

Impact of COVID-19 restrictions on South African air transport and tourism indicators

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Background: Air travel restrictions to prevent the spread of coronavirus disease 2019 (COVID-19) impacted air travel to and from and within South Africa significantly. The duration of the pandemic was more protracted than initially expected as new variants of the pandemic (in 'waves') resulted in additional restrictions.

Objectives: To determine the nature of COVID-19-related air travel restrictions, their impact on annual passenger demand, the number of flights operated (supply of services), the related average passenger loads carried as well as on tourism indicators of the direct contribution of travel and tourism, the total contribution to Gross Domestic Product (GDP) and employment.

Method: The study identifies the number of passengers carried and flights operated and calculates the average passenger load per flight and trends. The impact on tourism indicators is based on the unit values of metrics published by the World Travel and Tourism Council for the 2019 calendar year, adapted for the reduction in passengers in the first and second years following the COVID-19 lockdown.

Results: Significant decreases in the annual number of passengers carried, flights operated (in the three geographic areas), and their impact on tourism and employment indicators were identified.

Conclusion: The decline in passengers exceeded the decrease in flights operated, which resulted in a decline in the average load of passengers carried per flight. The significance of COVID-19 restrictions on tourism indicators and employment was also calculated.

Contribution: The study identifies the impact of COVID-19 air travel restrictions on both air transport and tourism indicators for South Africa.

Keywords: COVID-19; restrictions; regulations; air travel; air transport; tourism; passengers carried; flights operated; passenger load; recovery.

Introduction

Social value

The importance of aviation, according to the International Civil Aviation Organization (ICAO 2017), relates to its role in connecting people (cultures and businesses), supporting economic growth, generating tourism and trade, which brings about consumer choice, creates jobs and generates socio-economic benefits. According to the International Air Transport Association (IATA), the air transport sector significantly contributes to South Africa's economy by creating jobs and spending generated by airlines and their supply chain, the flows of trade, tourism and investment (IATA Economics 2019).

Coronavirus disease 2019 (COVID-19) was first identified in December 2019, and by 11 March 2020, it was declared a pandemic by the World Health Organization (WHO). The pandemic is estimated to have caused the most prominent global recession since the severe worldwide economic downturn in the 1930s. COVID-19 and measures to restrict the spread of the pandemic caused a significant decrease in passenger demand, while travel restrictions and flight bans resulted in the cessation of operations by most airlines (Sun et al. 2021).

Within South Africa, a total lockdown of air travel was implemented through alert level 5 from midnight 26 March 2020 until 30 April 2020 initially (South African Government 2022).

This study demonstrates the extent to which international passenger throughput and the number of flights were negatively affected and determines the impact of such reduction of the passengers on typical tourism indicators, like the direct contribution of travel and tourism, the total contribution to the GDP, and the tourism impact on employment.

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Scientific value

This study fills a gap in identifying and illustrating the impact of COVID-19 restrictions on demand in terms of an annual number of passengers carried and flights operated (as a proxy of supply) to and from South Africa (at ACSA airports) on a fiscal year basis, comparable to South Africa's first lockdown period. The study also calculates the average loads per flight and gauges the impact of COVID-19 on salient tourism indicators.

The study does not focus on the impact of COVID-19 restrictions on the individual suppliers (airlines) but aggregates passengers carried and flights operated for all the airlines in the three geographic areas as the measure of the supply within the industry. It should be noted that COVID-19 restrictions and weak demand emanating after that exacerbated airlines' financial distress and accelerated the demise of financially weak Southern African airlines. Two regional airlines, Air Namibia and S.A. Express were liquidated, and four airlines were placed in business rescue. These are Air Mauritius, Comair (with the British Airways and Kulula.com airline brands), South African Airways (SAA) and Mango (SAA's low-cost carrier subsidiary) since 2019. South African Airways was relaunched while still being under business rescue on a much smaller scale of domestic operations. Neither Comair's airline brands (British Airways and Kulula.com) nor Mango operate air services at the time of writing (Campbell 2022). Almost all intercontinental (long-haul) flights to and from the Southern African region depend on foreign airlines. Only four Southern African and Indian Ocean State-owned airlines are still operating intercontinental (long-haul) routes. These are Air Austral (Reunion), Air Mauritius, Air Tanzania and TAAG Angolan Airlines (Campbell 2022).

The study is based on the annual aggregation of monthly statistics for passengers and flights operated published by the Airports Company South Africa (ACSA), split into three markets: international (intercontinental), African regional and South African domestic routes. International Civil Aviation Organization also publishes charts of the daily number of flight departures for major South African airports (including Johannesburg and Cape Town airports) (ICAO 2022a), but does not distinguish between the three geographic areas. International Air Transport Association also publishes monthly Air Passenger Market Analysis (revenue passenger kilometres [RPKs] and Available Seat Kilometres [ASKs]) for the whole African region but does not identify the numbers for South Africa apart from all African countries.

Aim and objectives

The aim and objectives of this study are the following:

- Identify the nature of COVID-19-related air travel restrictions and regulatory directives.
- Determine the impact of these measures on the annual number of air travel passengers carried (as a proxy for demand) for each of the three geographic areas (international, regional and domestic).

- Determine the impact of these measures on the annual number of flights operated (as a proxy of supply or capacity produced) by airlines.
- Calculate the relationship between the decline in production of flights and the decline in the level of passengers carried, which is indicative of the operational efficiency and profitability of the airline industry.
- Calculate the average loads carried per flight, which can be compared to the average aircraft size operated in the three geographic markets.
- Calculate the impact of the decline in the annual number of air travel passengers on salient tourism indicators.

Research methods and design

Setting: COVID-19 air travel restrictions and regulatory directives

COVID-19 was declared a pandemic on 11 March 2020 by the WHO, following its first identification around Wuhan in China in December 2019, caused by Severe Acute Respiratory Syndrome Coronavirus 2. The COVID-19 pandemic posed a global risk to human health and global economies (Sun et al. 2021).

Apart from millions of confirmed cases of infection and fatalities caused by the COVID-19 pandemic, lockdown restrictions imposed to prevent the spread of infection caused the most extensive global recession since the severe worldwide economic downturn in the 1930s (the Great Depression), with millions of people falling into extreme poverty (Sun et al. 2021).

The COVID-19 crisis quickly spread globally as governments worldwide (including the South African Government) started to implement widespread lockdown measures (Suau-Sanchez, Voltes-Dorta & Cugueró-Escofet 2020).

The South African Government declared the National State of Disaster on 15 March 2020 to empower the government to take measures to slow down the rate of infection, ease pressure on hospitals, and provide the time to develop the infrastructure, resources and capacity to manage a large number of people who became ill as a result of COVID-19. This initially resulted in an effective complete lockdown of all movement from 27 March 2020. The National State of Disaster remained in place for 750 days (Ramaphosa 2022).

The South African Government imposed some of the world's most onerous lockdown restrictions on 27 March 2020. These included the closure of international borders, a directive for people to stay at home (Luke 2020) and the shutdown of all airports in the country, effectively restricting all local, regional and international flights (African Competition Forum [ACF] 2021:54).

The South African Government introduced five alert levels (one to five) for travel and two so-called adjusted alert levels (alter levels one to three). The duration of these alert levels are set out in Table 1b. The regulatory interventions

included 331 legal instruments (inclusive of amendments), identified in Table 1a, of which 13 directives were directed explicitly to air services.

The general COVID-19 lockdown alert levels in South Africa were supplemented with a range of additional directives applicable to air travel specifically, including; relaxed-, amended- and adjusted lockdown alert levels. The periods for which these impacted air transport, according to the Airports Company of South Africa (ACSA) are listed in Box 1.

On 04 April 2022 Cabinet decided to terminate the National State of Disaster with effect from midnight 04 April 2022 as the requirements for the National State of Disaster in terms of the *Disaster Management Act* were no longer met. However, specific transitional provisions would remain in place for 30 days after the termination of the National State of Disaster to ensure essential public health precautions and other necessary services are not interrupted during the time that new regulations (in terms of the *National Health Act*) would come into effect. The pandemic would, in future, be managed in terms of the *National Health Act* (Ramaphosa 2022).

The three remaining COVID-19 lockdown rules that remained were the following:

- The mask regime would be continued and will remain mandatory in shared indoor settings, which means that no mask would be required in most outdoor places.
- Patronage is limited to a maximum of 50% of the normal capacity of any venue (indoor or outdoor) on the basis that vaccination status is checked at entry. Indoor

gatherings would be capped at 1000 people and outdoor gatherings at 2000 people.

- Entry rules for travel from abroad require the traveller to be fully vaccinated or produce a COVID PCR (polymerase chain reaction) Test no more than 72 h old. Those who do neither will have to take a rapid antigen test at the border and will need to isolate for 10 days if positive (De Wet 2022).

On 22 June 2022, the Minister of Health repealed Regulations 16A (mask-wearing), 16B (gatherings) and 16C (for international travellers entering South Africa) of the Regulations Relating to the Surveillance and the Control of Notifiable Medical Condition in their entirety (Phaahla 2022a, 2022b).

Passenger traffic carried by the airline industry collapsed with unprecedented decline and difficulty in recovery (ICAO 2022c, 2022d). The Air Transport Bureau of the ICAO illustrates the impact of COVID-19 on passengers carried by the world's airlines since the Second World War in Figure 1 (ICAO 2022c, 2022d).

The decline and the period over which recovery is projected to occur (by the end of 2022) is compared with other major (black-swan) events that affected the number of passengers carried worldwide. These include the oil crises, the Iran-Iraq war, the Gulf and Asian crises, the 9/11 terrorist attack, SARS and the financial crises.

International Civil Aviation Organization also publishes monthly regional geographical analyses and forecasts (based on different scenarios) for the 2022 calendar year, which include Africa, but not South Africa, separately.

The initial post-lockdown relaunch of flights by airlines in or to South Africa was staggered on two dates June 2020 onwards (domestic airlines) and October 2021 onwards (African regional airlines and international airlines) (SACAA 2021).

Since January 2020, the WHO has defined specific Variants Under Monitoring (VUM), Variants of Interest (VOIs) and Variants of Concern (VOCs). Evidence from multiple countries with the extensive transmission of VOCs triggered public health and social measures, including infection prevention and control measures, to reduce COVID-19 cases, hospitalisations and deaths. National and local authorities are encouraged to continue strengthening (WHO 2022b).

The incidence of COVID-19 infection, reflected by the chart of the 7-day average of daily cases published (in Figure 2a) by the John Hopkins University and Medicine, Coronavirus Resource Centre, demonstrates four so-called waves of infection, each with a rising incidence of infection followed by a much lower level during the Omicron Variant, as indicated with the red dotted trend line curve in Figure 2b.

However, the incidence of deaths attributed to COVID-19 is reflected by a 7-day average daily death chart, also demonstrated by four so-called waves. However, since the second wave of deaths attributed to the Delta variant, a

TABLE 1a: Number of regulatory interventions to prevent the spread of COVID-19.

Number of interventions	Nature of intervention
15	Core lockdown regulations
232	Directives
22	Other lockdown regulations
24	Disaster management guidelines and notices
38	<i>Disaster Management Act</i> and Amendments
331	Total regulatory interventions

Source: South African Government, 2022a, *COVID-19 novel coronavirus*, viewed 15 January, from <https://www.gov.za/Coronavirus>.

TABLE 1b: Duration of salient alert levels imposed in South Africa.

Alert level	Period
5	Midnight 26 March 2020 to 30 April 2020
4	01 to 31 May 2020
3	01 June to 17 August 2020
2	18 August to 20 September 2020
1	21 September to 28 December 2020
3	29 December 2020 until 28 February 2021
1	01 March 2021 to 30 May 2021
2	31 May to 15 June 2021
3	16 June 2021 to 27 June 2021
4	28 June to 25 July 2021
3	26 July to 12 September 2021
2	13 to 30 September 2021
1	01 October 2021 to 04 April 2022
The national state of disaster lifted from 05 April 2022	

Source: South African Government, 2022b, *COVID-19 novel coronavirus*, viewed 06 April, from <https://www.gov.za/covid-19/resources/regulations-and-guidelines-coronavirus-covid-19>.

BOX 1: Duration and major impact of lockdown levels on air travel in South Africa.**Early days of the pandemic**

- COVID-19 started to affect air travel to and from China and Europe
- 30 January 2020 – WHO declared a public health emergency of international concern (that the spread of the virus constitutes a public risk through the international spread)
- 15 March 2020 – The President declared the COVID-19 pandemic a national disaster
- February 2020 – SA Express placed in business rescue
- 11 March 2020 – the WHO declared COVID-19 a pandemic

Hard lockdown: 27 March 2020 to 15 June 2020

- 27 March to 16 April – The President declared a national 21-day lockdown. Only essential services and businesses were permitted to operate, a ban on alcohol or cigarette sales and any form of travel or gathering
- 01 May 2020 to 31 May 2020 - South Africa moved to **Level 4** of the national lockdown, a slight easing of the hard lockdown restrictions
- May 2020 – Comair (with the kulula.com and British Airways airline brands) filed for voluntary business rescue
- International airlines: Virgin Australia filed for administration in April 2020. Avianca Airlines filed for Chapter 11 in May 2020, and Air Mauritius filed for administration in April 2020

01 June 2020 to 17 August 2020 – South Africa entered **Level 3** of the national lockdown

After ten weeks, the ban on commercial flights in South Africa was lifted but limited to domestic air travel for business purposes

Relaxed lockdown Level 4: 17 June 2020 to 17 August 2020

- A curfew from 21:00 to 16:00 was introduced, and family visits were prohibited
- All public schools closed for four weeks from 27 July to 24 August 2020
- 01 June 2020 - international airports O.R. Tambo, Cape Town and King Shaka reopened for business travel
- International borders remained closed
- International travel remained limited to the repatriation of foreign nationals from South Africa and citizen to South Africa
- 01 July 2020 Chief David Stuurman (Port Elizabeth), Upington and Bloemfontein International Airports reopened for business travel
- 22 July 2020 King Phalo (East London), George and Kimberley's airports were reopened for business travel
- International air travel, which generates 60% of ACSA's trade, remained prohibited
- Tobacco and sale of liquor bans persisted

Lockdown Level 2: 18 August 2020 to 20 September 2020

- 18 August South Africa entered Level 2 of the national lockdown
- Late August 2020 – Europe entered the second wave of COVID-19 infections
- South Africa's borders remained closed
- Limited domestic air travel resumed
- International air travel is still prohibited
- Sale of liquor permitted only from 09:00 to 17:00, Monday to Thursday

Lockdown Level 1: 21 September 2020 to 28 December 2020

- 21 September 2020 South Africa entered Level 1 of the national lockdown
- September 2020, South African Airways suspended all flight operations as the business rescue practitioners placed the airline under 'care and maintenance' until further funding could be sourced
- South Africa opened its borders, however, travel from key markets experiencing their second wave remained restricted
- South African market experienced a degree of recovery, but with foreign tourist arrivals from African sources as opposed to the historic European and American source markets.
- From 01 October, a gradual lifting of restrictions on international flights commenced
- In early December 2020, some recovery became evident as arrivals recorded at 43% of the year prior in December
- Sale of liquor permitted Monday to Thursday, 10:00 to 18:00 (including duty-free stores), including late-night international flights

Amended Lockdown Level 3: 29 December 2020 to 31 January 2021

- 09 December 2020 – the Minister of Health announced that the country had entered the second wave
- 18 December 2020 – the Minister of Health announced that scientists had discovered a new variant of coronavirus (Omicron), driving the second wave of infections
- December 2020, South Africa's second wave took hold with the new variant emanating from South Africa promoting the imposition of travel restrictions from our top tourist markets (UK and USA)
- South Africa entered an adjusted Level lockdown for two weeks
- Sale of alcohol again prohibited for two weeks
- 16 December 2020 until 03 January 2021, the Eastern Cape and Garden Route beaches were closed to the public.
- 16, 25, 26 and 31 December 2020 and 01, 02 and 03 January 2021 beaches in KwaZulu-Natal were closed to the public.
- Several European countries implemented restrictions on air travel from South Africa, the United Kingdom and Brazil to combat the spread of the Omicron variant of the virus
- Many foreign airlines halt flights to and from South Africa, including Turkish Airlines, British Airways, Virgin Atlantic, Emirates Airlines, Austrian Airlines, Air Seychelles, Edelweiss Air, KLM, and United Airlines.

Amended Lockdown Level 3:

01 February 2021 to 31 March 2021

- South Africa continued to remain under adjusted Level 3 lockdown
- Restrictions on air travel from South Africa to various countries continued

Adjusted Alert Level 1: 01 March 2021 – 30 May 2021

Most normal activities resumed subject to precautionary and health guidelines

Adjusted Alert Level 2: 31 May 2021 – 15 June 2021

Physical distancing regulations were maintained, and restrictions on leisure and social activities were imposed to prevent a resurgence of the virus

Adjusted Alert Level 3: 16 June 2021 – 27 June 2021

Restrictions are imposed on many activities, workplaces, and social situations to limit the high risk of transmission

Box 1 continues on the next page →

BOX 1 (Continues...): Duration and major impact of lockdown levels on air travel in South Africa.

<p>Adjusted Alert Level 4: 28 June 2021 – 25 July 2021 Extreme precautions are implemented to limit community transmission and outbreaks. Some activities not permitted under Level 5 were allowed</p>
<p>Adjusted Alert Level 3: 26 July 2021 – 12 September 2021 Many activities were restricted, including workplaces and social situations, to limit the high risk of transmission</p>
<p>Adjusted Alert Level 2: 13 September 2021 – 30 September 2021 Physical distancing regulations remained in place. Restrictions imposed on leisure and social activities to prevent a resurgence of the virus</p>
<p>Adjusted Alert Level 1: 01 October 2021 – 22 June 2022 Most normal activities resumed, subject to precautionary and health guidelines Under Adjusted Alert Level 1, all 53 of the country's land borders were open, and travel to and from South Africa from regional and international destinations was permitted, subject to: <ul style="list-style-type: none"> • fully vaccinated passengers (a valid vaccination certificate to be presented on arrival at land borders; and • unvaccinated passengers had to provide a negative COVID-19 test no more than 72 hours before the travel date </p>
<p>Restrictions lifted: 04 April 2022 Minister of Health repealed all South African imposed COVID-19 restrictions, including relating to international travellers entering the country. PCR and antigen testing at South Africa's borders were abolished, which enabled a full reopening of the tourism sector. The requirement that masks be worn in all indoor public venues was also abolished</p>

Source: ACSA, 2022b, *Integrated annual report 2022*, Airports Company South Africa, p. 93, viewed 15 February 2023, from <https://www.airports.co.za/business/investor-relations/financial-information>

WHO, World Health Organisation; PCR, polymerase chain reaction.

marked decline in deaths is clearly identifiable (indicated with the red dotted trend line curve) in Figure 2b. This trend divergence is referred to as a decoupling of the trends of incidence and deaths (John Hopkins University & Medicine, Coronavirus Resource Centre 2022).

SARS-CoV-2 variants

Current circulating VOCs are:

- The Delta version (B.1.617.2) was first documented in India in October 2020–December 2020.
- Omicron Variants, recorded in multiple countries in November 2021 (WHO 2022a), including.
 - **Omicron BA.1** was recorded in South Africa and Botswana in November 2021.
 - **Omicron BA.1.1** (or Nextstrain clade 21K) was documented in South Africa in November 2021 (ECDC 2022).
 - **Omicron 'Stealth' variant BA.2** (or Nextstrain clade 21L) (WHO 2022a).

Current circulating VOIs:

- **Omicron BA.4** was documented in South Africa in January 2022.
- **Omicron BA.5** was recorded in South Africa in February 2022 (ECDC 2022).

Currently circulating VUM are:

- XD, France, NTD Delta-like; remaining Omicron-like, January 2022.
- **Omicron BA.3 (z)** was documented in South Africa in November 2021 (ECDC 2022; WHO 2022a).

Gauging the impact of COVID-19 restrictions and recovery

International Civil Aviation Organization publishes daily updated charts illustrating daily flight departures observed in the last 7 days of every week, as the Global COVID-19 Airport Status, for each state and international airport, including South Africa. Since 14 October 2019, for 1 year, the current calendar year, the last 6 months, 3 months and the previous month, these charts are based on ADS-B flight data (Automatic Dependent Surveillance-Broadcast: Automatic, which transmits information with no pilot or operator involvement

required) and the COVID-19 cases per week for States, sourced from the European Centre for Disease Prevention and Control (ECDC).

The steep downturn and collapse of daily departures at COVID-19 lockdown and the slow recovery to just above 50% of the pre-COVID-19 level are identifiable.

An indicator for supply, the daily number of flights departing published by ICAO, combines flights to all three markets in Figure 3. However, it is more appropriate to gauge the flights (as an indicator of supply) in each of the three markets because the COVID-19 regulatory instruments diverged quite substantively in each market.

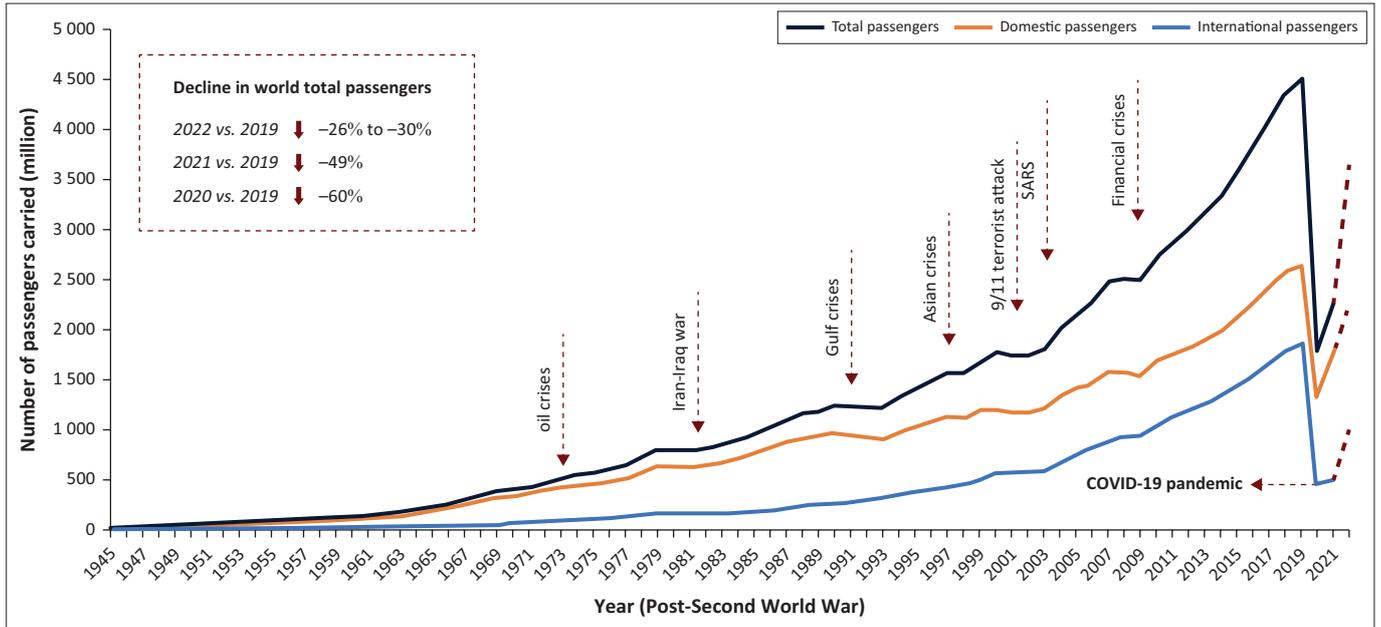
Study design: An outline of the type of study design

Time-series analysis is used extensively in the aviation industry. In such an analysis, the traffic variable to be forecast (the dependent variable, passenger, RPKs or cargo volumes, revenue, load factors) is plotted on the vertical axis, and time (the explanatory or independent variable) is plotted on the horizontal axis, from which the trend in traffic development is determined (Secretary General of the ICAO 2006:3 [I-3]).

Fluctuations in a time series curve could be caused by seasonality and cyclical factors or by specific factors or events, including the impact of economic, social and operational conditions which affect the development of traffic (Secretary General of the ICAO 2006:15 [I-15]) including COVID-19.

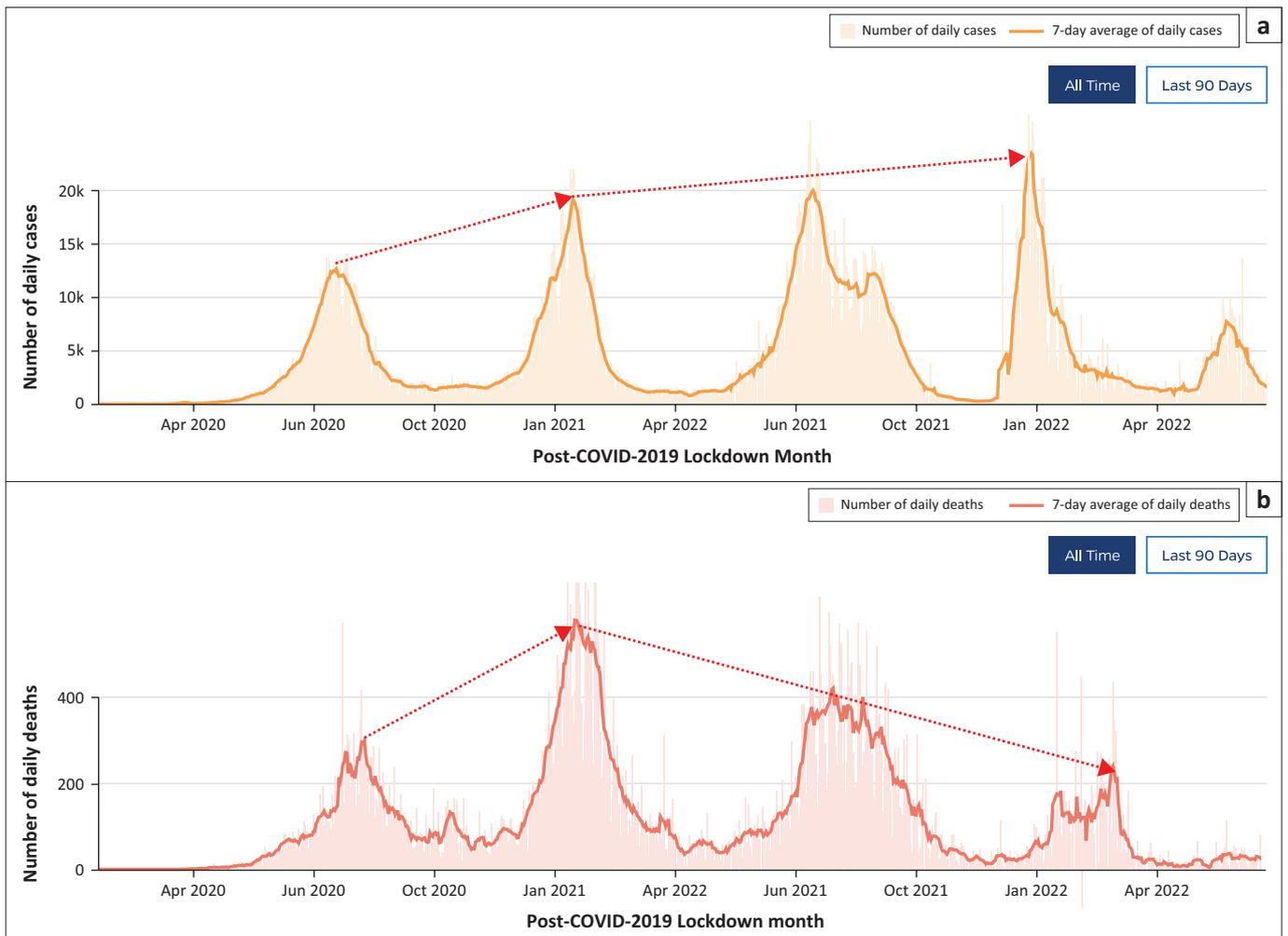
Then cause-and-effect relationships are used to develop forecasts (methods) in which various mathematical relationships of the dependent to the independent variables may be applied to forecast traffic (Secretary General of the ICAO 2006:17 [I-17]).

The data population comprise passenger throughput and flights operated to and from ACSA airports. The data is grouped into three markets: international (intercontinental),



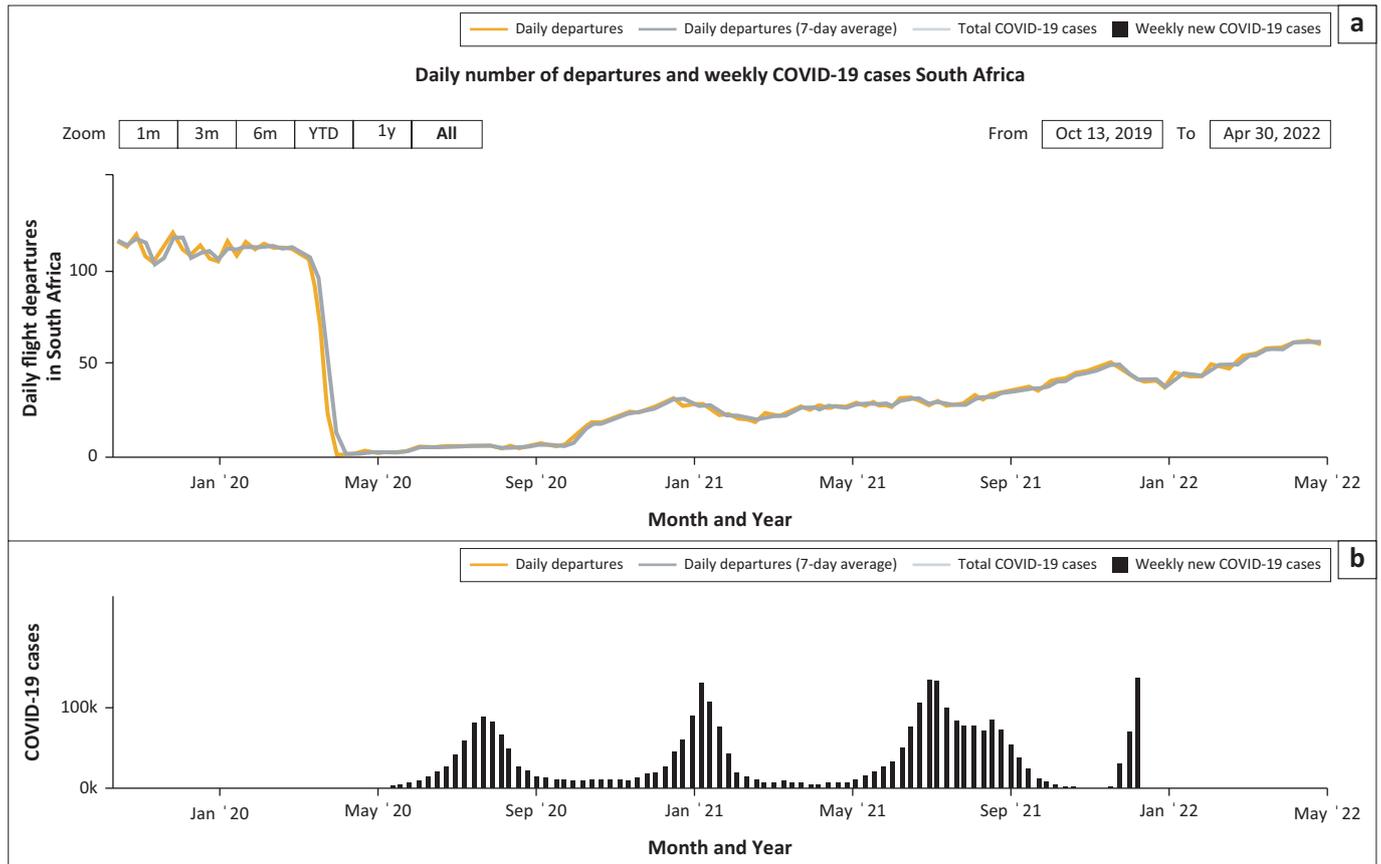
Source: ICAO (International Civil Aviation Organization), 2022d, *Economic development – Air Transport Bureau, Effects of novel coronavirus (COVID-19) on civil aviation: Economic impact analysis*, 17 March 2021, Montréal, Canada, viewed 08 March 2022, from <https://www.icao.int/sustainability/Pages/Economic-Impacts-of-COVID-19.aspx>.

FIGURE 1: Global annual passengers carried (from 1945 to 2022).



Source: John Hopkins University & Medicine, 2022, *Coronavirus Resource Centre, Data timeline, world countries South Africa*, viewed 08 June 2022, from <https://coronavirus.jhu.edu/region/south-africa>

FIGURE 2: Seven-day average of number of daily cases. (a) Four waves of infection. (b) Seven-day average of daily deaths.



Source: ICAO (International Civil Aviation Organization), 2022c, *Global COVID-19 airport status, South Africa, Johannesburg Oceanic (FAJO) Airspace and Cape Town (FACT) Airspace*, viewed 02 May, from <https://www.icao.int/safety/pages/covid-19-airport-status.aspx>

FIGURE 3: Daily flight departures in South Africa (a–b).

African regional and South African domestic routes. This represents most of the scheduled passenger throughput at the large international certified airports in South Africa and national airports owned by ACSA but excludes data of municipal airports, privately owned airports and private airport concessions, which is not published.

Following capturing and tabulating the ACSA data for passengers carried per market, the percentage difference to the previous year's numbers is calculated until the base fiscal year of 2019/20. After that, a comparison is made comparing the first and second post-COVID-19 lockdown years (2020/21 and 2021/22) to the base fiscal year 2019/20, expressed as a percentage of the volumes achieved during the 2019/20 (base) fiscal year to demonstrate the percentage of decline from the pre-COVID-19 baseline (in each geographic market) as is used by most international organisations (ICAO 2022b) to demonstrate the level of recovery from the pre-COVID-19 annual traffic base.

Each geographic area's percentage composition of traffic volume is compared per annum.

The annual throughput volumes of passengers for each fiscal year are then illustrated through a time-series chart compiled to illustrate the significant trends in passengers carried for each geographic area.

Similar calculations and analyses are also made for flights operated (as a proxy for production/supply) to and from ACSA airports, also illustrated by time-series charts.

The difference between the trends of the rate of decline in passengers carried and the rate of decline in flights operated demonstrates that an excess level of capacity was produced. This will make it difficult to achieve profitability in the airline industry in each geographic area, as capacity is not balanced to the levels of demand.

The average loads carried per flight at ACSA airports are then determined by dividing the number of flights into the number of passengers carried. This indicator can be used to determine the average aircraft size suitable for each of the three geographic markets, also illustrated by time-series charts.

Fluctuations in a time series curve could be caused by seasonality and cyclical factors or by specific factors or events, including the impact of economic, social and operational conditions which affect the development of traffic (Secretary General of the ICAO 2006:15 [I-15]) including COVID-19.

Then cause-and-effect relationships are used to develop forecasts (methods) in which various mathematical relationships of the dependent to the independent variables

may be applied to forecast traffic (Secretary General of the ICAO 2006:17 [I-17]).

The study population and inclusion or exclusion criteria

The ACSA passenger carried data and flights undertaken by the whole ACSA group, the three international certified airports (at Johannesburg, Cape Town and Durban) and each national airport (at George, Port Elizabeth, East London, Bloemfontein, Kimberley and Upington) were captured and analysed.

Airports Company South Africa published data excludes data from municipal airports, privately owned airports and private airport concessions, which are not published. In addition, passengers and flights operated on a non-scheduled basis were excluded to focus on the industry comprising regular commercial flights.

This study focuses on the impact of COVID-19 and the tempo and extent of recovery, not any forecasts into the future.

Data collection

Analysis of the impact of COVID-19 on annual traffic volume, departures and flights operated by international organisations like the World Bank, IATA, ICAO and the Airports Council International (ACI) compares the numbers for a full calendar year (January to December) 2020 to the 2019 whole calendar year numbers (ACI 2021; IATA Economics 2021; ICAO 2022c, 2022d). This implies that percentage declines calculated by comparisons of annual numbers for the 2020 and 2021 years to the 2019 base year would tend to understate the full negative impact of COVID-19 because the first few months of the 2020 calendar year would represent months not fully impacted by COVID-19 restrictive measures.

Airports Company South Africa's monthly data is published for the South African fiscal years (April to March of the following year) and not for the calendar year (January to December). The COVID-19 complete lockdown in South Africa came into effect on 27 March 2020, which implies that (apart from 5 remaining days in March 2020, the published monthly numbers for April 2020 to March 2021 (2020–2021) fiscal year provide a reasonable match of the impact of COVID-19 in comparison to the base year (April 2019 to March 2020).

Most international comparisons are based on calendar years, which in South Africa's case would imply that the first COVID-19 affected year of January 2020 to December 2020 would contain pre-lockdown data (for January 2020 to 27 March 2020). Such an approach would underestimate the annual decline for the first full year compared to a calendar base year for 2019. Therefore, the choice of fiscal years is more closely related to the periods affected by COVID-19 restrictions for South Africa.

Airports Company South Africa's monthly published data for passengers carried and flights operated at each ACSA airport and consolidated figures for all ACSA airports: Airports Company South Africa Total Consolidated Aircraft Movements were captured for the fiscal years (April to March) 2018/18, 2018/19, 2019/20, 2020/21, 2021/22.

Complete lockdown in South Africa occurred during the first 4 months of the 2020–2021 fiscal year (April 2020, May 2020, June 2020 and July 2020). Therefore, the monthly numbers from April 2020 to March 2021 (as the first post-COVID-19 lockdown fiscal year affected by COVID-19 restrictions), as well as April 2021 to March 2022 (as the second post-COVID-19 lockdown fiscal year), are compared to the 2019/20 fiscal year's monthly numbers (April 2019 to March 2020) as the base year for calculating the impact of COVID-19 regulations.

The calculation of the impact of COVID-19 in this study, therefore, makes use of fiscal years (April to March of the following year) because of being more aligned to the first lockdown period in South Africa, as opposed to the use of calendar year (January to December) in other studies.

Data analysis

Analysis of Airports Company South Africa annual data:

- The annual ACSA data for passengers carried and flights operated in all three geographic areas are compiled and analysed to determine the annual increase, decreases and percentages thereof.
- The annual data of passengers carried is divided by the number of flights operated to determine the average loads carried per flight.
- The three sets of data for the last two fiscal years (2020/21 and 2021/22) are then compared to the 2019/20 fiscal year (as the base year) to determine the passengers lost per annum from which various charts are compiled.
- The number of passengers carried for the fiscal year 2019/20 determined from the ACSA data is compared to the numbers of inbound tourists for the 2019 calendar year of the World Bank to assess the compatibility of the two sets of numbers.
- The leading tourism indicators of Direct Contribution of Travel and Tourism, Total Contribution to the GDP and the tourism impact on employment, published by the World Travel & Tourism Council (WTTC) for the 2019 calendar year, are then used to calculate the values of the indicators per tourist.
- The unit values of these indicators are then multiplied by the declines in passengers carried for the 2020–2021 and 2021–2022 fiscal years to determine the annual impact of COVID-19 based on the fiscal years, as calculated in Table 6.

Results

The first numerical analysis determines and analyses the number of passengers and flights for fiscal years on

international, regional and domestic routes. After that, a more detailed analysis is made, and trends are identified in monthly passengers carried and flights on international routes.

Analysis of annual passenger data April 2021 to March 2022 (fiscal year)

The annual numbers for sector passengers carried (based on ACSA monthly published numbers) are summarised and analysed in Table 2.

The impact of COVID-19 is evident in all three sectors. The passenger numbers in all three geographic areas in the fiscal years (2020/21 and 2021/22) are substantially down on the levels attained in the 2019/20 fiscal year. On the other hand, passenger numbers increased from zero in 2020/21 and the 2021/22 fiscal year. However, in none of the geographic areas, passenger numbers recovered to the level attached in the base year of 2019/20.

To illustrate the decline as a result of the COVID-19 lockdown restrictions, the aviation industry started to compare the latest passenger and flight numbers to a fixed base, namely the volumes achieved in the period before the COVID-19 lockdown (IATA 2022; IATA Economics 2021; ICAO 2022b) rather than to compare the numbers for each year to those of the previous year.

The same principle is applied further in this analysis by comparing post-COVID-19 lockdown annual numbers to the FY2019/20 base fiscal year. As a result, the analysis demonstrates the year-on-year percentage increase for the pre-COVID-19 years (2017/18, 2018/19, 2019/20) and the subsequent comparison of the numbers for 2020/21 and 2021/22 fiscal compared to the base year of 2019/20.

TABLE 2: Annual throughput of passengers at Airports Company South Africa airports.

Fiscal Year	International	Regional	Domestic	All Sectors
Passenger throughput at ACSA airports per geographic area				
FY17/18	11 827 665	1 122 984	28 423 001	41 373 650
FY18/19	11 930 818	1 103 016	28 923 109	41 956 943
FY19/20 Base	11 510 394	1 040 346	29 027 622	41 578 362
FY20/21	814 135	74 622	8 036 937	8 925 694
FY21/22	3 345 310	370 365	17 213 655	20 929 330
Geographic composition of annual passengers carried				
FY17/18	29%	3%	69%	100%
FY18/19	28%	3%	69%	100%
FY19/20 Base	28%	3%	70%	100%
FY20/21	9%	1%	90%	100%
FY21/22	16%	2%	82%	100%
Annual percentage decrease in passengers carried (* compared to 2019/20 base year)				
17/18 to 18/19	1%	-2%	2%	1%
18/19 to 19/20	-4%	-6%	0%	-1%
*19/20 to 20/21	-93%	-93%	-72%	-79%
*20/21 to 21/22	-71%	-64%	-41%	-50%

Source: Airports Company South Africa (ACSA), 2022, Statistics, Passenger Statistics and Aircraft Statistics (O.R. Tambo International, Cape Town International Airport, King Shaka International Airport, National Airports), viewed 27 April, from <https://www.airports.co.za/news/statistics> and from <https://www.airports.co.za/business/statistics/aircraft-and-passenger>

FY, Fiscal year; ACSA, Airports Company of South Africa.

The substantial decline from the pre-COVID-19 base year identified in the first post-COVID-19 lockdown year continued in the second post-COVID-19 lockdown year, although at a lesser percentage decline. International passengers declined by 93% in the first post-COVID-19 lockdown year and 71% in the second post-COVID-19 lockdown year compared to the pre-COVID-19 base year. Passengers on regional routes were 93% lower in the first post-COVID-19 lockdown year and 64% in the second post-COVID-19 lockdown year. Passengers on domestic routes were 79% lower in the first post-COVID-19 lockdown year and 41% in the second post-COVID-19 lockdown year.

As COVID-19 air travel restrictions did not affect the geographical regions equally, the composition of the geographic volumes also changed. Notably, international passengers carried in the immediate pre-COVID-19 period comprised about 30% of total passengers. This composition reduced to only 9% of total passengers in the first post-COVID-19 lockdown year and thereafter to 16% of total passengers carried in the second post COVID-19 lockdown year. Domestic passengers carried increased from a level of about 70% of total passengers carried in the immediate pre-COVID-19 year to 90% of total passengers in the first post-COVID-19 lockdown year and thereafter to 82% of total passengers carried in the second post COVID-19 lockdown year. Table 2 contains the annual Year-on-Year percentage increases from 2017/18 to 2018/19, 2018/1 to 2019/20, 2019/20 to 2020/21 and 2020/21 to 2021/22 in each of the three areas and the decreases from 2020/21 and 2021/22 compared to the base year of 2019/20 (identified as '*').

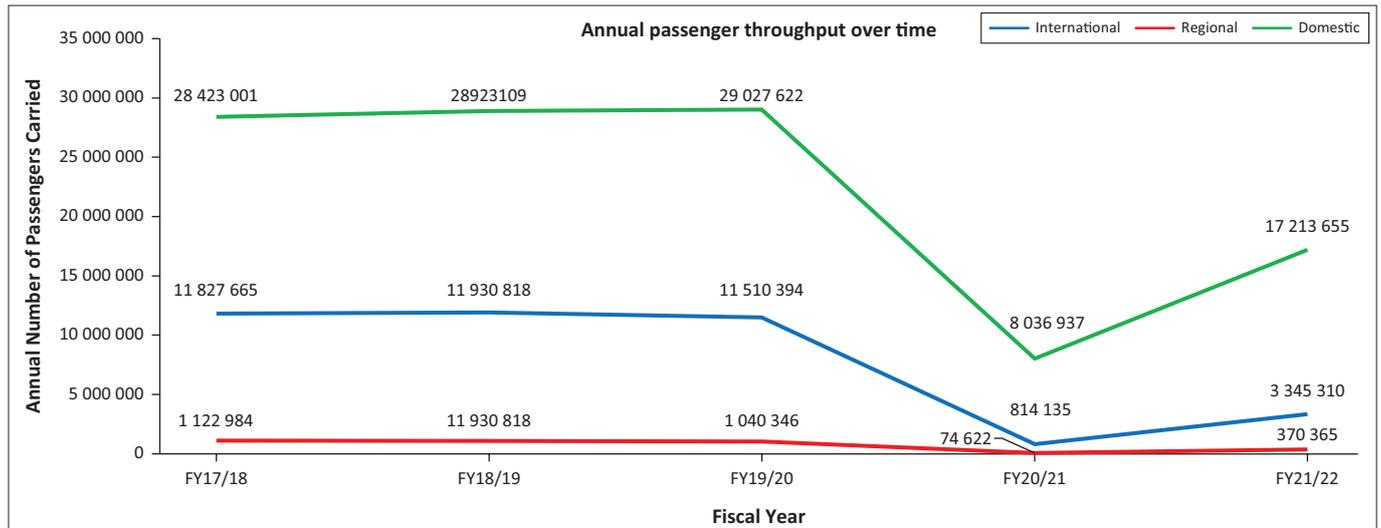
Figure 4 illustrates the collapse of passenger throughput during the 2019/20 fiscal year and that the levels attained before the COVID-19 lockdown have not been reached.

Analysis of annual flights operated from April 2021 to March 2022 (fiscal year)

As can be expected, the decline in passengers carried also impacted the number of flights operated in all three geographic areas in the fiscal years (2020/21 and 2021/22), which are also down on the levels attained in the 2019/20 base fiscal year. In none of the geographic areas have the number of flights operated recovered to the level attached in the base year of 2019/20. The annual numbers for sector passengers carried (based on ACSA monthly published numbers) are summarised and analysed in Table 3.

The number of flights in the post-COVID-19 fiscal years is compared to the volumes achieved before the COVID-19 lockdown rather than the previous year's numbers.

This analysis demonstrates the year-on-year percentage increase for the pre-COVID-19 years (2017/18, 2018/19, 2019/20, 2020/21) and the subsequent comparison of the numbers for the 2020/21 and 2021/22 fiscal compared to the base year of 2019/20.



Source: Airports Company South Africa (ACSA), 2022, Statistics, Passenger Statistics and Aircraft Statistics (O.R. Tambo International, Cape Town International Airport, King Shaka International Airport, National Airports), viewed 27 April, from <https://www.airports.co.za/news/statistics> and from <https://www.airports.co.za/business/statistics/aircraft-and-passenger> FY, Fiscal year.

FIGURE 4: Annual passenger throughput over time.

TABLE 3: Annual number of flights operated at Airports Company South Africa airports.

Fiscal Year	International	Regional	Domestic	All Sectors
Flight movements to and from ACSA airports				
FY17/18	77 976	26 149	281 334	385 459
FY18/19	77 837	25 263	271 812	374 912
FY19/20 Base	76 824	23 309	261 775	361 908
FY20/21	20 457	5 176	85 865	111 498
FY21/22	45 257	13 434	183 553	242 244
Geographic composition of flight movements				
FY17/18	20%	7%	73%	100%
FY18/19	21%	7%	73%	100%
FY19/20 Base	21%	6%	72%	100%
FY20/21	18%	5%	77%	100%
FY21/22	19%	6%	76%	100%
Annual percentage decrease in flights (* compared to 2019/20 base year)				
17/18 to 18/19	0%	-3%	-3%	-3%
18/19 to 19/20	-1%	-8%	-4%	-3%
*19/20 to 20/21	-73%	-78%	-67%	-69%
*20/21 to 21/22	-41%	-42%	-30%	-33%

Source: Airports Company South Africa (ACSA), 2022, Statistics, Passenger Statistics and Aircraft Statistics (O.R. Tambo International, Cape Town International Airport, King Shaka International Airport, National Airports), viewed 27 April, from <https://www.airports.co.za/news/statistics> and from <https://www.airports.co.za/business/statistics/aircraft-and-passenger> FY, Fiscal year; ACSA, Airports Company of South Africa.

The substantial decline from the pre-COVID-19 base year identified in the first post-COVID-19 lockdown year continued in the second post-COVID-19 lockdown year, although at a lesser percentage decline. International flights declined by 73% in the first post-COVID-19 lockdown year and 41% in the second post-COVID-19 lockdown year compared to the pre-COVID-19 base year. Flights operated on regional routes were 78% lower in the first post-COVID-19 lockdown year and 42% in the second post-COVID-19 lockdown year. Passengers on domestic routes were 67% lower in the first post-COVID-19 lockdown year and 30% in the second post-COVID-19 lockdown year.

As COVID-19 air travel restrictions did not affect the geographical regions equally, the composition of the

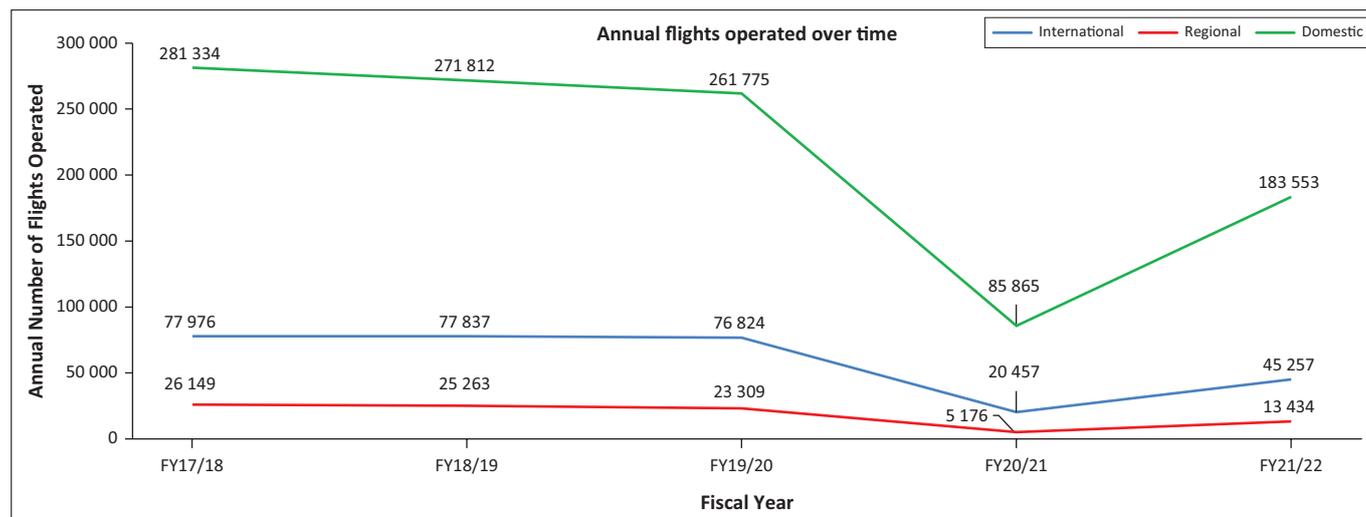
geographic volumes also changed. Notably, international flights operated carried in the immediate pre-COVID-19 period comprised about 20% of total flights operated. This composition reduced slightly to 18% of total flights operated in the first post-COVID-19 lockdown year and thereafter increased slightly to 19% of total flights operated carried in the second post COVID-19 lockdown year. Domestic flights operated carried increased from a level of about 73% of total flights operated carried in the immediate pre-COVID-19 year to 77% of total flights operated in the first post-COVID-19 lockdown year and thereafter to 76% of total flights operated carried in the second post COVID-19 lockdown year. Table 3 contains the annual Year-on-Year percentage increases from 2017/18, 2018/19, 2019/20, 2020/21 in each of the three areas and the decreases from 2020/21 and 2021/22 compared to the base year of 2019/20 (identified as '*').

Figure 5 illustrates the reduction in flights operated during the 2019/20 fiscal year and that the levels attained before the COVID-19 lockdown have not been reached.

The difference in rates of decline in passengers carried to the decline in flights operated

Ideally, increases and decreases in flights operated should be balanced to achieve the same operating result attained in the pre-COVID-19 base fiscal year. However, the comparison in Table 4 demonstrates that (in all three geographic areas) the rate (percentage) decline in passengers exceeded the rate of decline in flights operated since the pre-COVID-19 lockdown base year. This is calculated in the column 'Excess Flight decline to Passengers' (compared to 2019/20 Base Year). It illustrates that the airlines did not reduce their flights in relationship with the more significant percentage declines in passengers carried.

This means that the airlines would not be able to recover the cost of excessive flights because of the lower level of demand,



Source: Airports Company South Africa (ACSA), 2022, Statistics, Passenger Statistics and Aircraft Statistics (O.R. Tambo International, Cape Town International Airport, King Shaka International Airport, National Airports), viewed 27 April, from <https://www.airports.co.za/news/statistics> and from <https://www.airports.co.za/business/statistics/aircraft-and-passenger>

FY, Fiscal year.

FIGURE 5: Annual flights operated over time.

TABLE 4: The level of excess annual flights in comparison to passengers carried (compared to 2019 and 2020 base year).

Fiscal year	% Decline in passengers carried	% Decline in flights	% Excess flight decline to passengers
International			
*19/20 to 20/21	-93	-73	20
*20/21 to 21/22	-71	-41	30
Regional			
*19/20 to 20/21	-93	-78	15
*20/21 to 21/22	-64	-42	22
Domestic			
*19/20 to 20/21	-72	-67	5
*20/21 to 21/22	-41	-30	11
All Sectors			
*19/20 to 20/21	-79	-69	9
*20/21 to 21/22	-50	-33	17

which puts pressure on the operating margins of the airlines, resulting in higher fares as the airlines try and recover the additional cost of capacity operated but not supported by sufficient passenger demand.

In all the geographic areas, the 'Excess Flight decline to Passengers' increased in the second post-COVID-19 year of 2021/22. This implies that the airlines' operating margins would worsen in the second post-COVID-19 year of 2021–22 compared to the first post-COVID-19 year of 2020–21. The result is that the airlines' operating margins are collectively under even more pressure than in the first post-COVID-19 year of 2020–21.

The percentage decline from the 2019/20 base year in passengers and flights operated in each geographic area in the 2 years since the COVID-19 lockdown is illustrated in Figure 6.

The average loads per flight per annum

Apart from a decline in passengers carried per annum and flights operated, the calculated passenger load per flight

was also reduced. This is because the average number of passengers per flight is substantially lower than the size of seating of aircraft typically operated on these routes in these geographic areas.

The average loads per flight have not recovered to the pre-COVID-19 levels, as illustrated in Figure 7. However, a considerable decrease is evident in the average loads per international flight, which, at 74 per flight, was less than half of the 150 average loads per flight attained in the base year.

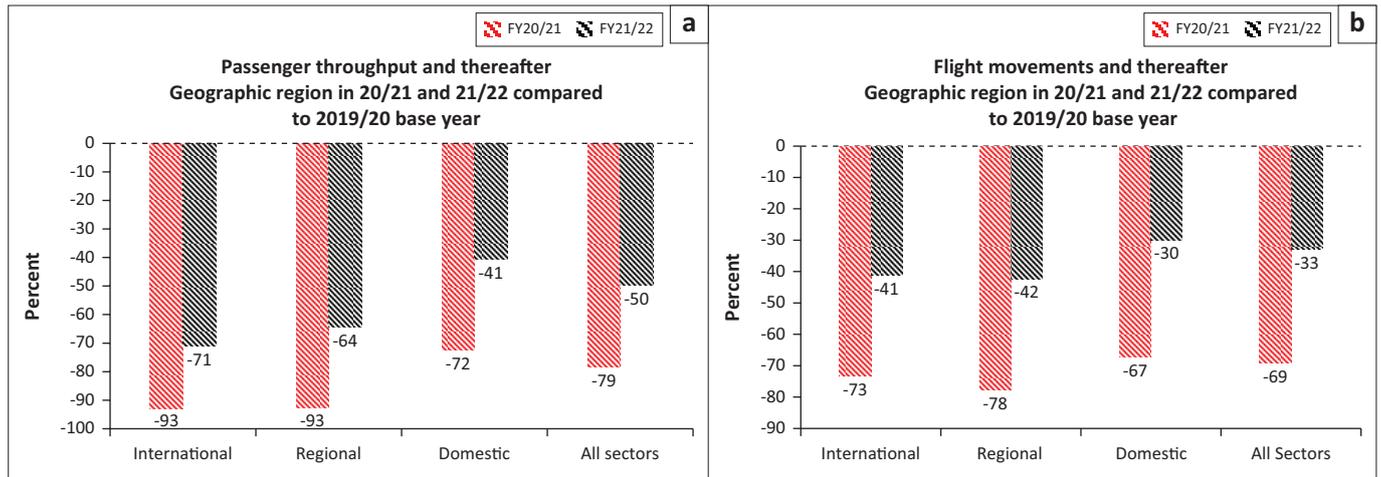
Impact of annual decline in passengers on tourism

The calculation of the tourism impact is based on the WTTC's analysis of three indicators for the base calendar year of 2019 (WTTC 2022), which comprised of Direct Contribution of Travel and Tourism of R294.6 billion, Total Contribution of Travel and Tourism to GDP of R363.2bn and 1 460 900 jobs.

There is a 15% difference in the number of inbound tourists for the 2019 calendar year (14 797 000) as published by the World Bank and the number of passengers carried during the fiscal year of 2019/20 (12 550 740) (as published by ACSA), defined as the base year in this article. This is because of the latter being more aligned to the first lockdown period, as explained above.

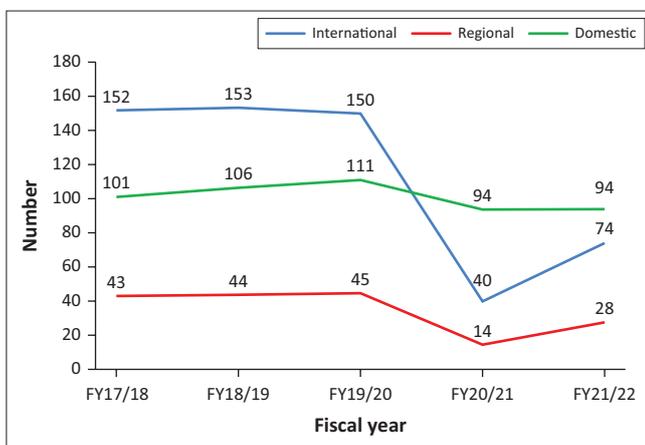
The differences in the number of over-border passengers (which includes international and regional markets) are below. Compared to the fiscal base year of 2019/20, there was a substantial percentage decline of 93% for the 2020/21 fiscal year compared to the base fiscal year (2019/20) and a percentage decline of 70% for the same base fiscal year 2019/20.

The impact of COVID-19 on the tourism indicators is based on the unit numbers for the tourism indicators,



Source: Airports Company South Africa (ACSA), 2022, Statistics, Passenger Statistics and Aircraft Statistics (O.R. Tambo International, Cape Town International Airport, King Shaka International Airport, National Airports), viewed 27 April, from <https://www.airports.co.za/news/statistics> and from <https://www.airports.co.za/business/statistics/aircraft-and-passenger>

FIGURE 6: Geographic region compared to 2019 and 2020 base year.



Source: Airports Company South Africa (ACSA), 2022, Statistics, Passenger Statistics and Aircraft Statistics (O.R. Tambo International, Cape Town International Airport, King Shaka International Airport, National Airports), viewed 27 April, from <https://www.airports.co.za/news/statistics> and from <https://www.airports.co.za/business/statistics/aircraft-and-passenger>

FIGURE 7: Fiscal year over time.

TABLE 5: Calculated average passengers carried per flight.

Fiscal year	Average passenger load per flight		
	International	Regional	Domestic
FY17/18	152	43	101
FY18/19	153	44	106
FY19/20	150	45	111
FY20/21	40	14	94
FY21/22	74	28	94

Source: Airports Company South Africa (ACSA), 2022, Statistics, Passenger Statistics and Aircraft Statistics (O.R. Tambo International, Cape Town International Airport, King Shaka International Airport, National Airports), viewed 27 April, from <https://www.airports.co.za/news/statistics> and from <https://www.airports.co.za/business/statistics/aircraft-and-passenger>

FY, Fiscal year.

which are derived by dividing the over-border passengers published by ACSA for the base fiscal year of 2019/20 (both international and regional) into the annual values of the tourism indicators, published by the WTTC (for the 2019 calendar year). The WTTC indicators for the 2019 calendar year are regarded as a 'typical year'. The impact of COVID-19 is then determined by multiplying the unit (per passenger) tourism indicators by the passenger

numbers carried for the first (2020/21) and second (2021/22) post-COVID-19 lockdown fiscal years set out in Table 6.

Summary of the impact of COVID-19 on the tourism indicators

The impact of COVID-19 for the 2020/21 fiscal year in comparison to the base fiscal year of 2019/20 (before lockdown) is calculated as:

- R273.74bn was lost in the direct contribution of travel and tourism in billions
- R337.48bn was lost in the total contribution of travel and tourism to the GDP
- a loss of 1 357 449 jobs (employment).

The impact of COVID-19 for the 2021/22 fiscal year in comparison to the base fiscal year of 2019/20 (before lockdown) is calculated as follows:

- R207.38bn was lost in the direct contribution of travel and tourism in billions
- R255.67bn was lost in a total contribution of travel and tourism to GDP
- a loss of 1 028 397 jobs (employment).

Discussion

Key findings

The impacts of COVID-19 air travel restrictions were severe, resulting in a decline of 93% in passengers carried on international and regional routes and 72% on domestic routes.

Combined, all the airlines providing air services to, from and within South Africa operated 73%, 78% and 68% fewer flights in the first post-lockdown year, respectively, for international, regional and domestic routes. These declines persisted into the second post-lockdown fiscal year with a decline of 71%, 64% and 41% in passengers carried in each of the respective geographic areas, with a lower decline in flights operated.

TABLE 6: Calculation of impact of the decline of passenger numbers on the tourism indicators.

Indicator	ACSA Data			
	A	B	C	D
	WTTC and WTO in Rands 2019 Calendar Year	Base Fiscal Year FY19/20	Decline 2020/2021 to Base Fiscal Year 2019/2020	Decline 2021/2022 to Base Fiscal Year 2019/2020
International Tourism Arrivals (World Bank) (i)	14 797 000			
Annual Passenger Traffic (ii)		12 550 740	888 757	3 715 675
Decline in Annual Passenger Traffic from Base Fiscal year (iii)			- 11 661 983	- 8 835 065
Percentage Decline in Annual Pax Traffic from Base Fiscal year (iv)			-93%	-70%
WTTC 2021 Annual Data				
Visitors Exports (a) in Billions	134.6			
Domestic Expenditure (b) in Billions	160			
Direct Contribution of Travel & Tourism (c = a + b) in Billions	294.6	294.60	- 273.74	- 207.38
Direct Contribution of Travel & Tourism per Tourist (Calc)	19 909	23 473	23 473	23 473
Total Contribution of Travel & Tourism to GDP in Billions	363.2	363.20	- 337.48	- 255.67
Total Contribution of Travel & Tourism to GDP per tourist (Calc)	24 546	28 939	28 939	28 939
Jobs	1 460 900	1 460 900	- 1 357 449	- 1 028 397
Jobs per Tourist (Calc)	10.13	8.59	8.59	8.59

FY, Fiscal year; ACSA, Airports Company of South Africa; GDP, Gross Domestic Product; WTTC, World Travel and Tourism Council.

TABLE 7: Annual percentage decline to 2019/20 (pre-COVID-19) base fiscal year.

Fiscal year	Passengers carried (%)	Flight movements (%)	The difference in pax & flight percentage of declines (%)	Average passenger loads per flight (%)
International				
FY20/21	-93	-73	-20	-73
FY21/22	-71	-41	-30	-51
Regional				
FY20/21	-93	-78	-15	-68
FY21/22	-64	-42	-22	-38
Domestic				
FY20/21	-72	-67	-5	-16
FY21/22	-41	-30	-11	-15

FY, Fiscal year.

The COVID-19 air travel restrictions also severely impacted tourism, travel revenue and employment. Therefore, the impacts of COVID-19 for the first (2020/21) and second (2021/22) fiscal years in comparison to the base fiscal year of 2019/20 (prior to lockdown) were calculated as:

- R273.74bn was lost in the direct contribution of travel and tourism in the first post lockdown fiscal year, and R207.38bn was lost in the second post lockdown fiscal year.
- R337.48bn was lost in total contribution of travel & tourism to GDP for the first post lockdown fiscal year and R255.67bn lost in the second post lockdown fiscal year.
- A loss of 1 357 449 jobs (employment) for the first post lockdown fiscal year and 1 028 397 jobs lost in the second post lockdown fiscal year.

Discussion of key findings

The decline in passengers exceeded the decrease in the number of flights operated, resulting in a decline in the average load of passengers carried per flight.

As a result, airlines have not successfully balanced capacity (flights operated) to the lower level of demand in South Africa. This implies a mismatch between direct operating costs and the revenue from lower demand levels. Apart from

the decline in demand, the average passenger loads per flight reduced compared to the pre-COVID-19 base fiscal year. This would, on average, reduce the airlines' load factors and exacerbate their financial plight in the subsequent recovery periods.

Strengths and limitations

The strength of this study is based on the following:

- This study determined the annual impact of COVID-19 based on the South African fiscal year (April to March):
 - This is a preferred time period as it more closely matches the initial lockdown period in South Africa. Other studies are based on calendar years, which matches reporting periods elsewhere but creates some contamination of data, some of which are otherwise excluded in pre-COVID-19 lockdown period and therefore included in post-COVID-19 lockdown periods.
 - The study also distinguishes between three geographic areas, namely international (intercontinental), African regional and South African domestic routes, while most studies focus on combined data for countries.
- The dimensions measured include:
 - Passengers carried, as a proxy for demand, compared to passenger seat kilometres (RPKs) used in other studies. This is a direct measurement of demand and is not impacted by the size of declining networks (distances flown) as in the case of RPKs.
 - Flights operated as a proxy for supply compared to ASKs) used in other studies. This is a direct measurement of output decisions by airlines and is not impacted by the size of declining networks (distances flown) as in the case of ASKs.
 - Other studies do not measure the average load of passengers carried per flight. However, it provides a quick metric to gauge the financial health of flight operations when compared to the size of aircraft usually deployed in each of the three geographic markets.

- The study also bridges the connection between air transport and tourism by calculating the impact of COVID-19 on the leading tourism indicators for South Africa. The impact was calculated compared to the tourism indicators published by the WTTC for the 2019 calendar year as the pre-COVID-19 basis. These include metrics for Direct Contribution of Travel and Tourism, Total Contribution to the GDP and the tourism impact on employment.

The study is limited by not extending into the demise, business rescue, relaunch or otherwise of the individual suppliers (airlines).

Although this study determines the overall annual impact of COVID-19, it does not identify the impact of the massive travel restrictions imposed by other States during the occurrence of the Omicron Variant of COVID-19 separately. This would be determined in a separate study.

Implications or recommendations

The study demonstrates the risk of airlines operating at excessive capacity upon resumption of flight operations in the post-COVID-19 recovery period with weak or insufficient demand.

The severity of the impact of the air travel restrictions to prevent the spread of COVID-19 should be taken into account by COVID-19 regulators, especially because of the measures taken by the aviation industry to prevent contagion and the lack of objective evidence that air travel contributed to the spread of the pandemic.

Conclusion

This study determined the severity of the impacts of COVID-19 on air transport and tourism. On restart and recovery of air services, airlines were not successfully balancing capacity (flights operated) to the lower level of demand for air travel, which resulted in a mismatch between higher production levels of capacity compared to softer demand. As a result, a severe decline in the average load of passengers carried per flight materialised. The impact on the direct contribution of tourism and the total contribution of travel and tourism to GDP and employment was severe. The following was lost in the first post-lockdown fiscal year and second post-lockdown fiscal year respectively:

- R273.74bn and R207.38bn in the direct contribution of travel and tourism.
- R337.48bn and R255.67bn in a total contribution of travel and tourism to GDP.
- 1 357 449 and 1 028 397 in jobs of total employment.

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Competing interests

The author has declared that no competing interest exists.

Author's contributions

J.V. was the sole author of this article.

Ethical considerations

Ethical clearance CODE 02 was granted by the CBE research ethics committee of the Department of Transport and Supply Chain Management of the University of Johannesburg from 15 February 2021 until 14 February 2023 (2021-TSCM002).

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Data availability

The data that support the findings of this study are openly available from:

Airports Company of South Africa (ACSA)

<https://www.airports.co.za/business/statistics/aircraft-and-passenger>

<https://www.airports.co.za/news/statistics>

International Civil Aviation Organization (ICAO)

https://www.icao.int/sustainability/Documents/COVID-19/ICAO_Coronavirus_Econ_Impact.pdf

<https://data.icao.int/COVID-19/>

<https://www.icao.int/safety/pages/covid-19-airport-status.aspx>

International Air Transport Association (IATA)

<https://airlines.iata.org/news/the-impact-of-covid-19-on-aviation>

<https://www.iata.org/monthly-traffic-statistics>

World Bank

<https://data.worldbank.org/indicator/IS.AIR.PSGR>

Disclaimer

The views and opinions expressed in this article are those of the author and do not necessarily reflect the official policy or position of any affiliated agency of the author.

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