# The Impact of the Coronavirus (COVID-19) Outbreak on Asia-Pacific Airways Stocks Prices: An Event-Study Approach

Musab Talha Akipinar[a], Keziban Seckin Codal[a]

[a]Management Information Systems Ankara Yildirim Beyazit University

Abstract

Coronavirus SARS-CoV-2 (formerly 2019-nCoV) reported the first deadly infectious disease of on 11 January 2020. First cases were detected and China has alerted the World Health Organization (WHO) of several flu-like cases in Wuhan, the capital of Central China's Hubei province with 11 million population. Patients have been quarantined and health authorities commenced work on tracing the source of the flu in last day of 2019. WHO has announced that 83,774 confirmed coronavirus cases (primarily in mainland China) and 2,867 deaths have been linked to the virus in 28 February 2020. This paper tries to describes the spread of the disease in Asia and discusses its impact on the airlines economy. Corona was an unexpected negative shock. The most significant negative effects were on the demand side, with national and international flights related to civil aviation severely affected in the short run. Fear and panic continuing once the outbreak was not under control. Treatment or vaccine was not found yet and the air transportation stock market has collapsed.

**Keywords**

Civil Aviation, Asia-Pacific Stock Markets, Coronavirus, Transportation Economy, Data Analytics

## 1. Introduction

Air transportation is a major industry in its own right and it also provides important inputs into wider economic, social and political processes. The aviation industry supports $2.7 trillion (3.5%) of the world's GDP thus; it has always been seen to have an inherently strategic role [1]. With 35 million flight departures per year, data is critically important for any planning decision made by airlines and airports [2]. To understand the structure of aviation sector the dominated international mega-hubs by Asia-Pacific, Europe, Middle East and Africa, North America and Latin America should be individually investigated. The most connected international hubs in the Asia Pacific are the most connected Mega hub in the world for low-cost carriers. According to IATA forecast to 2034, the routes to, from, and within Asia-Pacific will carry 42% of all world traffic. The network airlines in Asia have reacted to low-cost carriers (LLCs) in multiple ways, and competition increases to depend on the firm's internal resources and external environment [3]. Asia-Pacific comprises China and India, which is in developing markets in global aviation [4]. India's investment pipeline for airport upgrading and expansion is around USD 5 billion while China plans to invest USD 130 billion in airports which is supported the claim of the rise of both full service and low-cost airlines [5]. The hubs like USA, EU, UAE, Singapore, China mutually supports and benefits from their aviation sector and other sector such as robust industrial, trading, maritime and tourism ecosystem. Leading aviation hubs drive the hinterland economy [6]. However, some hubs in Asia-Pacific weakly deploy the hinterland economy, national carrier is weak, the tourism is inadequate, airport transfers are inefficient and no open skies agreement with other countries [5]. The literal meaning of this, Asia-Pacific region becomes the attractive aviation markets for other players due to the competitive strength of local carriers. The three main sub-regions of Asia that is Northeast Asia, Southeast Asia and South Pacific is attracted foreign capital withal soaring the air traffic. The aviation sector may confront the challenge that lead to inflict mass casualties, damage of economy or tourism and weakness of high safety and security standards [7]. This challenge encompasses terrorist attack, sabotage, cyber-attack, biological, chemical and radiological attack and other airborne threat. In addition, this sector is frequently affected by pandemic causes compare with other threat. The threat resulted with collateral damage for many sectors in the region. In the next future, the forecast of similar events could be done with the help of Artifial Intelligence Algorithms mostly by using high performance systems as described in [8, 9, 10]. The spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has taken on pandemic

*IVUS 2020: Information Society and University Studies, 23 April 2020, KTU Santaka Valley, Kaunas, Lithuania*

takpinar@ybu.edu.tr (M.T. Akipinar); kscodal@ybu.edu.tr (K.S. Codal)

proportions, affecting over 100 countries in a matter of weeks. In march 2020 Italy has rapidly become the country hit second hardest in the world by the coronavirus pandemic [11, 12]. In this study, the impact of COVID-19 epidemic on transportation economy is examined.

## 2. The Threats Facing The Aviation Industry

The first change was the deregulation of the airline industry in 1978. A fundamental change in airline services was occurred after the Civil Aeronautics Board eliminated restrictions on routes and fares. The second major change was the dramatic downturn in the US airline industry following the attacks of September 11, 2001. Although revenues had decreased at the major airlines before the 9/11 attacks, the subsequent changes in travel behavior resulted in a 10 to 20 percent decrease in national air transport capacity in just a matter of weeks. This dramatic change has highlighted the key interdependencies between the economy and the airline industry [13]. The airline industry lost about $1.1 billion because of the decline, which is 11 percent of the loss attributed directly to 9/11 [14]. There is a clear and accepted securitizing move in response to the attacks of 9/11, the creation of new rules. The 9/11 attacks were directly linked to airport security deficiencies, especially passenger screening, the securitization of civil aviation. The external threat of terrorists using aircraft as weapons of mass destruction resonated widely across the community, the political elite, the technocrats and the scientific community. In particular, the real-time broadcast of the second plane hitting the World Trade center, and the repetition of those images, gave aviation security a dominant position in the public imagination of homeland security [15]. Between 2004 and 2007, several other securitization and de-securitization steps took place, involving mainstream, political, technocratic and science communities [16]. Most airline crashes are characterized by "the suddenness and fatal consequences of the triggering event" [17], which demand from an airline an immediate response and high level of communication with its stakeholders. Exceptionally, the disappearance of flight Malaysian Airlines 370 (MH370) still remains one of the aviation's greatest mysteries. On March 8, 2014, a Boeing 777 with 239 people went missing on a flight between Kuala Lumpur and Beijing [18]. Malaysia Airlines was unable to provide consistent crisis communication, due to the lack of knowledge on the incident and confusing and contradictory reports voiced by numerous spokespeople. The disappearance of Malaysia Airlines' flight MH370 has been one of the most highly discussed and debated crises in last decade. The company's net loss rose by 59% to $138M in the January-to-March period, marking its fifth straight quarter of losses in 2014.

This loss caused significant financial problems for Malaysia Airlines [19]. The endemic of a disease demonstrates how a single person could spread disease via air travel and SARS was one of a number of outbreak global events in 2003 [20]. Air China Flight 112 was a scheduled international passenger flight on 15 March 2003 that carried a 72-year-old man infected with severe acute respiratory syndrome [21]. This man infected 20 passengers and two aircraft crew, resulting in the dissemination of SARS to northern Mongolia and southern Thailand [22]. When SARS hit, global passenger traffic fell by 18.5% in April 2003 compared to a year earlier, with a drop of almost 45% in Asia-Pacific [23]. The COVID-19 outbreak will continue to be centered in China and spread to other markets. Thus, it expects the impact on airlines will be severe for those particularly exposed to the China market. IATA estimates that global traffic will be reduced by 4.7% by the virus in 2019, which will more than offset the growth the industry group previously forecast and cause the first overall decline in demand since the Global Financial Crisis of 2008-2009 [17]. That scenario would translate into lost passenger revenues of $29.3 billion [24]. In an attempt to better understand COVID-19 external influences, this paper tries to examines some aspects of how the air transportation system has had an impact on the airlines stock market and transportation economy.

## 3. COVID-19 Outbreak

In December 2019, China informed the World Health Organization (WHO) that an infection by an unknown agent, labelled as COVID-19, was detected in Wuhan, the capital city of the Hubei province. And by the first week of this year, Chinese President Xi Jinping ordered his top officials to take all necessary measures to fight COVID-19, leading to the complete lockdown of Wuhan city and Hubei province. While the COVID-19 outbreak has currently infected almost 83,721 people and caused 2868 casualties (as of 28 February) within China, the number of confirmed infection and casualties outside of China has reached 4,361 and 67 respectively [23].

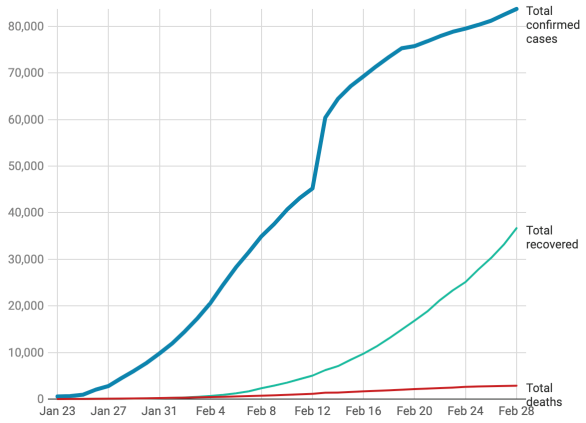


**Figure 1:** Coronavirus: Global Confirmed Coronavirus Cases, Deaths and Recovered Numbers

## 4. Methodology

The COVID-19 virus has been found in 30 countries, and growth of COVID-19 cases has kept on rising across the world. In the Fig. 1, global confirmed coronavirus cases, deaths and number of recovered are seen.

The pandemic' social and economic effects may bring to the shutdown in Asia-Pacific airlines to prevent the spread of coronavirus in homeland and overseas. The International Air Transport Association has published an initial assessment of the impact of COVID-19 which estimates total global lost airline revenue could be as high as $29.3 billion, with a potential 13% full-year loss of passenger demand and $27.8 billion revenue loss in 2020 for carriers in the Asia-Pacific region [25]. Airlines registered in China would be most affected with $12.8 billion lost in the China domestic market [26]. China is currently the world's second-largest civil aviation market, behind the United States, hauling in $151 billion in revenue last year, according to Xinhua. Major Chinese carriers Air China (AIRYY), China Southern (ZNH) and China Eastern (CEA) have grown five to six-fold compared to 2003 (Frost, 2020). It is shown that China Air which is the flag carrier and one of the major airlines of the China based on last five-year January flight traffics. Table 1 display the information of Revenue Passenger-Kilometers (RPK), Revenue Tons - Kilometers (RTK) and Revenue Freight Tons - Kilometers (RFTK).

Air China Flight traffic, which consists domestic and international flight, dwindled unusually on the basis of the previous year data on RTKs, RPKs, RFTKs and number of passengers carried. Besides, freight transportation via air cargo that has always been an integral component of economy drastically reduced. Table 2 shows that the percentage of change in flight traffic based on year over year data. China's three largest airlines reported declines in January passenger traffic due to the coronavirus outbreak, with the shortfalls likely to deepen this month through the epidemic continues to disrupt travel for millions of people. Air China Ltd's numbers slipped 2.9% from a year earlier, while China Southern Airlines Co's fell 4.6% and China Eastern Airlines Corp.'s dropped 5.4%, according to statements filed to Hong Kong's stock exchange [2].

In this study, the loss on decreasing stock-exchange value of some of the largest Asia-Pacific Airlines has been monitored during the spread of the coronavirus COVID-19. It is assumed that these sample; Singapore Stock, Air China Ltd (0753), China Eastern Airlines Corp Ltd (0670), China Southern Airlines Co Ltd (1055), Hainan Airlines Co Ltd B (900945), Singapore Airlines Ltd (SIAL), Air Asia Bhd (AIRA), Garuda Indonesia Persero Tbk (GIAA), ANA Holdings Inc (9202), Japan Airlines Co Ltd (9201) is represented the Asia-Pacific region. The starting point is determined as a December 31 that is first cases detected China and the World Health Organization (WHO) was alerted for several flu-like cases in Wuhan.

For this reason, all active stock days from January 1st to the present day have been analyzed and illustrated. Table 3 introduces the Asia- Pacific Airlines stock exchange securities for round forty days. Airline stocks are taking a hit in premarket trading Monday, amid growing worries about how the global spread of COVID-19 will impact travel. The largest drop in history occurred on February 2020 due panic over the 2019-2020 coronavirus outbreak.

Garuda Indonesia posted the biggest loss in the most recent month, it will continue to lost money over time. The stock exchange securities of Air Asia, China Eastern Airlines, China Southern Airlines, Air China, Japan Airlines, ANA Holdings, Hainan Airlines, and Singapore Airlines sharply dropped.

The Fig. 2 shows below the 9 biggest Asia-Pacific Airways Stocks Prices for the last 5 years in January-February. It is clearly shown that Asia Pacific airlines, which have always been profit taking in the last 4 years with 2 exceptions, faced dramatic declines in 2020.

Especially, Garuda Indonesia and Air Asia companies really affected Coronavirus (COVID-19) outbreak in Asia.

## 5. Conclusion

Coronavirus fears drive stocks down especially in Asia markets. The virus, which has now spread to 47 coun-

**Table 1**
Air China Flights Traffic in last 5 years

| Traffic | Jan 2020 | Jan 2019 | Jan 2018 | Jan 2017 | Jan 2016 |
|---|---|---|---|---|---|
| **1. RTKs (in millions)** | 1999.2 | 2066.235 | 2208.4 | 2031.3 | 1893.1 |
| **Domestic** | 1098 | 1104.6 | 1077.5 | 1029 | 936.7 |
| **International** | 841.7 | 884.60 | 1064.30 | 938.40 | 890.00 |
| **Regional** | 59.5 | 77.10 | 66.70 | 63.90 | 66.40 |
| **2. RPKs (in millions)** | 18880 | 18930.60 | 17468.30 | 16803.90 | 15149.60 |
| **Domestic** | 11176.6 | 10960.50 | 10456.50 | 10186.20 | 8994.10 |
| **International** | 7106 | 7216.30 | 6395.00 | 6012.70 | 5537.10 |
| **Regional** | 597.3 | 753.70 | 616.80 | 605.00 | 618.40 |
| **3. RFTKs (in millions)** | 351 | 404.20 | 662.60 | 556.60 | 554.20 |
| **Domestic** | 123.8 | 144.00 | 154.10 | 138.60 | 144.30 |
| **International** | 224.3 | 252.70 | 499.10 | 409.70 | 400.20 |
| **Regional** | 3 | 43466.00 | 9.05 | 8.03 | 9.07 |
| **4. Number of Passengers carried (in thousands)** | 9188.8 | 9156.50 | 8590.30 | 8411.20 | 7523.70 |
| **Domestic** | 7334 | 7243.80 | 6980.80 | 6838.50 | 6038.20 |
| **International** | 1471.2 | 1441.10 | 1218.80 | 1191.70 | 1100.90 |
| **Regional** | 383.6 | 471.60 | 390.70 | 381.00 | 384.70 |
| **5. Total Cargo Tons Carried** | 110836.4 | 128179.40 | 165130.20 | 145413.20 | 148683.70 |
| **Domestic** | 76644.4 | 88339.60 | 95915.20 | 89029.40 | 92720.40 |
| **International** | 32022.8 | 35245.60 | 62275.40 | 50337.10 | 49164.80 |
| **Regional** | 2169.2 | 4594.10 | 6939.50 | 6046.60 | 6798.50 |
| **Load Factor** | Jan 2020 | Jan 2019 | Jan 2018 | Jan 2017 | Jan 2016 |
| **1. Passenger Load Factor (%)** | 76.6 | 79.90 | 79.00 | 81.70 | 79.50 |
| **Domestic** | 76.3 | 79.60 | 80.30 | 82.30 | 80.70 |
| **International** | 77.5 | 80.10 | 76.90 | 81.30 | 78.30 |
| **Regional** | 70.5 | 81.90 | 79.30 | 76.20 | 74.00 |
| **2. Cargo Load Factor (%)** | 35.3 | 40.60 | 55.20 | 49.80 | 52.60 |
| **Domestic** | 29.7 | 35.20 | 40.20 | 37.50 | 51.40 |
| **International** | 40 | 45.10 | 62.90 | 56.60 | 53.50 |
| **Regional** | 16.3 | 29.60 | 40.00 | 33.00 | 36.90 |
| **3, Overall Load Factor (%)** | 62.1 | 66.00 | 69.10 | 68.30 | 68.30 |
| **Domestic** | 63.3 | 67.10 | 69.30 | 69.40 | 73.00 |
| **International** | 60.6 | 64.40 | 68.90 | 67.50 | 64.20 |
| **Regional** | 59.9 | 68.70 | 68.70 | 63.90 | 63.30 |

tries (28 February), has put pressure on businesses and supply chains around the world. Because of the coronavirus, Asian markets closed sharply lower and European stocks tumbled at the start of trading.

The widening scope of the health crisis threatens to overwhelm global supply chains, especially in China, the world's second-largest economy after the United States. In addition, the outbreak could crush consumer demand, as people limit travel or stay home even without a government order to do so. Due to the coronavirus outbreak consumers change their behavior so they stop flying, they don't take the vacation, they cancel even the business trip. As a consequence, airlines particularly Asian airways flight and their load factor fall down as it mentioned above now therefore their stock prices collapsed [27].

Not only Asian airlines but also Among the more-active carriers stock price dropped such as shares of United Airlines (Holdings Inc. UAL) -26%, Delta Air (Lines Inc. DAL) -21%, American Airlines (Group Inc. AAL) -31%, Southwest Airlines (Co. LUV) -15%, Deutsche Lufthansa (AG LHAG) -29%, Air France KLM (SA AIRF) -30%.

Initially, many businesses, investors, and companies expected the coronavirus outbreak to be similar to the 2003 eruption of SARS, if perhaps a bit more painful. However now that the virus has spread to the Middle East (Especially Iran) and Europe (closing big chunks of Italy's northern economic heartland and even spreading into Spain) the worry is that what began as a contained outbreak could turn into a pandemic, as the World Health Organization warned in February 2020. And fi-

**Table 2**
Air China Flights Traffic % change in last 5 years

| Traffic% | change vs Jan 2019 | % change vs Jan 2018 | % change vs Jan 2017 | % change vs Jan 2016 | % change vs Jan 2015 |
|---|---|---|---|---|---|
| **1. RTKs** | -5.60% | 7.80% | 8.07% | 7.10% | 14.08% |
| **Domestic** | -4.80% | 7.10% | 4.07% | 9.08% | 6.08% |
| **International** | -5.10% | 7.90% | 13.04% | 5.03% | 24.03% |
| **Regional** | -22.80% | 18.00% | 4.01% | -3.80% | 17.03% |
| **2. RPKs** | -2.90% | 10.90% | 4.00% | 10.09% | 18.06% |
| **Domestic** | -2.40% | 8.90% | 2.07% | 13.02% | 6.08% |
| **International** | -1.90% | 13.00% | 6.04% | 8.06% | 43.70% |
| **Regional** | -20.70% | 20.80% | 1.07% | -2.20% | 21.09% |
| **3. RFTKs** | -14.20% | -0.30% | 19.00% | 0.30% | 7.07% |
| **Domestic** | -16.90% | 0.90% | 11.02% | -4.00% | 10.04% |
| **International** | -11.30% | -1.00% | 21.08% | 2.02% | 7.01% |
| **Regional** | -60.30% | -0.60% | 13.01% | -14.40% | -3.70% |
| **4. Passengers carried** | -4.10% | 11.30% | 2.01% | 11.08% | 11.08% |
| **Domestic** | -4.20% | 9.40% | 2.01% | 13.02% | 6.09% |
| **International** | 0.90% | 18.70% | 2.03% | 8.02% | 43.30% |
| **Regional** | -18.70% | 20.70% | 2.03% | -0.90% | 21.06% |
| **5. Total Cargo tons carried** | -15.50% | 2.00% | 13.06% | -2.40% | 8.04% |
| **Domestic** | -16.10% | 1.10% | 7.07% | -4.20% | 9.05% |
| **International** | -9.20% | 4.90% | 23.07% | 2.02% | 7.07% |
| **Regional** | -52.80% | -2.90% | 14.08% | -11.10% | -0.90% |

**Table 3**
Stock Change Securities for Airlines in Asia-Pacific Region in 2020 January/February

| Airlines | Stock Change between 02.01.2020-27.02.2020 |
|---|---|
| **Air China** | -19.94% |
| **Air Asia** | -37.54% |
| **ANA Holdings** | -16.91% |
| **China Eastern Airlines** | -20.15% |
| **China Southern Airlines** | -19.90% |
| **Garuda Indonesia** | -54.39% |
| **Hainan Airlines** | -12.17% |
| **Japan Airlines** | -18.00% |
| **Singapore Airlines** | -7.17% |

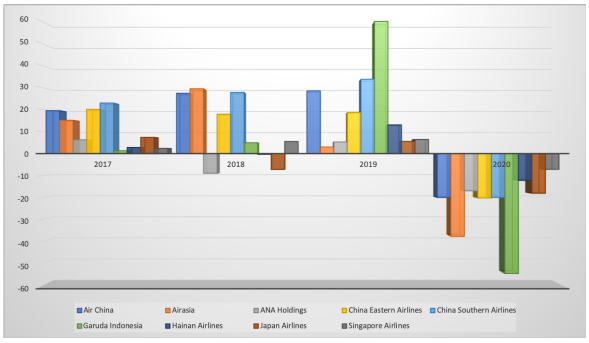


**Figure 2:** Stock change securities for airlines in asia-pacific region in 2020 january/february

nally, stock markets are starting to recognize the uncertainty.

# References


[1] A. C., IATA, I. ICCAIA, Aviation benefits report, 19 (2019).

[2] W. Davies, China's biggest airlines report early hit from virus outbreak, https://www.bloomberg.com/news/articles/2020-02-17/chinese-airlines-begin-reporting-impact-from-coronavirus (2020).

[3] M. B. Salter, Securitization and desecuritization: a dramaturgical analysis of the canadian air transport security authority., Journal of international relations and development 11 (2008) 321–349.

[4] K. Christidis, M. Devetsikiotis, Blockchains and smart contracts for the internet of things, Ieee Access (2016) 2292–2303.

[5] P. K. Agrawal, Opportunities and financing outlook for aviation sector. new delhi : Yes bank

(2019).

[6] M. A. Coogan, Ground access to major airports by public transportation, Transportation Research Board 4 (2008).

[7] J. C. Henderson, Communicating in a crisis: flight sq 006, Tourism Management 24 (2003) 279–287.

[8] S. Spanò, G. Cardarilli, L. Di Nunzio, R. Fazzolari, D. Giardino, M. Matta, A. Nannarelli, M. Re, An efficient hardware implementation of reinforcement learning: The q-learning algorithm, IEEE Access 7 (2019) 186340–186351. doi:10.1109/ACCESS.2019.2961174.

[9] F. Beritelli, G. Capizzi, G. Lo Sciuto, C. Napoli, F. Scaglione, Rainfall estimation based on the intensity of the received signal in a lte/4g mobile terminal by using a probabilistic neural network, IEEE Access 6 (2018) 30865–30873.

[10] F. Beritelli, G. Capizzi, G. Lo Sciuto, C. Napoli, M. Woźniak, A novel training method to preserve generalization of rbpnn classifiers applied to ecg signals diagnosis, Neural Networks 108 (2018) 331–338.

[11] M. Ciotti, S. Angeletti, M. Minieri, M. Giovannetti, D. Benvenuto, S. Pascarella, C. Sagnelli, M. Bianchi, S. Bernardini, M. Ciccozzi, Covid-19 outbreak: an overview, Chemotherapy 64 (2019) 215–223.

[12] S. I. Illari, S. Russo, R. Avanzato, C. Napoli, A cloud-oriented architecture for the remote assessmentand follow-up of hospitalized patients, in: Symposium for Young Scientists in Technology, Engineering and Mathematics (SYSTEM), volume 2694 of *CEUR Workshop Proceedings*, 2020, pp. 29–35.

[13] G. Topham, Malaysia airlines 'technically bankrupt' as new chief seeks to shed 6,000 jobs, https://www.theguardian.com/business/2015/jun/01/malaysia-airlines-technically-bankrupt-christoph-mueller-cuts-boss (2020).

[14] G. Blalock, V. Kadiyali, D. Simon, The impact of post-9/11 airport security measures on the demand for air travel, The Journal of Law and Economics 50 (2007) 731–55.

[15] R. Tam, R. J. Hansman, An analysis of the dynamics of the us commercial air transportation system (2003).

[16] R. Tam, R. J. Hansman, Impact of air transportation on regional economic and social connectivity in the united states (2002).

[17] M. Moodie, The first overall decline in demand since the global financial crisis of 2008-09, IATA projects a very tough year for airlines (2020).

[18] Malaysia airlines losses worsen on mh370 disappearance, https://www.bbc.com/news/business-27435455 (2020).

[19] J. Bowen, Airline hubs in southeast asia: national economic development and nodal accessibility, Journal of Transport Geography 8 (2000) 25–41.

[20] Update 95 - sars: Chronology of a serial killer, https://www.who.int/csr/don/2003 07 04/en (2015).

[21] S. J. Olsen, H. L. Chang, T. Cheung, A. Tang, T. L. Fisk, S. Ooi, K. H. Hsu, at all, Transmission of the severe acute respiratory syndrome on aircraft, New England Journal of Medicine 349 (2003) 2416–2422.

[22] S. Pham, Sars cost global airlines $7 billion. the coronavirus outbreak will likely be much worse, https://edition.cnn.com/2020/ 02/05/business/ coronavirus-airline-cost/index.html (2020).

[23] L. F. S. Baker, The coronavirus death toll has surpassed 2,760, with more than 81,000 infected. here's everything we know about the outbreak, https://www.businessinsider.com/china-virus-everything-we-know-deadly-2019-ncov-wuhan-spread-2020-1 (2020).

[24] S. Folinas, T. Metaxas, Tourism: The great patient of coronavirus covid-2019 (2020).

[25] M. Garcia, Coronavirus could cost airlines $30 billion, but that's not the whole story for aviation, https://www.forbes.com/sites/marisagarcia/2020/02/21/iata-forecasts-potential-lost-revenue-of-293-billion-from-covid-19-but-thats-not-the-whole-story/#2b1c8d0d1464 (2020).

[26] N. Frost, Coronavirus has struck at the absolute worst time for china's tourism sector, https://qz.com/1790775/coronavirus-has-struck-at-the-worst-time-for-chinese-tourism/ (2020).

[27] J. Pearson, D. Pitfield, T. Ryley, Intangible resources of competitive advantage: Analysis of 49 asian airlines across three business models, Journal of Air Transport Management 47 (2015) 179–189.