aviation sector's early negative performance between February and March as pointed out by (Nhamo et al., 2020a&b).

By May, on average, the global airlines had shed about 49% of their market share value. In comparison, American airlines had shed about 55% of their share value. On the other hand, the Asia Pacific airlines had shed about 37% of their share value. The subdued performance of share prices for Asia, Pacific and North American Airlines could be attributed to a combination of factors, chief amongst them the continued lockdown and traffic restriction, cash burn and downgrades by global rating agencies and poor business outlook. The adoption of aviation layers of

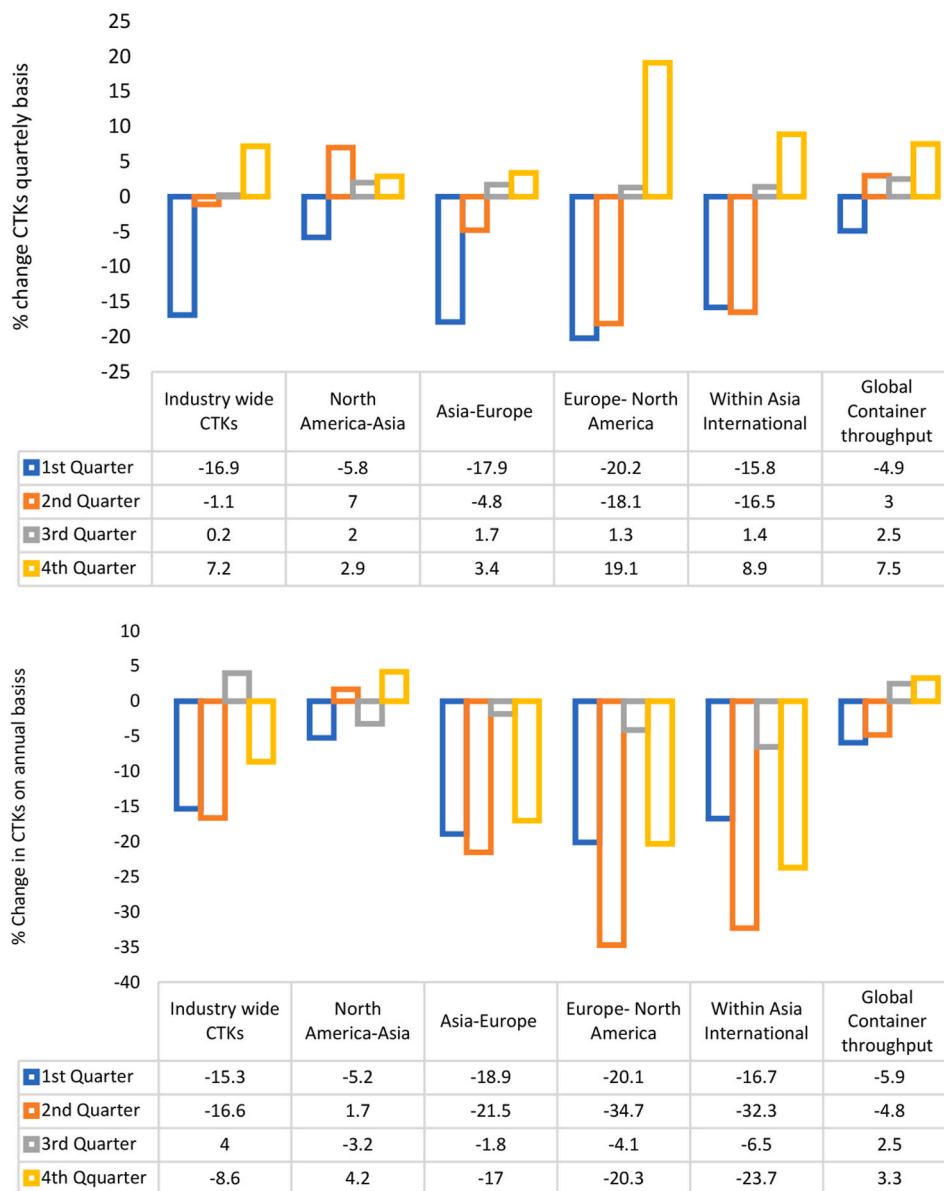


Fig. 2. Cargo volumes January to November 2020. Source: Authors, Data from IATA (2020).

safety protocols for COVID-19 and tests on arrivals at many destinations, coupled with news of the discovery of COVID-19 vaccines immensely helped improve airlines’ share performance across the aviation regions as evidenced by better share price performance between October and November 2020. It appears the early recovery in Europe between May and September 2020 was buoyed by the opening of the regional market in June and July, which boosted business confidence in that region.

The Asian Pacific market, which also performed better than other regions, was helped by the rebound in the Chinese aviation sector, which was the first to witness some form of recovery (Fig. 3). Due to the pandemic’s impact, share prices of various airlines across the world were adversely affected due to the poor economic performance of the aviation sector. The hard lockdowns forced the grounding of the majority of the aircraft. The share prices reached a peak low between March and April and predominantly remained depressed as most airlines reported second-quarter losses during their second-quarter financial reports. The significant decline in share prices increased structural systematic financial risks to airlines across the world.

Consequently, the cost of borrowing for airlines significantly

increased, threatening the survival of many airlines. Maneenop and Kotcharin (2020), made similar findings pointing out that airlines were suffering from severe financial losses and disinvestments in the sector due to a fall in stock price. As a result, there is a need for fiscal and monetary support for the sector to ensure its survival prospects.

Although the Chinese market was the first to recover, the growth was relatively weak and sluggish, with the market battling to rebound to the January 2020 pre-pandemic levels. This shows that the sector’s recovery in some markets may be much slower with little hope for a V-shape recovery in the sector given prevailing uncertainties about the disease’s course. Three forms of recovery trajectories could be anticipated: a swift, gradual and muted recovery (Nhamo et al., 2020c). The muted recovery was likely to be assumed by the aviation sector, a development requiring more cash injection to ensure that the increased cash burn out does not lead to airline collapse as suggested by Nhamo et al. (2020a). Airlines also need to make financial adjustments to shed off unnecessary expenses to ensure businesses survive. Expense reduction in the short-to medium-term is necessary to keep the airlines industry afloat amidst signs of the sector’s observed muted growth.

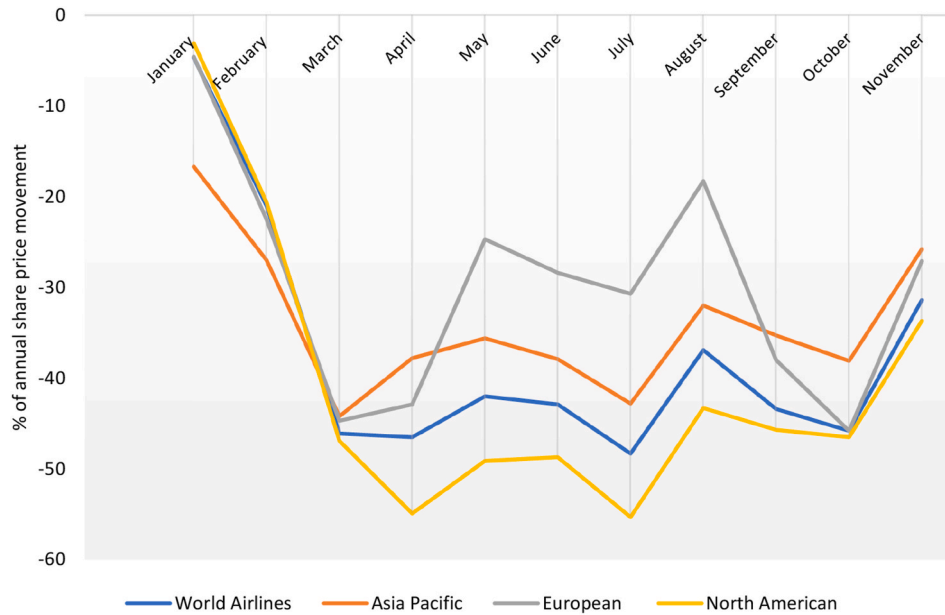


Fig. 3. Annual share price of airline share price movement between January and November 2020. Source: Authors, Data from IATA (2020).

3.1.1. COVID-19 implication on Chinese Airmarket

Of interest is traffic performance at Beijing Capital International Airport and other major airports, which significantly improved from the February record lows. The news of a second wave of the pandemic saw an almost immediate slump as most airlines moved to cancel flights to Beijing although there was another recovery beginning of July. Such recovery has been sustained with most airports have made significant gains to near pre-pandemic levels that were witnessed between December 2019 and January 2020. Needless to point out that some airports such as Chengdu Shuangliu International airport had returned to pre- COVID-19 levels by mid-August 2020 (Fig. 4). The traffic growth was premised mainly on strong domestic departures across China’s more than 200 airports. The downward spiral witnessed on the announcement of the second wave in June is indicative of the fragility and sensitivity of the sector to increase in daily COVID-19 infections. Growth in most destination across the world was likely to be driven by primarily domestic and regional demand. In a move to reduce cash burnout, in mid-

October 2020 Cathay Pacific laid off 5300 employees. Of those, 2000 were cabin crew members and 550 pilots (Lee and Magramo, 2020). This was amidst concerns over the sluggish recovery of the aviation sector.

3.1.2. COVID-19 and European Air travel market

The case for a slow and fragile recovery is made more concrete if one looks at the European aviation market. This was one of the global pandemic epicentres around early March. Since the massive declines started in early March and continued to the end of March, the aviation industry had been operating at less than 20% compared to 2019 levels. The situation started easing up starting on the 15th of June for domestic flights. On the 1st of July, there was a regional opening of air traffic for passenger flights. The EU opened its borders to 15 countries including Algeria, Australia, Canada, Georgia, Japan, Montenegro, Morocco, New Zealand, Rwanda, Serbia, South Korea, Thailand, Tunisia, Uruguay and China, subject to confirmation of reciprocity (Council of the European Union, 2020). This led to an improvement in traffic, which saw the

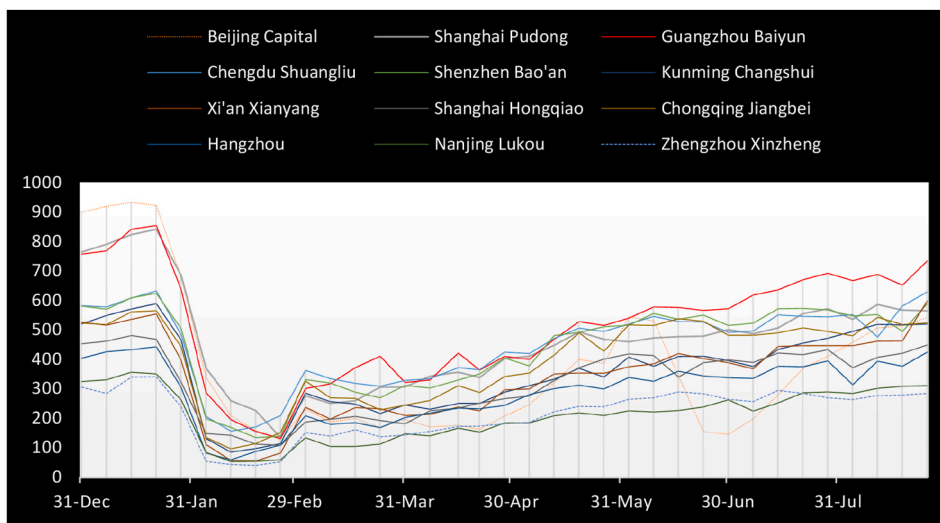


Fig. 4. Weekly traffic volumes at selected Chinese airports 31 December 2019–25 August 2020. Source: Authors, Data from Flightradar24 (2020).

region operating at about 40% capacity levels last witnessed around March 19, 2020 (Fig. 5). In as much as the sector witnessed some significant traffic improvements between July and October, there was stagnation and slight reversal of gains made in the previous months in November and October. This could be attributed to a surge in daily infection rates which forced some governments to reintroduce travel restriction measures to try and force down new daily infection figures further prolonging the challenges faced by airlines, airports and air navigation companies in the region (Fig. 6).

Temporary improvements in the region between July and mid-October helped slow down cash burn by airlines and the industry at large. Evidence from EUROCONTROL shows that compared to 2019, several airlines were still operating at very low levels as shown in Table 1. According to Nhamo et al. (2020b&c), there were concerns on the impact of the industry’s low operating capacity as this had an adverse impact on airports and air manufacturing industries, which stood to lose from lucrative orders. At a country level, as of October 28, 2020, compared to 2019 departure/arrival traffic, Norway traffic was at -39%, Turkey -52%, France -55%, Germany -62%, Italy -64%, while Italy and Spain were at -69% and -71% respectively. Therefore, there is continued demand for support for the entire aviation value chain as it remains critical for the future recovery of economies post COVID-19. Packages that ensure staff protection within the industry were also integral to ensuring the protection of this fragile economic sector’s livelihoods.

With early signs pointing to slow, unpredictable and stretched recovery, the airlines are likely to continue witnessing colossal cash burn although at a reduced rate than at the beginning of the pandemic.

Consequently, measures must be put in place to reduce massive cash burn to avoid airlines’ collapse. The study found that the aviation industry in Europe experienced massive revenue declines due to the pandemic as expected revenue plunged as low as 88% in April and by the end of June the industry was only realising less than 20% of revenue (Fig. 6). Losses in the EUROCONTROL were estimated to be €4.5 billion. It emerges that the recovery process that had started around May in Europe had stalled in September as airlines continue to lose revenue due to depressed and volatile market travel conditions.

Restructuring and resizing of airline companies is therefore inevitable to mitigate cash burn which threatens the viability of several airlines. In response, the industry embarked on several measures to reduce cash burns such as several job layoffs and retiring of old and large aircraft with a view of increasing operational efficiency in the most cost-effective way. In a bid to manage the situation, British Airways retired 31 Boeing B747-400 models in mid-July 2020, four years earlier than the planned retirement date of 2024. This was done to reduce its cost, fleet, and demand for carbon emissions reduction by the sector. In April, Lufthansa had permanently retired six A380s, seven A340-600s and five B747-400 (Caswell, 2020) to respond to the downturn. Other airlines that had retired airlines include Virgin Atlantic Airways which retired its Airbus A340-600 aircraft ahead of time and KLM Royal Dutch Airlines which retired B747-400 aircraft for passenger use at the end of March. More airlines were likely to follow suit.

Data from Airlines for America show that year on year (YOY) tonnes enplaned between the USA and world areas declined significantly between January and February. In January there was a -5.4% decline, February -7%, and in March -17%. However, the declines were not

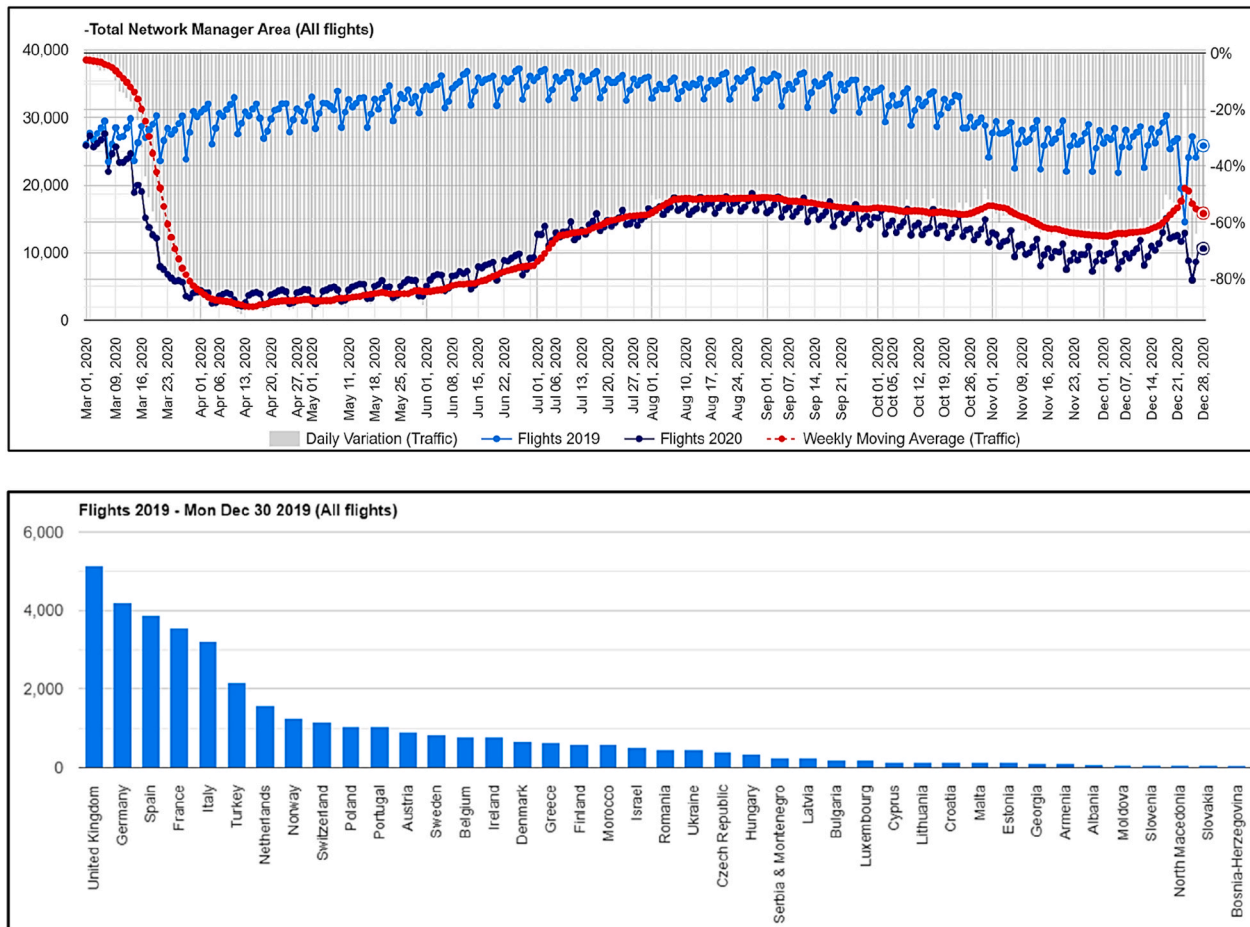


Fig. 5. Daily traffic variation – March to December 2020. Source: EUROCONTROL (2020).

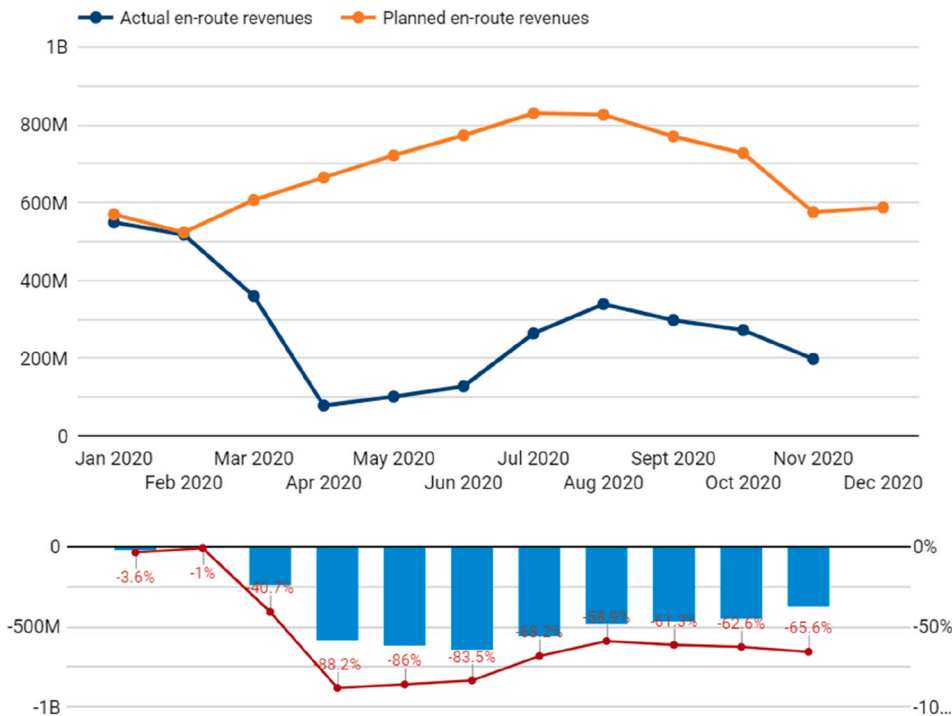


Fig. 6. Revenues from en-route charges (€) - Monthly evolution for the EUROCONTROL Member States except for Monaco and Ukraine. Source: EUROCONTROL (2020).

Table 1 Major selected airline performance in 2020 against 2019 baseline as of October 28, 2020.

Airline	Widerøe	Pegasus	Wizz Air	KLM	Turkish Airlines	Air France	British Airways	Ryanair	Lufthansa	easyJet
Operation level	-13%	-39%	-48%	-51%	-56%	-57%	-64%	-78%	-76%	-85%

Source: Authors Data from EUROCONTROL.

uniform as the most significant decline was reported in Europe at a 43.8% at the end of April, while Latin America reported the start of a recovery in April after three months of decline. The study also found that the pandemic led to the mass grounding of aircraft (Fig. 7). The peak grounding was observed from March through to June. A study by Nhamo et al. (2020) indicates that most airports battled to find space to park several aircraft that were grounded then. Such groundings equally came with increased parking fees and mandatory maintenance, further putting pressure on the fragile economic sector.

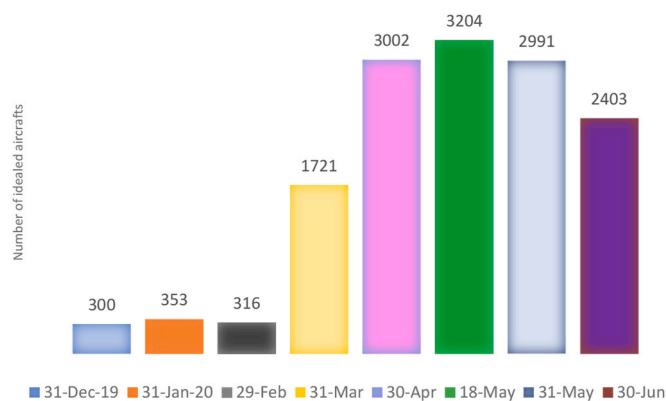


Fig. 7. USA passenger airlines: idle aircraft. Source: Authors, Data from Airlines for America (2020).

3.2. Impact of COVID-19 on USA airline company ratings

The grounding of aircraft was not unique to the USA. It was a problem across the world and resulted in significant loss of airline revenues. As a consequence of the pandemic, in March and later again in June, Standard & Poor's (S&P) downgraded most USA airlines to junk status (Table 2). Airline downgrades was a testament to the high impact of COVID-19 on airline industry liquidity. American Airlines had the most dramatic downgrades, which resulted in three notches down. The United and Southwest airlines lost single notches, and the rest lost two notches each. American Airlines was left far worse off than others. However, rating agencies believed that airlines were likely to recover post-pandemic due to government support. Rating agencies believed that airlines could draw some money from their credit card partners, particularly in the USA, where there was a solid partnership. The belief was that some companies could also dispose of their assets to avail cash for various airlines.

With a strong domestic focus, airlines were likely to weather the pandemic better than the other airlines, which had an international focus. Needless to point out that there were fears that airlines based in most pandemic heat areas were likely to experience prolonged slow recovery periods. This could be attributed to anxiety and fear, which forced many to stay at home and not travel. Bae and Chang (2020) and Xiong et al. (2020) cite anxiety and fear as some of the biggest threats to the tourism and aviation industry. Therefore, there is the need to find ways to deal and address this to stimulate travel and save jobs, livelihoods and the industry in general. Government and individual efforts are needed to deal with COVID-19 induced psychological distress.

The other two rating agencies also downgraded other airlines outside

Table 2
S&P and Fitch Ratings' credit ratings for passenger airlines due to COVID-19's impact on financial liquidity.

S&P Rating	Alaska	Allegiant	Delta	Hawaiian	JetBlue	Southwest	Spirit	United	American
March 2020	BB+	BB-	BBB-	BB-	BB	BBB+	BB-	BB	BB-
June 2020	BB-	B	BB	B	B+	BBB	B	BB-	B-
August 2020	BB-	B	BB	CCC+	B+	BBB	B	B+	B-
Fitch Ratings									
April 2020	BB + from 'BBB-	-	BB+ from BBB-	B+ from 'BB-	BB from BB+	BBB+ from A	BB- from 'BB	BB- from BB	B from B+

Source: Authors, Data from Airlines for America and [Fitch Ratings 2020](#).

of the USA. Fitch Ratings affirmed Air Canada's IDR at "BB" with a negative outlook as they expected the deterioration of cash flow balance status. Air Canada at the time had substantial liquidity with US\$6 billion in cash, and the government had indicated it would take over its staff wage bill having taken measures to furlough 50% of its hourly staff ([Fitch Ratings, 2020](#)). Moody's also downgraded several airlines due to the pandemic's impact, while S&P downgraded New Zealand, Australia airport companies, and European airlines. The downgrading of airlines had a damaging effect on the airline's finances as it increased borrowing costs when the sector needed affordable finance to remain afloat. Alternative affordable finance was crucial, particularly from government, central banks and shareholders to ensure sector viability during the troubled time.

Among those downgraded were EasyJet, Ryanair, Lufthansa, IAG, British Airways, Air Baltic, Turkish Airlines and SAS. They were also placed on alert for further downgrades as the coronavirus imposed a considerable dent on airlines' liquidity positions. Some air manufacturing companies such as Rolls had their long and short-term ratings slashed to junk status as they were downgraded from B to BB. This painted a gloomy picture for the aviation industry as a whole. The rating downgrade was an infliction on the already troubled sector as these downgrades often carry negative implications on aviation recapitalisation in several ways. The placing of several airlines in junk status under watch, or review, is likely to dent the share value and make any borrowings by aviation companies more expensive when cheaper finance was needed to sustain the industry. There is evidence that a negative outlook and downgrades negatively impact market performance and affect capacity and the cost of borrowing for companies and states ([Naik et al., 2017](#); [Gumata and Ndou, 2019](#); [Binici et al., 2020](#)).

From March 1, 2020, more than 16 airlines on the shaky ground either filed for bankruptcy or shut down ([Table 3](#)). The collapse of airlines came at a considerable cost to the aviation industry's supply chain with negative implications for jobs in the sector.

3.3. Aviation stabilisation and recovery

The pandemic came when the aviation sector had very low cash flow reserves with most airlines having only two months' worth of cash available or less ([Nhamo et al., 2020](#); [IATA, 2020](#)). At a global level, the pandemic resulted in a revenue loss of US\$126 billion between January and May 2020 ([ICAO, 2020](#)). Airlines for America reported a cash burn of US\$10 billion in March alone ([Airlines for America, 2020](#)). Given the gravity of the challenge that airlines were facing, most governments tried to intervene to ensure that the aviation industry did not collapse

Table 3
Global airlines that either restructured, went bankrupt or shut down between March and October 2020 due to COVID-19.

North America	Africa	Europe	Australasia	Asia	Latin America
Compass Airlines	Comair	Alitalia	Virgin Australia	Thai Airways	Tame
Miami Air International	South African Airways	Flybe		AirAsia	Avianca
RavnAir Group	SA Express	German Airways			Latam
Express Jet	Air Mauritius	Germanwings			Aeromexico
Trans States Airlines					

Source: Authors.

given its significance in assisting business and trade. The aviation industry had a massive cash burn instigated by closing airports and borders as the world battled to quell the pandemic. The aviation industry also had a central role in the pandemic to ensure the supply of pharmaceutical products needed to deal with the pandemic ([Nhamo et al., 2020](#)). Most importantly, the aviation industry had an equally important role in the global and tourism revival project that lay ahead post COVID-19 or under the "new normal" with the virus.

In response to COVID-19 and the interest of the industry, the governments and private players provided several relief and rescue packages to the aviation industry equating to US\$123,1 billion globally ([Fig. 7](#)). The aid came in various forms and was crucial in providing relief to the aviation industry to cover airlines' fixed costs. However, the government aid was far too low, contributing at most, less than 25% of airlines' revenue the previous year in 2019. The aid amounted to about 25% in North America, 15% in Europe, 10% in the Asian Pacific, 1%, Latin America and 1% in Africa and the Middle East. The aid percentage was way lower than the cash burn the industry was experiencing, making the collapse of airlines a high possibility. Some of the aid created new liabilities with the potential to weaken the airline industry further.

IATA noted that out of the US\$123.1 billion, US\$67 billion or 55% of government aid created additional debt. This added to the already huge debt the industry had at the close of 2019, which stood at US\$430 billion ([IATA, 2020](#)). Conditions for a government bailout, such as staff retention, created a headache for the industry when the industry needed to reduce expenditure. On the other hand, caps and restrictions placed on executive staff in as much as it was well-intentioned had a risk of seeing the industry losing the best talent when they needed to retain them to provide strategic leadership.

Besides government funds, the airlines' industry in the USA and across the world tried to raise funds through the capital markets ([Fig. 8](#)). The figures show that the airlines would have a long road ahead of a financial recovery, given the demand for cash. The anticipation was that with recovery was going to be long and winding. This means that more external cash injection was needed to keep airlines afloat (see [Fig. 9](#)).

As the industry restarted in some regions, it was doing so against the backdrop of mounting debt. There is a need for the recovery process to be managed sustainably to foster resilience building within the industry. Given that the aviation sector was reopening amid a raging pandemic, various players made a concerted effort to put in place measures to ensure customer and employee safety. There were also efforts to adopt a different business model that takes into consideration a turbulent operating environment. This approach had to be adopted by both the airlines and airports while also factoring in sustainability issues.

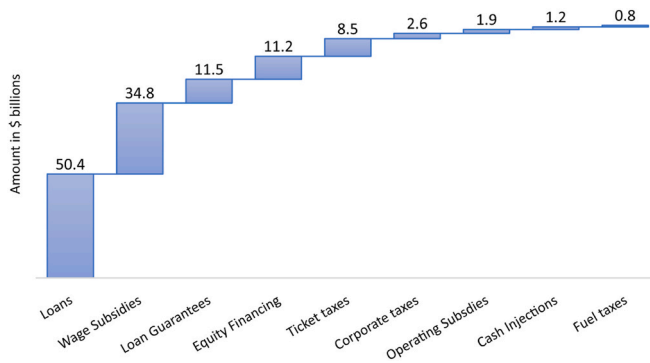


Fig. 8. Government aid made available to airlines due to COVID-19 by type (US \$123,1 billion) March–June 2020. Source: Authors, Data from IATA (2020).

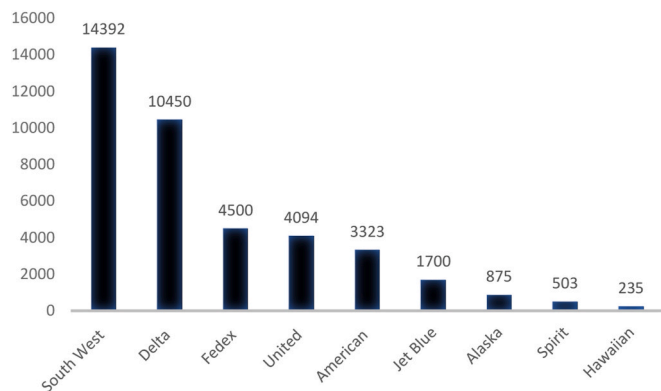


Fig. 9. Funds raised on markets by various airlines between February and March 2020. Source: Authors, Data from Airlines for America (2020).

Sustainability is a critical issue that demands the aviation sector’s attention globally (Dube and Nhamo, 2019). Ensuring customer safety is crucial as it would motivate people to want to travel again, as evidence shows that most people are not as eager to travel owing to health and safety concerns triggered by the pandemic. About ten strategies are being adopted by 25 leading airlines to ensure comfort, health and safety of travellers. According to *Global Industry Travel News* (2020), the most common of these measures are shown in Box 1.

The measures had the burden of increasing operating costs when the sector needed to cut cost. Such efforts needed to be done in a cost-recovery manner that balances with affordable travel needs to allow sector recovery.

3.4. Health and safety matters within the aviation industry

The aviation industry is adopting various strategies that are aimed at ensuring passengers and staff health and safety matters are well taken care of while ensuring business sustainability. There are hopes that the pandemic provides the aviation and the tourism industry with an opportunity to transform and reconfigure in a cleaner and sustainable way (Romagosa, 2020; Renaud, 2020; Hall et al., 2020). A host of measures are being adopted to provide several layers of protection to the travellers. Chief among them is providing health and safety to travellers on-board an aircraft using the high-efficiency particulate air HEPA system. The HEPA system is believed to deliver high airflow and replacement rates combined with hospital-grade filters. The system allows for the exchange of cabin air every 2–3 min and kills close to 99% of COVID-19 virus particles.

The seat arrangement facing forward is believed to be a measure that does not allow for face to face interactions. Back facing seats were believed to act as barriers against transmission onboard. IATA proposed other measures that were supposed to be adopted to add to the passengers’ layer of protection and safety. However, there are mixed views and varying opinions in the literature regarding the onboard transmission of COVID-19. Eldin et al. (2020) suspected that onboard transmission had taken place during a flight from Central Africa to France. On another flight from Wuhan to Guangzhou, then Guangzhou to Toronto, Canada carried an asymptomatic passenger contact tracing proved that no onboard transmission occurred (Schwartz et al., 2020). In a bid to reduce the risk of pandemic transmissions; therefore, IATA developed a raft of measures and protocols (Fig. 10) to improve public confidence and induce travel again.

The airlines adopted several cleaning techniques that were aimed at ensuring safety. Among such techniques is using alcohol-based substances for deep cleaning and sanitisation of touch prone areas such as trays. There have been complaints from travellers that this requirement was not being adhered to in some circumstances, raising the ire of some governments and authorities who accused airlines of chasing profit at the expense of people’s health.

Concerning airports, their mandate and responsibility were expanded, placing a demand for more to be done to ensure passengers and employees’ safety. By nature, airports were never designed for social distancing but rather were designed to be a place to promote social interaction. However, due to COVID-19, there was a need for airports to reconfigure to address current challenges posed by the pandemic. The pandemic will likely result in a decline in revenue due to a decline in revenue collection from airports’ main funding streams such as rentals of airport space and a decline in airport taxes from both passengers and airlines. Consequently, there is an urgent demand to adopt a model that drastically reduces costs and increases airport operational efficiency and speed processing of passengers, while enhancing the quality of service offered to reduce the chances of the disease spreading at airports across

Box 1

Common Strategies adopted by leading airlines.

- Electrostatic antiviral spraying of cabins surfaces such as overhead bins, seats, air nozzles and light controls, and tray tables
- Face coverings using surgical masks
- Providing care kits for travellers comprising items such as face mask, sanitising wipes, and sanitising liquid
- Require passengers to conduct temperature checks before boarding
- Cabin baggage restrictions (CB) to decongest cabin and restrict cabin movement
- Hand sanitiser (HS) in gate areas and onboard
- Middle seat kept empty (MS)
- Protective equipment for the cabin crew (PE)
- Spraying or fogging disinfectant (SD)
- Spray and wipe to disinfect the cabinSource: *Global Industry Travel News* (2020).

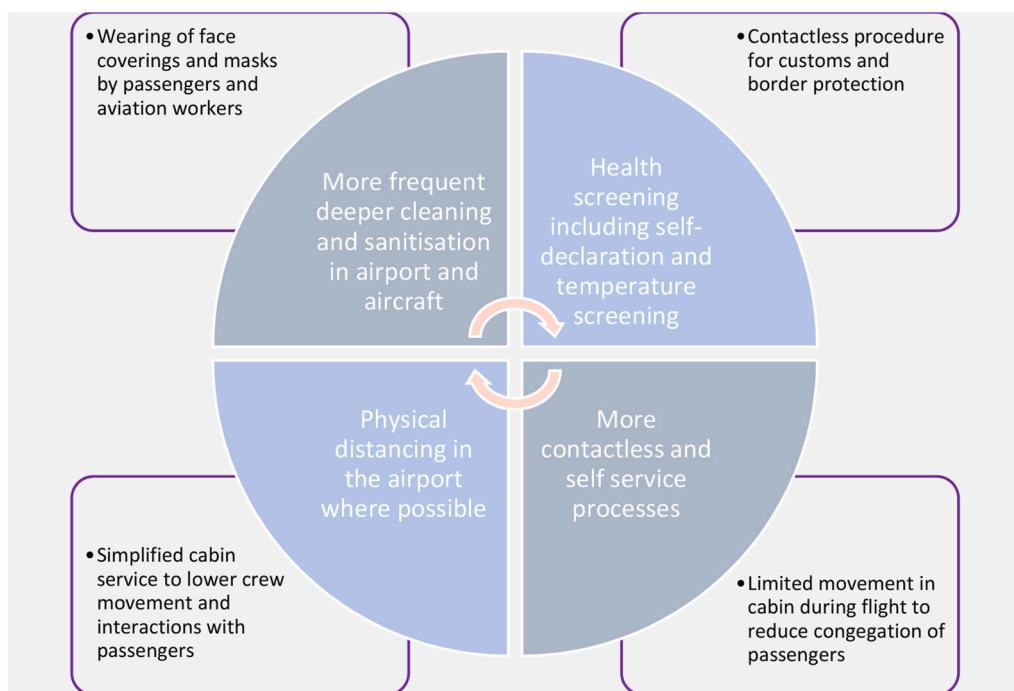


Fig. 10. Measures put in place to ensure aviation safety during COVID-19. Source: Authors, based on IATA (2020).

the world.

To achieve operational efficiency and drive the cost of doing business down, certain imperatives need to be considered by focusing on airports' operations. Ensuring operational efficiency required that airports look at their airspace management, movement area optimisation, and revisit gate allocation to ensure synchronisation of turnaround coordination. Auto allocation of airport resources could be done, making use of sophisticated computer systems.

There is also a need to review the check-in process to ensure that it is seamless. This can be done by employing technology that allows for the quick processing and screening of passengers before they get onto flights. Robots and automation can be employed to achieve the same or other human augmented systems. This means having technology that is fast, efficient, and reliable, where a high level of accuracy is ensured. In this regard, some automation use and use of robotics in various processes of the airport value chain were inevitable. Building capacity for rapid testing of travellers, where tests results can be delivered quickly, will be a crucial step in the fight against the spread of COVID-19 in the aviation industry. However, even if this was to be achieved, there is no guarantee that travel restrictions by the governments seeking to protect their citizens were going to be lifted. Conducting rapid tests also came with its challenges. While IATA had proposed rapid tests using antigens, some countries found these to be inadequate (Guglielmi, 2020). They are said not to be sensitive to detect the virus than more expensive polymerase chain reaction (PCR) dependent tests that can pick up minuscule amounts of the SARS-CoV-2 virus. Hence, logistics, cost of PCR tests, and the inadequacy of such tests discouraged luxury travel as in some cases authorities would require that travellers conduct these twice on every departure to a destination.

There was also a need to reduce the paperwork involved in the availing of tests results and screening of travellers at airports at departure and arrival. Working with government and other civic organisation health authorities, and organisations such as CAPSCA and IATA could also put in place a universal portal where a single health form can be utilised in the screening of a passenger. This system should allow for the authorities and travellers to log travel history and patterns.

The handling of baggage is also an area where speed and efficiency

can be a consideration, with travellers having the capacity to do a quick baggage drop and pick up and consider the biosecurity hazards posed by baggage. Sanitisation of baggage was a measure adopted by several airports to reduce the virus's chances of spreading through baggage handling. Reducing congestion at baggage drops and also ensuring the security of baggage handlers is an important consideration. Therefore, there was a need to offer protective clothing to baggage handlers and ensure the processing of luggage is done in a way that allows for the quick processing of passengers. The revisit of the picking up and dropping of passengers at airports required severe consideration to ensure that travellers are protected from risk exposure as they go to and from the airport.

One of the airports that embraced this approach is the San Francisco International Airport, which now uses Artificial Intelligence (AI) to predict traffic to increase operational efficiency (International Airport Review, 2020). Airports could also adopt other innovations such as Smart Flows to enforce social distancing, as the software can monitor the entire airport system to monitor people density. In turn, the system could trigger messages to alert airport authorities of overpopulation to allow authorities to decide on a course of action to be taken to rectify the problem and enforce social distancing (Smart Flows, 2020). The same system could also be used in other public spaces such as casinos and malls.

A contactless immigration security system at check-in and checkout and fast, efficient processing of aircraft and passengers at the airport is likely to enhance travellers' quality of experience at a difficult time. This could assist in reducing the carbon footprint of airports and ensure sustainability. There is also a need to continuously monitor the passenger from time to time to ensure adequate staffing during peak demands in line with the demand to ensure fast, efficient, and cost-effective travel.

There are many options most airlines adopted from the airline side to reduce their cash burn. In the main, the industry opted for several measures. These included reducing staff numbers, rescheduling debts, repurposing passenger planes into cargo aircraft, suspending capital projects and renegotiating fees with airports. Other measures were rescheduling payments with vendors and deferring the taking of

deliveries of new aircraft. The industry should also ensure enough cash reserves that consider the sector's vulnerability to internal and external business threats. Insurance can play a crucial role in bridging this gap, although this is likely to come at a considerable premium.

As the recovery process occurs, the airline industry must streamline operations and use the most efficient and cleaner aircraft on the market to reduce financial and environmental costs. Given that the recovery process is expected to be slow, the introduction of small and medium aircraft can ensure maximum returns for airlines as demand is likely to be depressed. The industry could also use the grounding of large aircraft in as much as it was driven by the need to cut costs to cut back its carbon footprint by permanently retiring old aircraft. New and more efficient aircraft could be used going forward to address the industry's poor record in addressing climate change in line with SDG13 on climate change action. This could boost the sector's March towards a sustainable future as envisaged in its sustainability roadmap titled "Onboard A Sustainable Future" developed by ICAO's environmental wing, Carbon Offsetting and Reduction Scheme for International Aviation (CORSA).

4. Conclusions and recommendations

The study tracked the global aviation industry's impact and recovery pathways following the COVID-19 pandemic and mainly focused on North America, Europe and Pacific Asia. The study found that the global aviation industry had taken a severe knock due to the pandemic's impact, with many revenue losses being experienced since travel restriction measures were put in place. The recovery process in other regions started in June 2020, except in China, which took a different trajectory. It is emerging that in many instances, the recovery process will be slow and likely to follow COVID-19 resurgence trajectories of various aviation geographic region. The recovery is also likely to follow travel policies instituted by various states to reduce the impact of COVID-19. The study also found that the sector's recovery was likely to be enhanced with domestic and regional aviation demands. International air travel recovery was likely to respond positively to markets that embraced quick testing, as opposed to quarantine on arrival.

Prolonged travel restrictions across the world placed the industry in a precarious position, with several airlines downgraded, which raised the cost of restart and capitalisation. As a response strategy, there is a need to provide affordable finance by both private and public players to ensure sustainability. The pandemic also offered the aviation a possibility of a fresh start premised on operational efficiency and technological advancement. New fuel efficient medium to narrow-bodied remains the best alternative to achieving efficiency and environmental sustainability for most routes. Hence the industry needed to continue getting rid of old and fuel-inefficient aircraft that are costly both financially and environmentally. This requires finance to allow the sector to embrace sustainability in line with the SDGs, especially sustainable energy (SDG 7) and climate action (SDG 13). The aviation sector should not see this as an excuse to renege its earlier commitment to a sustainable aviation future.

Both the SDGs and the Sendai Framework for Disaster Risk Reduction underscore the need for (i) Strengthening disaster risk governance to manage disaster risk; (ii) Investing in disaster reduction for resilience and; (iii) Enhancing disaster preparedness for effective response, and to "Build Back Better" in recovery, rehabilitation and reconstruction. The study shows glaring areas of concern where the aviation sector is ill-prepared to deal with disasters. To this end, there is a need for the sector to enhance disaster risk reduction and management going forward as pandemics and other natural hazards are expected to increase in the future. Such resilient building means a revisit of cashflow hold for the aviation industry to reduce taxpayer funds dependency as this is not the best option forward.

The adoption of various health and safety protocols had to be synchronised across the world. Crucial in achieving this is the role of airports, health authorities and civic organisations to ensure industry

uniformity in a manner that addresses customers' fears and concerns. For a sustainable growth pathway, there is a need for the airlines to revise their booking and cancellation policies to offer customer flexibility given that customers might need to do last-minute amendments to travel itineraries. Transparency is also a must for the industry concerning customers' treatment at various destinations as most travellers are nervous about being quarantined at destinations upon arrival. In that breath, all airports, working hand in hand with their government health authorities, need the capacity to conduct reliable rapid screening at least 24 h or less before the travellers depart. This might require that airports get some Biosafety Trust certification where airports are accredited for instituting biosecurity measures aimed at addressing COVID-19. The success of the travel industry is premised on layers of biosecurity measures. However, in between the place of origin and the destination, any measures addressing travellers' health and safety were likely to welcome such measures include physical distancing measures throughout the journey.

Credit author statement

This serves to declare that myself Kaitano Dube on my behalf and on behalf of the co-authors Prof Godwell Nhamo and David Chikodzi are the sole authors of the article COVID-19 pandemic and prospects of recovery from the aviation industry which we have submitted for publication consideration in the Journal of Air Transport Management. All the authors participated enough to be considered authors of the article. We further attest that all third part material has been acknowledged. The research was conducted in line with ethical provisions as provided by researcher institutions. There is no conflict of interest in conducting and writing of the article.

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