

Repositório ISCTE-IUL

Deposited in *Repositório ISCTE-IUL*:

2021-03-05

Deposited version:

Accepted Version

Peer-review status of attached file:

Peer-reviewed

Citation for published item:

Piccinelli, S., Moro, S. & Rita, P. (2021). Air-travelers' concerns emerging from online comments during the COVID-19 outbreak. *Tourism Management*. N/A

Further information on publisher's website:

[10.1016/j.tourman.2021.104313](https://doi.org/10.1016/j.tourman.2021.104313)

Publisher's copyright statement:

This is the peer reviewed version of the following article: Piccinelli, S., Moro, S. & Rita, P. (2021). Air-travelers' concerns emerging from online comments during the COVID-19 outbreak. *Tourism Management*. N/A, which has been published in final form at <https://dx.doi.org/10.1016/j.tourman.2021.104313>. This article may be used for non-commercial purposes in accordance with the Publisher's Terms and Conditions for self-archiving.

Use policy

Creative Commons CC BY 4.0

The full-text may be used and/or reproduced, and given to third parties in any format or medium, without prior permission or charge, for personal research or study, educational, or not-for-profit purposes provided that:

- a full bibliographic reference is made to the original source
- a link is made to the metadata record in the Repository
- the full-text is not changed in any way

The full-text must not be sold in any format or medium without the formal permission of the copyright holders.

Air-travelers' concerns emerging from online comments during the COVID-19 outbreak

Abstract

This research aims to assess air travelers' concerns affected by the Coronavirus pandemic, expressed in the comments they wrote online. A sample of 639 comments written on the Italian National Consumer Union website and related to the airline industry was assessed through an automated sentiment analysis in this study. The achieved results showed that travelers' concerns were directed mainly towards compensations, cancellations, and COVID-19 and at the same time, they had mixed and unpredictable feelings. This element suggests that consumers may have understood that airline companies are facing unsustainable cash-flow and revenue situations. Moreover, all our hypotheses, grounded on existing literature, were refuted. Accordingly, we argue that the actual context prevents assessments based on previous assumptions, and studies related to the impact of COVID-19 need to be conducted anew.

Keywords: COVID-19; coronavirus; pandemic; online comments; air-travelers; Italy.

1. Introduction

As a key element in the travel and tourism industry, air transport contributes largely to economic development (Moro et al., 2020). As the COVID-19 epidemic disease became a worldwide pandemic, the vital airline industry suddenly came to a halt. As a result, prospective air travelers, apprehensive with the absence of flights, started writing their concerns in online comments. This study aims to analyze such comments in order to unveil the relation between the evolution of the pandemic and travelers' concerns.

During the first quarter of 2020, the disease had already caught the global attention of media, health organizations, and researchers, and the theme had been analyzed under multiple facets (e.g., Velavan & Meyer, 2020). Nonetheless, little is known about how related prospective customers perceived the virus outbreak's impact on the airline industry. Indeed, the purpose of this investigation is to reduce such research gap through a sentiment analysis of online comments related to airline companies. Understanding customers' point of view and how the main concerns evolved during the pandemic would help air carriers cope with the crisis more effectively and enrich their contingency plans.

1 In this study, an automated textual analysis was run on a sample of 639 comments related
2 to the airline industry, written by consumers on the Italian National Consumer Union website.
3 The source was chosen because Italy is among the countries most severely affected by the
4 worldwide pandemic. Sentiment analysis was adopted to unveil affected travelers' sentiments
5 towards a set of relevant categories grounded on existing literature. While most previous
6 studies adopted sentiment analysis for analyzing datasets composed by after-service reviews
7 (e.g., Brochado et al., 2019; Calheiros et al., 2017), this research is innovative by focusing on
8 the pre-service stage, where consumers are uncertain whether or not they will actually be able
9 to travel.

10 The remainder of this paper is structured as follows: section 2 presents a literature review
11 on the subjects relevant to this manuscript and proposes research hypotheses. Section 3
12 describes the dataset and methodology. Section 4 showcases the results and reviews their main
13 implications. Finally, section 5 summarizes findings, addresses limitations, and proposes new
14 paths for future research.

15 **2. Literature review and research hypotheses**

16 The sentiment analysis run on comments enables to determine their polarity (positive or
17 negative) as well as the intensity of consumers' perceptions (with zero being a neutral
18 sentiment comment and a different numeric value reflecting that intensity for both polarities,
19 negative and positive) (Pang & Lee, 2008). Therefore, sentiment analysis has been extensively
20 applied within tourism and hospitality literature to understand tourists' perceptions from online
21 comments (Guerreiro & Rita, 2020; Moro et al., 2019). After recognizing its importance and
22 extensive development in existing literature, Tiwari et al. (2019) ran a sentiment analysis on a
23 Twitter dataset related to the airline industry. They highlighted that passengers had negative
24 comments regarding delayed and canceled flights, booking issues, and customer service.
25 Indeed, as the increase of COVID-19 cases and consequent travel bans that led to a reduction
26 of flights (Chinazzi et al., 2020) prevented prospective travelers from actually traveling, the
27 concerns regarding boarding and on-time departures were less, while the concerns toward
28 cancelation issues increased. Thus, we have proposed the following hypotheses:

29 (H1) The sentiment score regarding boarding issues and on-time performance is neutral
30 during the pandemic.

31 (H2) The sentiment towards cancellations and related compensations and interaction
32 with the customer service department decreased (i.e., became more negative) as
33 COVID-19 spread worldwide.

1 Vogiatzis et al. (2021) stressed the importance of assessing risks and having a
2 contingency plan to ensure air travel business sustainability in the face of causes of force
3 majeure that may affect air flights, such as weather conditions. Furthermore, Liau & Tan
4 (2014), while studying customers' comments towards low-cost carriers (LCC) through text
5 mining, pinpointed that LCCs' customers negatively perceive flight cancellations, despite the
6 attempt by companies to please them with monetary compensation. However, in this peculiar
7 context, the numerous cancellations led to an unsustainable cash-flow and revenue situation
8 for the transport and travel sectors (European Commission, 2020). Airlines have thus been
9 struggling to issue immediate funds due to the lack of financial resources, as operational costs
10 keep accumulating without any return on investment. Some countries (e.g., Australia) and
11 companies (e.g., Singapore Airlines), obliged to issue a full refund or, at consumers' discretion,
12 to issue a voucher for future use, have offered their prospective travelers bonus advantages
13 and long voucher expiration dates to attract consumers to choose the voucher over the refund
14 option (Ramsay, 2020). However, in other countries such as Italy, a special exemption of full
15 refunds was allowed by governmental authorities due to the extreme and unexpected nature of
16 the pandemic crisis (Ramsay, 2020). As a matter of fact, to support operational costs by
17 preserving their liquidity, the carriers were offering primarily vouchers instead of refunds
18 (Suau-Sanchez et al., 2020). This practice seems to be not in line with customers' expectations
19 since they do not know when it will be possible to fly and are afraid to do so (Riefa, 2020).
20 Governments became trapped between the need to comply with consumers' justified claims
21 and the need to support airlines' business continuity to avoid bankruptcy. Such a dichotomy
22 led to different reimbursement solutions by European Union countries, despite the
23 recommendations issued by the European Commission (Grigorieff & Erotokritou, 2020).
24 Consequently, the following hypothesis was also assessed:

25 (H3) The management of cancellations by the carrier, specifically in this emergency
26 scenario when companies need to preserve liquidity, has caused a constant negative
27 sentiment score towards compensations and cancellations.

28 Lastly, Chen et al. (2020) recently investigated Chinese news coverage related to
29 COVID-19 and tourism by developing an automated content analysis of 499 articles. Nine
30 main themes emerged and, among them, the 'people's sentiment' reflected that the disease
31 affected public emotions and that at the beginning, anxiety and panic might have risen, most
32 likely among tourists stuck at their destination. Nevertheless, with the hospitality staff's
33 assistance aimed to bolster guests' confidence by setting a 'home environment,' the pressure
34 was released. Moreover, Mao et al. (2010), while examining the post-SARS recovery of

1 inbound arrivals in Taiwan, pinpointed that out of three countries of origin that composed the
2 dataset (Hong Kong, US, and Japan), the number of tourists arriving from two of them (Hong
3 Kong and the US) bounced back to the pre-SARS level right after the removal of the SARS
4 alert in Taiwan.

5 As the confinement measures implemented to avoid healthcare systems from
6 collapsing (Grasselli et al., 2020) resulted in turning the exponential increase of new cases into
7 more controllable numbers (i.e., by reducing the number of new cases versus recoveries), it
8 was more likely that prospective travelers became more positive toward the disease risk (Chen
9 et al., 2020). Also, as Mao et al. (2010) confirmed in the SARS 2003 context, a reduction of
10 infected cases led governmental authorities to analyze the removal of travel bans, which
11 increased travelers' predisposition to think about traveling again, mitigating the negative effect
12 of the outbreak. Thus, we proposed that:

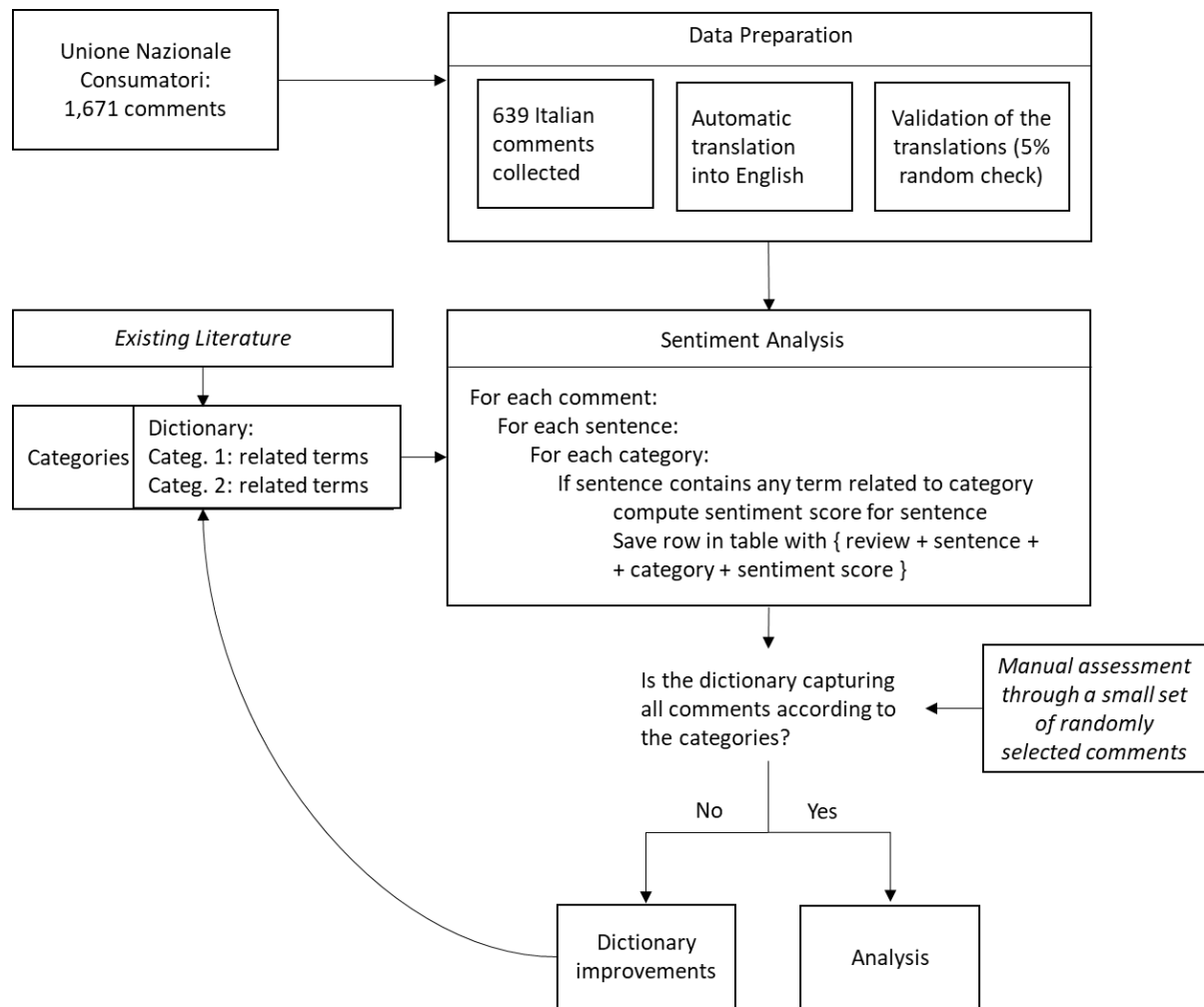
13 (H4) The decrease of new cases and fatalities leads to an increase in the sentiment score
14 (i.e., more positive sentiment) towards the disease itself.

15
16

17 **3. Methodology**

18 The source of the online comments analyzed in the current research was the *Unione*
19 *Nazionale Consumatori* (National Consumer Union) website
20 (<https://www.consumatori.it/bacheca-reclami/>) (UNC, 2020a). Founded in 1955, the UNC is
21 the oldest consumer association in Italy. The UNC is a member of the National Council of
22 Consumers and Users (CNCU), set up within the Italian Ministry of Economic Development,
23 and it is a social promotion association approved by the Italian Ministry of Labor and Social
24 Policy. Moreover, the UNC is officially notified to the European Commission as a Consumer
25 Association in Italy (UNC, 2020b).

26 The whole approach undertaken for the experiments is summarized in Figure 1. All the
27 experiments were conducted using the R statistical tool, which is an open-source software for
28 data analysis supported by a broad community of contributors for packages to perform
29 numerous tasks, including sentiment analysis.



1
2

3 Figure 1 – Proposed approach

4

5 Consumers can write comments about every issue they encounter with a product or a
 6 service with an entity On the National Consumer Union's website. While submitting a
 7 comment, firstly, the macro category (e.g., Car Rental, E-Commerce, Tourism & Travel)
 8 closer to the issue (if none of the macro-categories work, there is a 'generic' one) which needs
 9 to be chosen and then the related company. When the company is not listed, there is the
 10 possibility of selecting an 'other' option. The consumer fills in a form with their written
 11 comment and can decide whether it is published online (making it publicly available) or not.

12 We only considered the 'Tourism and Travel' macro-category for our analysis. The
 13 related company's list shows the following six sub-categories: 'Alitalia,' 'Ryanair,' 'Trenitalia,'
 14 'Italo,' 'Alpitour,' and 'other for tourism and travel.' Between January 1 and April 30, 2020,
 15 1,671 comments were published under the 'Tourism and Travel' macro category. Out of them,
 16 all the comments that were classified under the sub-categories 'Alitalia' and 'Ryanair' (both

1 airlines) were selected. Additionally, from the comments classified under the remaining sub-
2 categories, those that were related to the airline industry were also selected.

3 Moreover, duplicates were removed, and also all comments which mentioned that the
4 purchase was made through a third party (e.g., Travel Agency, Online Travel Agency) were
5 excluded. Considering that the intermediary is the airline company's direct customer instead
6 of the final customer, consumers should address the third party for potential claims. This facet
7 is aligned with our goal of understanding travelers' perceptions about airlines and not towards
8 travel agencies. Although affected by the pandemic too, these belong to a different segment
9 and require a different study. The achieved result was a pruned set of 639 comments.

10 Most of the comments were written in Italian. Those were automatically translated into
11 English using the Yandex translate API through a specifically developed R script using the
12 "RYandexTranslate" package. The translation was validated with a random check of 5% of the
13 comments by one of the authors whose native language is Italian and who writes fluently in
14 English.

15 The approach detailed in Figure 1 aimed at discovering and classifying sentences
16 according to the consumer's feelings in which (s)he denotes specific aspects deemed as
17 important in existing literature (Table 1). It should be noted that the references highlighted in
18 Table 1 are related to studies that analyzed the corresponding categories in the airline industry,
19 which are the focus of our approach, regardless of the adopted methodologies or data sources.
20 The approach is cyclic to allow incremental improvement of the underlying expressions that
21 denote each category and that were not found in the previous iteration. First, a set of categories
22 and related terms was developed based on existing literature. Then, the sentiment analysis
23 algorithm detailed in Figure 1 was executed. It consisted of searching if a sentence contained
24 any of the expressions related to each category in every comment and every sentence in each
25 comment. If a match was found, then the sentiment score was computed using the "sentimentr"
26 package. The sentiment score is a numeric variable, with the two polarities denoting negative
27 or positive sentiments, respectively. The absolute numeric value denotes the sentiment
28 intensity (with zero meaning a neutral sentiment and higher absolute values implying stronger
29 sentiments) (Pang & Lee, 2008). Such a procedure enabled capturing the sentiments perceived
30 by prospective travelers about each category as the epidemic turned into a pandemic and spread
31 globally and, specifically, to Italy during the analyzed period. The iterations through the cycle
32 were needed since the common language used by travelers in online posts was not fully
33 captured in the initial dictionary matching terms to each category. In each iteration, a small set
34 of randomly selected comments was evaluated to assure if those contained any word that was

1 not captured as belonging to a given category (e.g., 'toll-number' was not initially captured
 2 within the 'Customer Service' category; it was included later after the described tuning
 3 process). Consequently, the dictionary was enlarged to the version shown in Table 1, and the
 4 analysis was re-run in each new iteration of the cycle.

5

Reference	Categories	Examples of terms related to the category*
(Brochado et al., 2019; Bhadra, 2009; Gardner Jr, 2004)	Boarding Issue	boarding denied, overbooking, check-in, mishandled luggage
	On-time performance	delay, landed late, departed later
	Cancellation	cancellation, re-protection, reallocation, hijacking customer service, chat, help desk, toll-free number
	Customer Service	refund, compensation, voucher
(Abd-Alrazaq et al., 2020)	COVID-19	coronavirus, pandemic, quarantine, decree

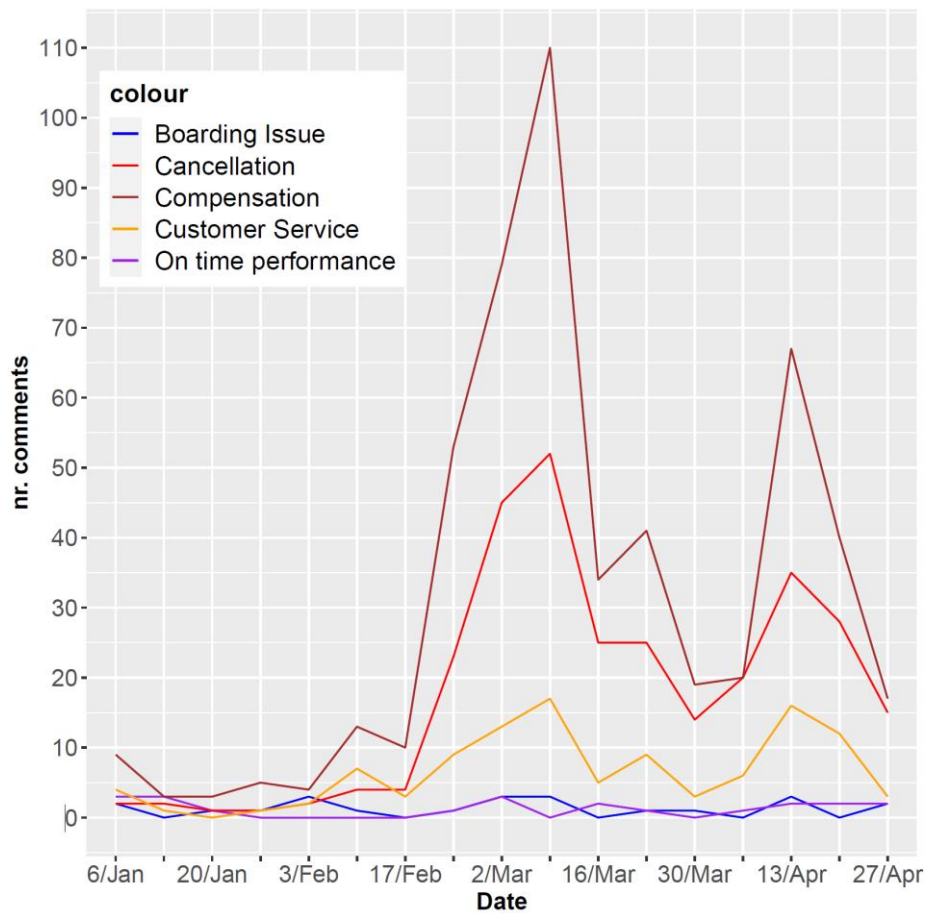
6 *All terms are in lower case and separated by commas

7 Table 1 – Dictionary for airline industry

8

9 **4. Results and Discussions**

10 Figure 2 shows the main reasons that led customers to write comments online. By
 11 assessing the volume of comments during the peak of the pandemic in Italy, it is possible to
 12 highlight that compensation and cancellation were the prevalent motives of concern.



1

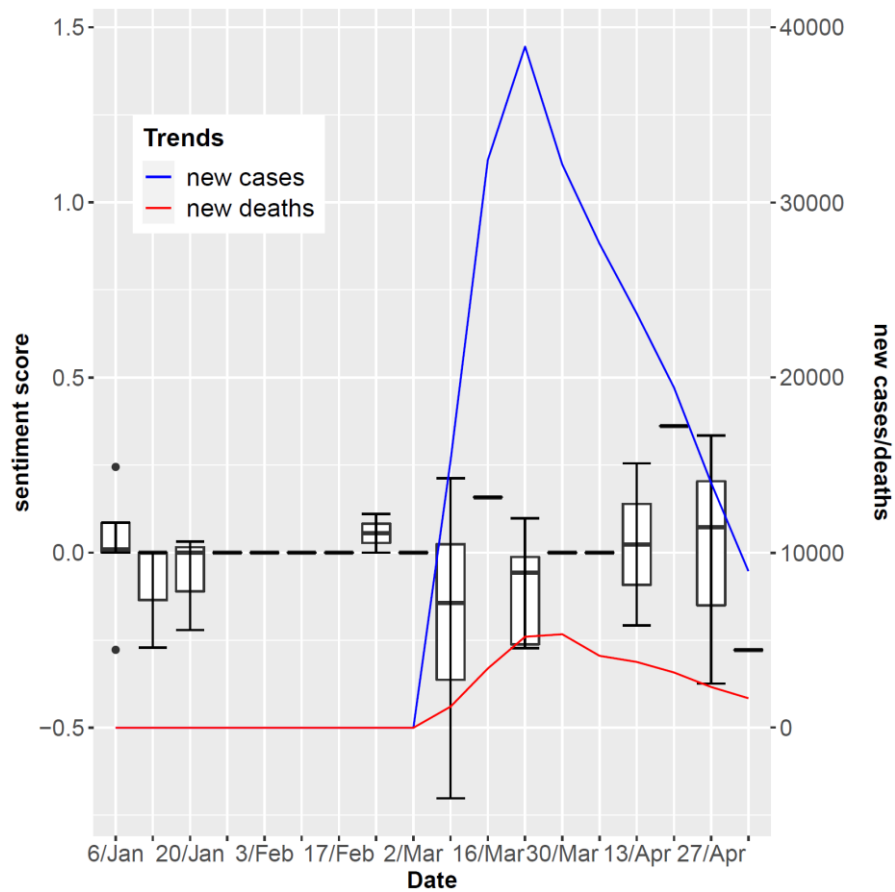
2 Figure 2 – Distribution of comments per each category.

3 The results of the sentiment analysis are presented through box-and-whiskers diagrams
 4 (also known as box plots). The x-axis represents the weeks in each figure, while the left y-axis
 5 and the right y-axis show the sentiment scores and the number of new and death COVID-19
 6 cases reported in Italy, respectively (European Center for Disease and Control, 2020). The data
 7 is aggregated per week, and each box-and-whisker plot shows the weekly sentiment scores'
 8 five summary-statistics (minimum, maximum, median, lower quartile, and upper quartile). We
 9 hypothesized there was a relation between the number of new cases and deaths in the country
 10 and each of the six categories defined in Table 1. To assess it, we adopted a linear regression
 11 model. However, as the number of comments mentioning each category was small (Figure 2),
 12 we adopted the bootstrapping resampling method, which is considered a viable option to
 13 analyze moderate sample sizes (Shrout & Bolger, 2002). We adopted 5000 resampling
 14 processes, a number also adopted by Volgger and Pechlaner (2014), who highlighted that it is
 15 considered sufficient in existing statistics literature.

16 With the reduction of flights, one might expect a null score towards both 'on-time
 17 performance' of flights and issues related to boarding, since most commercial flights were not
 18 operating. Notwithstanding, it can be noticed from Figure 3 that from the beginning of the

1 outbreak in Italy (beginning of March), most of the expressed sentiments were negative toward
2 'on-time performance.' Only after April did the sentiment became neutral and even positive as
3 the weekly new cases plummeted. Table 2 shows there is no support for a relation between
4 cases/deaths and the sentiment score towards boarding issues as the COVID-19 numbers
5 increased over the analyzed period. As for boarding issues, Figure 4 highlights that there was
6 an increase in the sentiment generated for boarding when the outbreak hit Italy exponentially
7 hard. It can be hypothesized that this resulted from most flights to, from, and within Italy being
8 grounded from March 10 onwards. Thus, as observed in Figure 4, despite the pandemic
9 striking hard since the end of February, the travel sector's media coverage and preannounced
10 flight bans might have triggered a positive effect on travelers for actually being able to travel
11 in that situation. Also, as more prospective travelers chose not to travel to avoid risk, the
12 boarding procedure was likely swifter. The dispersion in the box plots shown after flights being
13 grounded may also be justified because consumers write their comments whenever they want,
14 which may happen after some time of the original situation (Stamolampros & Korfiatis, 2018).

15 Given the results discussed above, H1 can be assessed. Although flights were grounded
16 in entire Italy since the second week of March, the trend regarding sentiments towards 'on-
17 time performance' kept pace with the pandemic evolution, showing significant dispersion.
18 While this contradicts the findings by Chinazzi et al. (2020), it should be noted that these
19 authors analyzed the Chinese context, and before the disease was declared a pandemic by the
20 World Health Organization (WHO). Also, they considered traffic flow and disease spread and
21 not travelers' perceptions. The results regarding boarding issues were also not consistently
22 neutral (there is high dispersion regarding the generated sentiments – Table 3), as proposed in
23 H1. Thus, H1 is not supported.



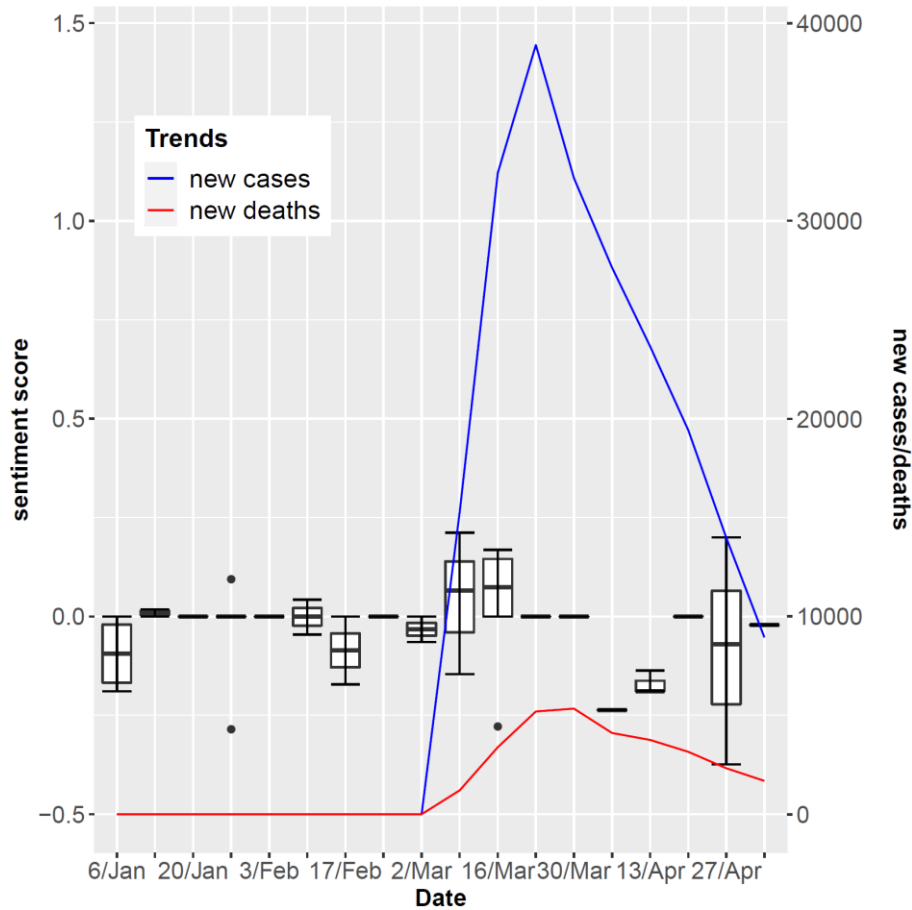
1
2 Figure 3 – On-time performance

	Estimate	Std. Error	<i>t</i> -value	<i>p</i> -value
<i>Independent variables</i>				
cases	-3.04E-05	8.29E-05	-0.3670	0.7172
deaths	6.76E-04	6.05E-04	1.1170	0.2756
<i>Model summary</i>				
<i>F</i> -value	1.8360			0.1820
Adjusted <i>R</i> ²	0.0627			

Note: **Bold** *p*-values indicate that their corresponding variables are significant at $p < 0.05$

3 Table 2 – Regression model explaining "On-time performance" sentiment score

4



1
2
3

Figure 4 – Boarding issues

	Estimate	Std. Error	<i>t</i> -value	<i>p</i> -value
<i>Independent variables</i>				
cases	1.11E-04	4.75E-05	2.3330	0.0273
deaths	-9.27E-04	3.21E-04	-2.8910	0.0075
<i>Model summary</i>				
<i>F</i> -value	5.1350			0.0129
Adjusted <i>R</i> ²	0.2219			

Note: **Bold** *p*-values indicate that their corresponding variables are significant at $p < 0.05$

4
5

Table 3 – Regression model explaining "Boarding issues" sentiment score

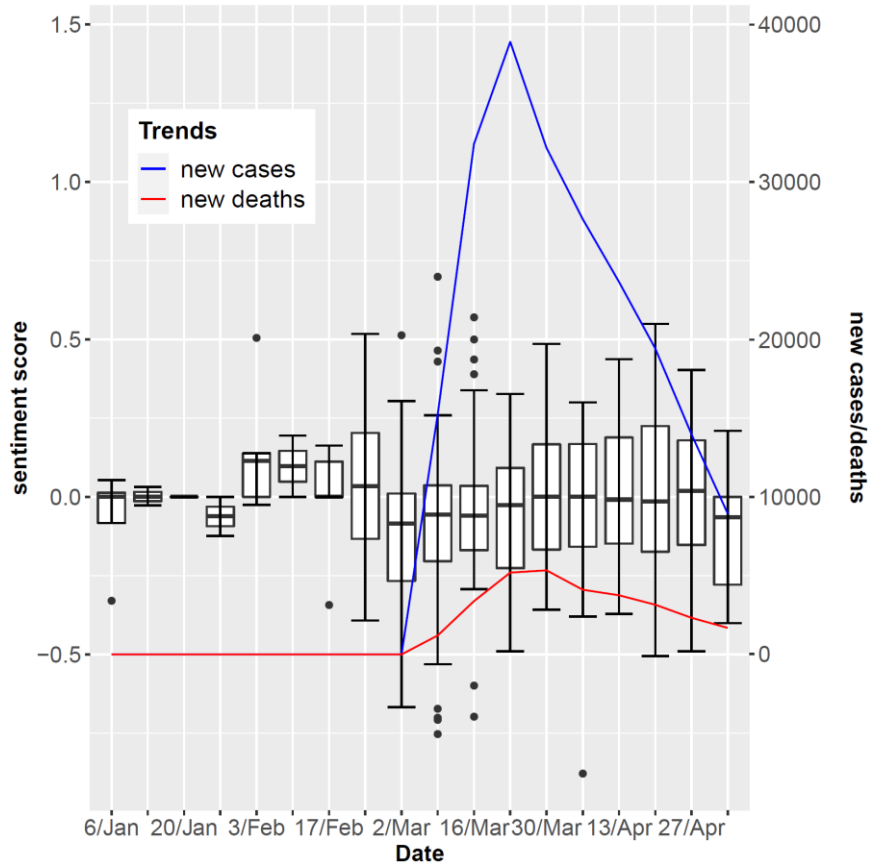
6
7
8
9
10
11

Contextually, following the reduction of the flying activities, a decrease in the sentiment score (more negative) towards cancellations and related compensations was expected, as well as towards the interaction with customer service. The sentiment analysis towards 'cancellation' showed how in Italy at the beginning of the outbreak, the feeling started to have a greater variation during each week than the previous periods when it was more consistent. Additionally, when the casualties started to rise, the average sentiment score

1 towards cancellations was slightly negative and then remained neutral (Figure 5). The
2 considerable variation shows that consumers experienced very different feelings. The results
3 suggest that few people canceled flights before the pandemic (and, subsequently, few reported
4 them online). From the sentiment analysis, it can be noticed that the consumers' perceptions
5 of the topic 'compensation' present a large variation each week regardless of the pandemic.
6 From the beginning of the outbreak until the end of the selected timeframe, the sentiment was
7 averagely positive (Figure 6).

8 Since, at these peculiar times, airline customer services are flooded with calls from
9 customers needing assistance and long wait times are a consequence (The Wall Street Journal,
10 2020), we were presuming a negative sentiment score towards it. Unexpectedly, during the
11 outbreak, the average sentiment scores were alternating negative, neutral, and positive
12 positions with large weekly variations (Figure 7). Zendesk, a CRM software company builder,
13 while investigating the impacts of COVID-19 on customers' experience, discovered that global
14 customer satisfaction scores remained stable during the pandemic. More precisely, customer
15 satisfaction only fell 3% towards airlines, suggesting that customers may be more forgiving
16 during a crisis (Zendesk, 2020).

17 Unlike as hypothesized, the sentiment scores related to cancellations, compensations,
18 and customer service showed heterogeneous perceptions among consumers. While the results
19 in tables 4, 5, and 6 support the existence of a relation between COVID-19 numbers and
20 sentiments towards cancelation/compensation/customer service, a rise in the number of cases
21 has a negative influence, whereas a rise in deaths has a positive influence. It seems as if more
22 deaths make customers more sympathetic towards impacted airline services. Thus, H2 is not
23 supported. One can argue that the COVID-19 pandemic and its unprecedented impact
24 generated mixed feelings in citizens in present times. Some travelers are also workers in small
25 and medium enterprises (some are owners) and understand that airlines are currently facing
26 enormous difficulties and may not be able to refund travelers at all. On the opposite side, if
27 citizens are facing financial difficulties and see that airlines may never be able to recover fully,
28 people will complain heavily and demand to be refunded.



1

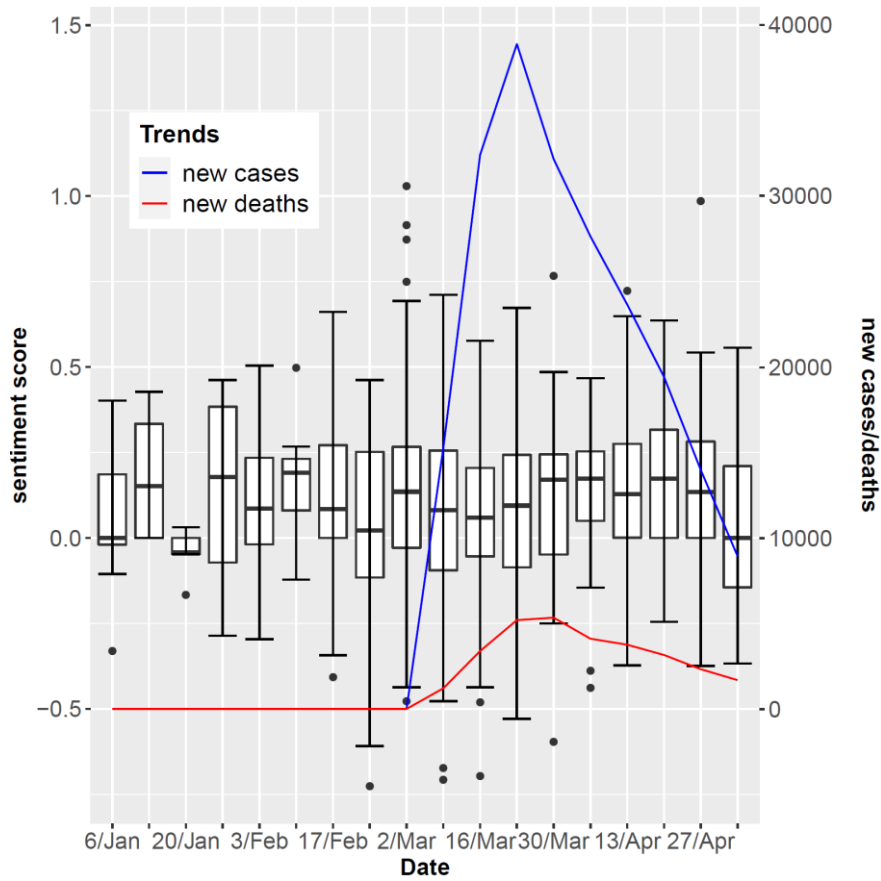
2 Figure 5 – Cancellation

	Estimate	Std. Error	<i>t</i> -value	<i>p</i> -value
<i>Independent variables</i>				
cases	-4.12E-05	1.64E-05	-2.5070	0.0126
deaths	5.12E-04	1.09E-04	4.6830	0.0000
<i>Model summary</i>				
<i>F</i> -value	19.4000			0.0000
Adjusted <i>R</i> ²	0.0864			

Note: **Bold** *p*-values indicate that their corresponding variables are significant at $p < 0.05$

3 Table 4 – Regression model explaining "Cancellation" sentiment score

4



1
2
3

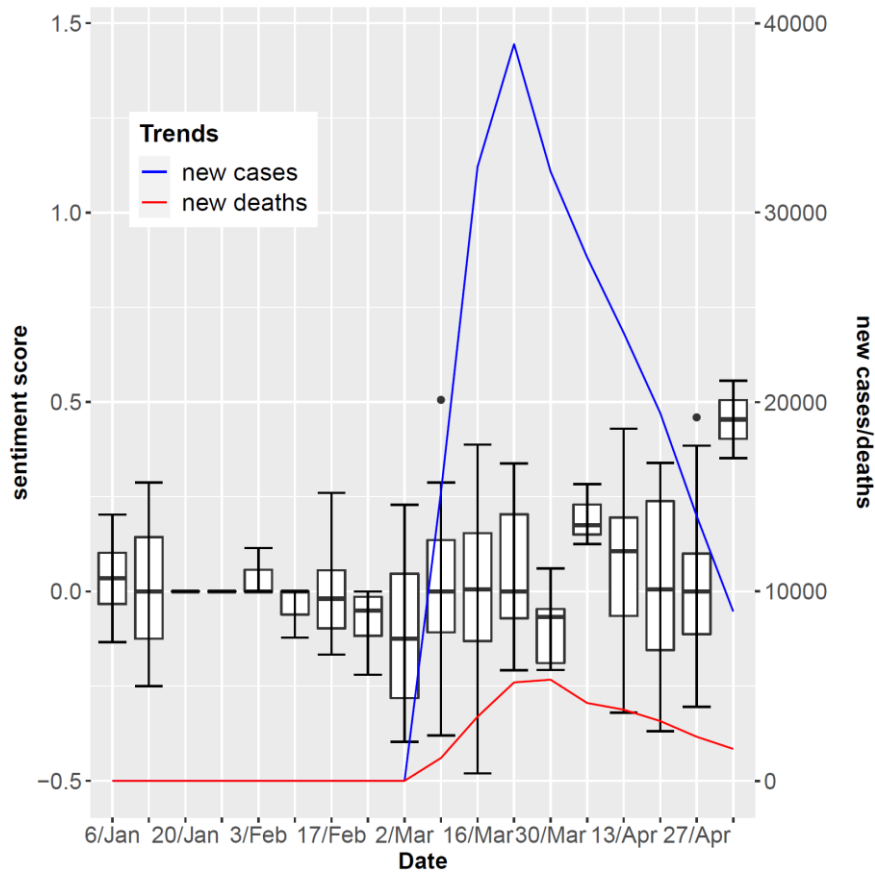
Figure 6 – Compensation

	Estimate	Std. Error	<i>t</i> -value	<i>p</i> -value
<i>Independent variables</i>				
cases	-3.23E-05	1.22E-05	-2.6440	0.0083
deaths	2.87E-04	8.28E-05	3.4620	0.0006
<i>Model summary</i>				
<i>F</i> -value	6.9190			0.0010
Adjusted <i>R</i> ²	0.0133			

Note: **Bold** *p*-values indicate that their corresponding variables are significant at $p < 0.05$

4
5

Table 5 – Regression model explaining "Compensation" sentiment score



1

2 Figure 7 – Customer service

	Estimate	Std. Error	<i>t</i> -value	<i>p</i> -value
<i>Independent variables</i>				
cases	-9.72E-05	2.92E-05	-3.3270	0.0012
deaths	7.19E-04	1.88E-04	3.8200	0.0002
<i>Model summary</i>				
<i>F</i> -value	7.3130			0.0010
Adjusted <i>R</i> ²	0.0911			

Note: **Bold** *p*-values indicate that their corresponding variables are significant at $p < 0.05$

3

Table 6 – Regression model explaining "Customer service" sentiment score

4

In this unprecedented time, where airline companies are experiencing unsustainable cash-flow and revenue situations (European Commission, 2020), to preserve their liquidity, they are offering vouchers instead of refunds (Suau-Sanchez et al., 2020) for canceled flights. Vouchers would help ease the liquidity problems and could lead to better protection of passengers' interests (European Commission, 2020). However, European regulation Nr. 261/2004 guarantees the right of the passengers to be refunded.

10

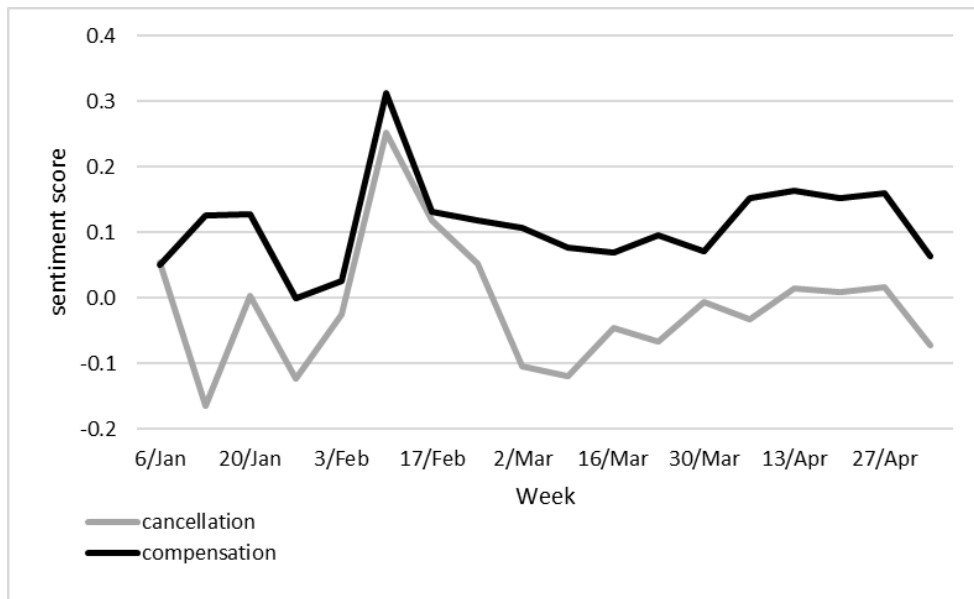
Considering that companies were initially omitting the refund option and according to Forbes (2020), some airlines have been accused of actively hiding the steps to get a cash

11

1 refund, one can assume that the improper management of the cancellations and related
2 compensations acted by the carriers (i.e., highly advertising vouchers as a form of
3 compensation for the canceled flights rather than offering the refund option) caused incredible
4 frustration (i.e., constant negative score related to compensations and cancellations) among
5 prospective travelers. Furthermore, taking into account that the Employment Expectations
6 Indicator plummeted to its lowest level on record in April 2020 (Directorate-General Financial
7 and Economic Affairs of the European Commission, 2020), those passengers may have
8 suffered the economic impact of the pandemic and have seen their income cut following the
9 reduction of the economic activities (European Commission, 2020); indeed a monetary
10 compensation would be much needed.

11 In addition to what has been previously pinpointed regarding the sentiment scores
12 towards 'compensation' and 'cancellation' (Figures 4 and 5), Figure 8 summarizes the trend of
13 both themes showing that 'cancellation' was always perceived more negatively than
14 'compensation,' whereby the values were computed with the average of the sentiment scores
15 emerged from the sentences containing the keywords. Moreover, both themes had a common
16 behavior at different levels, suggesting that they were strictly interconnected. Lastly, even
17 though the form of compensation presented was not the preferred one, sentiment toward
18 compensation was averagely positive throughout the pandemic.

19 Given the results discussed above, H3 can be assessed. Despite the improper
20 management of the cancellation adopted by carriers, sentiment scores towards 'compensation'
21 were positive, and the ones related to the 'cancellations' were slightly negative when the
22 casualties started to arise and then remained neutral. Additionally, in contrast to the findings
23 of Liao & Tan (2014), where the cancellation is perceived as a negative issue, it should be
24 noted that COVID-19 created an unprecedented environment where people have mixed and
25 unpredictable feelings. Thus, H3 is not supported.



1
2 Figure 8 – Evolution of cancellation and compensation sentiment scores

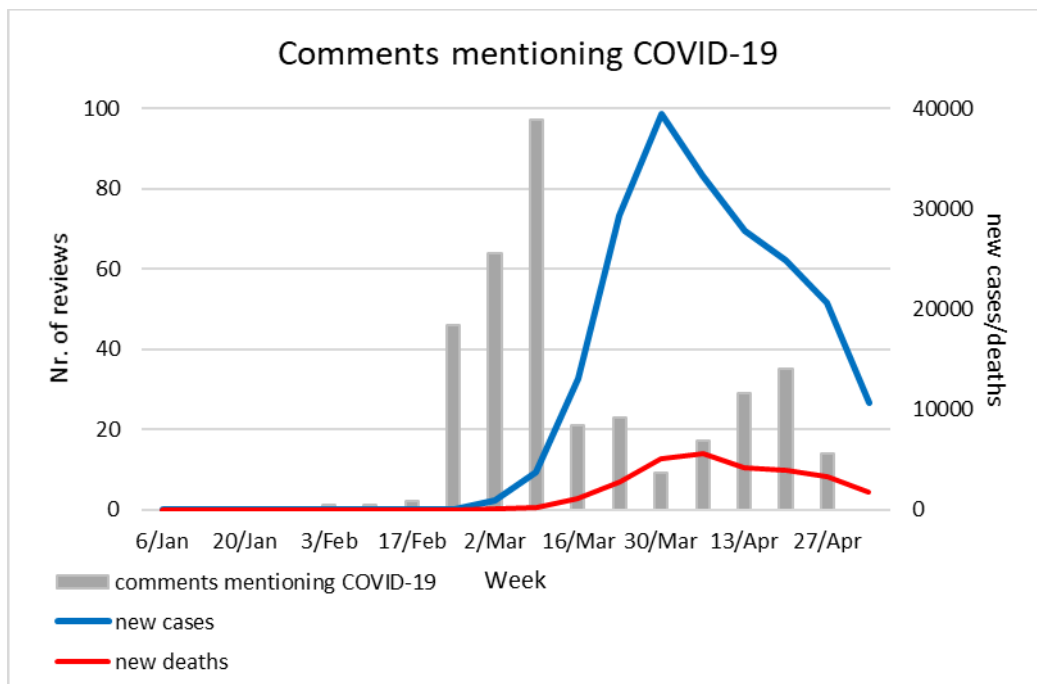
3
4 Although its first appearance in China occurred at the end of 2019, the current analysis
5 pinpointed that COVID-19 was mentioned for the first time on the National Consumer Union
6 website only at the beginning of February. Most likely, travelers whose destination was Asia
7 were already concerned about the matter occurring at the destination. Later, at the beginning
8 of the outbreak, as soon as the first cases were detected in Italy, the mention of the disease rose
9 incredibly (Figure 9). A similar pattern occurred with the diffusion of MERS in South Korea:
10 according to Yongsu (2016), once the first case was registered, the number of related tweets
11 increased and surged when the first death case was reported. As stated for MERS (Yongsu,
12 2016), it can be argued that the knowledge of the actual number of victims increased the feeling
13 among travelers that COVID-19 could threaten their safety (consequently generating a
14 negative score). Indeed, with the decrease of new cases, the feeling towards the disease should
15 be more positive.

16 The sentiment analysis (Figure 10) shows that before the outbreak in Italy, the theme
17 COVID-19 was firstly perceived positively and then neutrally with little dispersion, meaning
18 that consumers had a similar consistent feeling towards it. Also, little was known about the
19 matter at that time; travel bans were not in place, and the WHO had not yet declared it a
20 pandemic. Later, during the outbreak, the sentiment alternated between slightly negative and
21 neutral scores with large variations, showing again that people had mixed feelings. The only
22 exception occurred at the end of March, where the lowest average score towards the disease
23 and the smallest variations were detected, concurrently with the number of deaths reaching its
24 peak. Moreover, with the number of cases decreasing, starting from a slightly negative

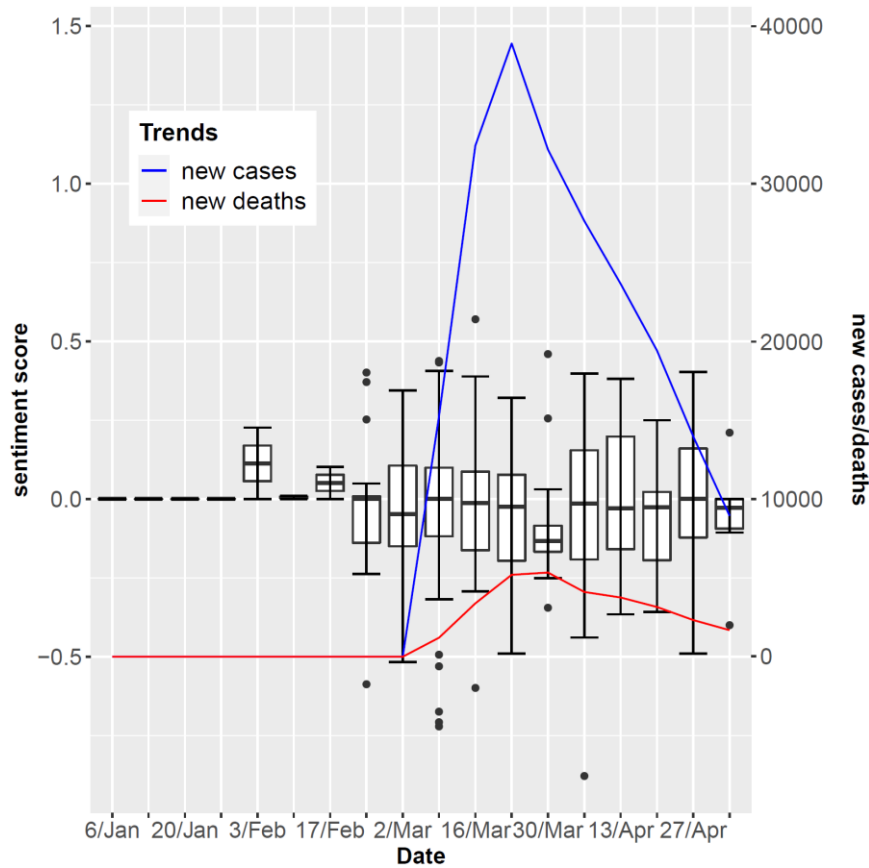
1 position, the sentiment score first decreased (becoming more negative), and then returned to
2 almost neutral.

3 Mao et al. (2010) taught us that a reduction of SARS infected cases made the authorities
4 consider the removal of travel bans, predisposing travelers to think about future journeys and
5 'virtually' escape from their lockdown situation, generating an overall positive feeling.
6 Furthermore, Mao et al. (2010) highlighted that as soon as the travel bans were removed, the
7 number of incoming visitors from two out of three countries analyzed bounced back, showing
8 that people were eager to travel and feared the disease less.

9 To conclude, unlike hypothesized, while the new cases were decreasing, the sentiment
10 score was not increasing. The statistical results shown in Table 7 provide evidence of the
11 absence of a relation between cases/deaths and the overall sentiment towards COVID-19 in
12 the context of (non-)travel flights. Thus, H4 is not supported. However, it should be underlined
13 that from its lowest average score at the end of March, with the number of cases dropping, the
14 score improved while remaining negative, almost reaching a neutral status.



15
16 Figure 9 – Comments mentioning COVID-19



1

2 Figure 10 – COVID-19

	Estimate	Std. Error	<i>t</i> -value	<i>p</i> -value
<i>Independent variables</i>				
cases	-1.65E-05	1.59E-05	-1.0420	0.2980
deaths	9.64E-05	1.08E-04	0.8940	0.3720
<i>Model summary</i>				
<i>F</i> -value	0.5506			0.5771
Adjusted <i>R</i> ²	-0.0025			

Note: **Bold** *p*-values indicate that their corresponding variables are significant at $p < 0.05$

3

Table 7 – Regression model explaining "COVID-19" sentiment score

4

5. Conclusions

6

This research showcased how air-travelers' concerns developed and changed during the COVID-19 pandemic through a sentiment analysis of online comments. The comments that composed the dataset in this study lay in a pre-service stage where consumers had not yet flown. Indeed, considering the likely impossibility to fly, travelers sought 'compensation,'

9

1 which explains the highest frequency of that theme. Moreover, 'cancellations' and 'COVID-19'
2 attracted much attention, and LCC were mentioned 1.67 times more than traditional airlines.

3 The COVID-19 pandemic and its unprecedented impact in present times definitely
4 generated mixed feelings among travelers: sentiments towards delays and boarding issues kept
5 pace with the pandemic evolution and showed significant dispersion, while the sentiments
6 related to cancellations, compensations, and customer service displayed unpredictable
7 behaviors. Moreover, it can be contended that cancellations and compensations are linked and
8 showed similar patterns at different levels. Although the carriers initially improperly managed
9 cancellations by highly advertising and offering vouchers instead of refunds, sentiment toward
10 cancellation was slightly negative when the casualties started to arise and then remained
11 neutral, while the one related to compensation was on average positive. Specifically in Italy,
12 companies were not required to fully refund their customers immediately since an alternative
13 issued voucher maintained the same monetary value. Additionally, the Italian government
14 released a plan to nationalize Alitalia, the largest Italian airline, which might have calmed
15 down concerned customers. This nationalization was a backup solution that many national
16 governments have announced, with many already issuing refunding plans to major national
17 companies such as Air France (in France), British Airways (in the UK), and Lufthansa (in
18 Germany). We believe the national governments' support of airlines during this troubled period
19 was mandatory to enable the survival of existing airlines. This measure is vital for a quick
20 resume of travel when the pandemic hopefully begins to be under control.

21 Several reasons may have led to the rejection of all four hypotheses. Based on existing
22 literature, we assumed that delay issues would be nonexistent since air fleets were grounded.
23 However, there were some negative comments regarding delays. Those may have been related
24 to the numerous repatriation flights, which were especially scheduled to bring home travelers
25 caught by the confinement rules suddenly applied worldwide (Pongpirul et al., 2020). Such
26 travelers included both tourists and foreign workers who wished to return home. Some of the
27 latter unexpectedly found themselves unemployed, while others were concerned with their
28 families (Liao, 2020). Hence, a first recommendation stemming from such finding is the need
29 for national contingency plans, that address unexpected crisis situations such as a pandemic,
30 to repatriate nationals to their home countries, in association with national airlines.

31 Despite the implementation of country-level lockdowns brought the pandemic numbers to
32 lower levels and helped healthcare systems to be able to support increased demand, the
33 situation was not sustainable in the long-term. Thus, as country-level lockdowns started to be
34 lifted, a recommendation to the nation-level bodies that regulate the travel industry is to adopt

1 different strategies to address tourists and traveling workers. For example, the former will not
2 accept to be under quarantine due to the usually small duration of a vacation period of just a
3 few days, while the latter may be willing to accept it. Thus, for tourists, additional COVID-19
4 tests may be required as an alternative to quarantine. As of December 2020, some nations (e.g.,
5 the UK) started to approve the first vaccines and huge logistic efforts are on the way to
6 distribute them at an unprecedented worldwide scale. We can foresee that air traveling resume
7 will require a certificate of vaccination instead of COVID-19 test or quarantine period.
8 However, these are still crucial since vaccines will likely take a while before reaching the
9 worldwide population.

10 In the face of our results, we can conclude that studies on the effects of COVID-19 in
11 tourism may need to be developed anew. As highlighted by Kock et al. (2020), innovative
12 tourism research remains low even in top-tier journals. Our study attempts to answer the
13 challenge raised by Zenker and Kock (2020) to assess if existing knowledge is still valid under
14 the "new normal" driven by the coronavirus pandemic. Novel research unarguably needs to
15 address this pertinent pressing issue. Notably, special issues are requesting submissions related
16 to the impact of COVID-19 in tourism, and the top-tier Journal of Travel Research only accepts
17 new submissions that assess such impact since pre-COVID-19 research may have become
18 obsolete¹

19 The analysis of online comments for research has limitations (Moro et al., 2019) that need
20 to be mentioned. As with any secondary data source, data is limited to what is available. For
21 example, it is not possible to assess if a consumer has some concerns about the airline's
22 difficulties to struggle with the pandemic or if (s)he is only concerned due to individual
23 motivations. To deal with such limitations, we propose a primary data-based study using a
24 specifically designed questionnaire to assess individual motivations versus understanding
25 airline difficulties when expressing consumers' concerns as future follow-up research. Such
26 future research could also aim at analyzing guests' expectations in the face of crises such as
27 the COVID-19 pandemic.

28 **References**

29 Abd-Alrazaq, A., Alhuwail, D., Househ, M., Hamdi, M., & Shah, Z. (2020). Top Concerns of
30 Tweeters During the COVID-19 Pandemic: Infoveillance Study. *Journal of Medical Internet*
31 *Research*, 22(4), e19016.

32

¹ <https://journals.sagepub.com/author-instructions/JTR>

1 Adams, D., & Lupini, C. (2020). Master List Of All Major International Airline Coronavirus
2 Change And Cancellation Policies. *Forbes*. Available at:
3 [https://www.forbes.com/sites/advisor/2020/03/26/master-list-of-all-major-international-](https://www.forbes.com/sites/advisor/2020/03/26/master-list-of-all-major-international-airline-coronavirus-change-and-cancellation-policies/#67ae1db3a59a)
4 [airline-coronavirus-change-and-cancellation-policies/#67ae1db3a59a](https://www.forbes.com/sites/advisor/2020/03/26/master-list-of-all-major-international-airline-coronavirus-change-and-cancellation-policies/#67ae1db3a59a). Accessed on June 20th,
5 2020.
6

7 Bhadra, D. (2009). You (expect to) get what you pay for: A system approach to delay, fare,
8 and complaints. *Transportation Research Part A: Policy and Practice*, 43(9-10), 829-843.
9

10 Brochado, A., Rita, P., Oliveira, C., & Oliveira, F. (2019). Airline passengers' perceptions of
11 service quality: Themes in online reviews. *International Journal of Contemporary Hospitality*
12 *Management*, 31(2), 855-873.
13

14 Calheiros, C., Moro, S., & Rita, P. (2017). Sentiment classification of consumer generated
15 online reviews using topic modeling. *Journal of Hospitality Marketing & Management*, 26(7),
16 675-693.
17

18 Chen, H., Huang, X., & Li, Z. (2020). A content analysis of Chinese news coverage on
19 COVID-19 and tourism. *Current Issues in Tourism*,
20 <https://doi.org/10.1080/13683500.2020.1763269>
21

22 Chinazzi, M., Davis, J.T., Ajelli, M., Gioannini, C., Litvinova, M., Merler, S., ... & Viboud,
23 C. (2020). The effect of travel restrictions on the spread of the 2019 novel coronavirus
24 (COVID-19) outbreak. *Science*, 368(6489), 395-400.
25

26 Directorate-General Financial and Economic Affairs of the European Commission (2020).
27 *Business and consumer survey results for April 2020*. Available at:
28 https://ec.europa.eu/info/sites/info/files/full_bcs_2020_04_en.pdf. Accessed on June 20th,
29 2020.
30

31 European Center for Disease and Control: *Download today's data on the geographic*
32 *distribution of COVID-19 cases worldwide*. Available at:
33 [https://www.ecdc.europa.eu/en/publications-data/download-todays-data-geographic-](https://www.ecdc.europa.eu/en/publications-data/download-todays-data-geographic-distribution-covid-19-cases-worldwide)
34 [distribution-covid-19-cases-worldwide](https://www.ecdc.europa.eu/en/publications-data/download-todays-data-geographic-distribution-covid-19-cases-worldwide). Accessed on May 17th, 2020
35

36 European Commission (2020). Commission Recommendation (EU) 2020/648 of 13 May 2020
37 on vouchers offered to passengers and travellers as an alternative to reimbursement for
38 cancelled package travel and transport services in the context of the COVID-19 pandemic.
39 *Official Journal of European Union*. Available at: <http://data.europa.eu/eli/reco/2020/648/oj>.
40 Accessed on June 13th, 2020
41

42 Gardner Jr, E. S. (2004). Dimensional analysis of airline quality. *Interfaces*, 34(4), 272-279.
43

44 Grasselli, G., Pesenti, A., & Cecconi, M. (2020). Critical care utilization for the COVID-19
45 outbreak in Lombardy, Italy: early experience and forecast during an emergency response.
46 *JAMA*, 323(16), 1545-1546.
47

48 Grigorieff, C. I., & Erotokritou, C. (2020). EU Regulation No 261/2004 on Air Passenger
49 Rights: The Impact of the COVID-19 on Flight Cancellation and the Concept of Extraordinary
50 Circumstances. *Air and Space Law*, 45(Special issue).
51

1 Guerreiro, J., & Rita, P. (2020). How to predict explicit recommendations in online reviews
2 using text mining and sentiment analysis, *Journal of Hospitality and Tourism Management*,
3 43, 269-272.
4
5 Judgment of the Court (Grand Chamber) (2006). *Case C- 344/04: The Queen, on the*
6 *application of International Air Transport Association and European Low Fares Airline*
7 *Association v Department for Transport. European Court Reports.* Available at: [https://eur-](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A62004CJ0344)
8 [lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A62004CJ0344](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A62004CJ0344). Accessed on June 19th,
9 2020.
10
11 Kock, F., Assaf, A. G., & Tsionas, M. G. (2020). Developing courageous research ideas.
12 *Journal of Travel Research*, <https://doi.org/10.1177/0047287519900807>.
13
14 Liao, K.A.S. (2020). Operation 'bring them home': learning from the large-scale repatriation
15 of overseas Filipino workers in times of crisis. *Asian Population Studies*,
16 <https://doi.org/10.1080/17441730.2020.1811511>
17
18 Liao, B.Y., & Tan, P.P. (2014). Gaining customer knowledge in low cost airlines through text
19 mining. *Industrial Management & Data System*, 114(9), 1344-1359.
20
21 Mao, C.K., Ding, C.G., & Lee, H.Y. (2010). Post-SARS tourist arrival recovery patterns: An
22 analysis based on a catastrophe theory. *Tourism Management*, 31(6), 855-861.
23
24 Moro, S., Lopes, R. J., Esmerado, J., & Botelho, M. (2020). Service quality in airport hotel
25 chains through the lens of online reviewers. *Journal of Retailing and Consumer Services*, 56,
26 102193.
27
28 Moro, S., Rita, P., Esmerado, J., & Oliveira, C. (2019). Unfolding the drivers for sentiments
29 generated by Airbnb Experiences. *International Journal of Culture, Tourism and Hospitality*
30 *Research*, 13(4), 430-442.
31
32 Pang, B., & Lee, L. (2008). Opinion mining and sentiment analysis. *Foundations and Trends*
33 *in Retrieval*, 2(1), 1-135.
34
35 Pongpirul, K., Kaewpoungngam, K., Chotirosniramit, K., & Theprugsa, S. (2020).
36 Commercial airline protocol during COVID-19 pandemic: An experience of Thai Airways
37 International. *Plos one*, 15(8), e0237299.
38
39 Ramsay, I. (2020). Consumer Law and Policy Relating to Change of Circumstances Due to
40 the COVID-19 Pandemic. *Journal of Consumer Policy*, 43, 437-450.
41
42 Riefa, C. (2020). Coronavirus as a Catalyst to Transform Consumer Policy and Enforcement.
43 *Journal of Consumer Policy*, 43, 451-461.
44
45 Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies:
46 new procedures and recommendations. *Psychological Methods*, 7(4), 422-445.
47
48 Stamolampros, P., & Korfiatis, N. (2018). Exploring the behavioral drivers of review valence.
49 *International Journal of Contemporary Hospitality Management*, 30(10), 3083-3099.
50

1 Suau-Sanchez, P., Voltes-Dorta, A., & Cugueró-Escofet, N. (2020). An early assessment of
2 the impact of COVID-19 on air transport: Just another crisis or the end of aviation as we know
3 it? *Journal of Transport Geography*. <https://dx.doi.org/10.1016%2Fj.jtrangeo.2020.102749>
4

5 Terlep, S., & Krouse, S. (2020). Customer Calls to Companies Rise Amid Coronavirus, but
6 Operators Aren't Standing By. *The Wall Street Journal*. Available at:
7 [https://www.wsj.com/articles/calls-to-companies-rise-amid-coronavirus-but-operators-arent-](https://www.wsj.com/articles/calls-to-companies-rise-amid-coronavirus-but-operators-arent-standing-by-11585483200)
8 [standing-by-11585483200](https://www.wsj.com/articles/calls-to-companies-rise-amid-coronavirus-but-operators-arent-standing-by-11585483200). Accessed on June 15th, 2020.
9

10 Tiwari, P., Pandey, H.M., Khamparia, A., & Kumar, S. (2019). Twitter-based opinion mining
11 for flight service utilizing machine learning. *Informatica*, 43, 381-386.
12

13 Unione Nazionale dei Consumatori (2020a). *Bacheca dei Reclami*. Available at:
14 <https://www.consumatori.it/bacheca-reclami/>. Accessed daily between April 9th and 30th,
15 2020.
16

17 Unione Nazionale dei Consumatori (2020b). *Welcome*. Available at:
18 <https://www.consumatori.it/welcome/>. Accessed on May 18th, 2020.
19

20 Velavan, T.P., & Meyer, C.G. (2020). The COVID-19 epidemic. *Tropical Medicine &*
21 *International Health*, 25(3), 278-280.
22

23 Vogiatzis, K., Kassomenos, P., Gerolymatou, G., Valamvanos, P., & Anamaterou, E. (2021).
24 Climate Change Adaptation Studies as a tool to ensure airport's sustainability: The case of
25 Athens International Airport (AIA). *Science of The Total Environment*, 754, 142153.
26

27 Volgger, M., & Pechlaner, H. (2014). Requirements for destination management organizations
28 in destination governance: Understanding DMO success. *Tourism Management*, 41, 64-75.
29

30 Yongsu, A. (2016). *The Impact of the MERS Outbreak in Daily Lives: Sentiment Analysis of*
31 *Korean Tweets using Time-series Methods*. Master Thesis, University of North Caroline.
32 Available at: https://cdr.lib.unc.edu/concern/masters_papers/5999n700p. Accessed on June
33 20th, 2020.
34

35 Zendesk (2020). *Benchmark Snapshot: Tracking the impacts of COVID-19 on CX*. Available
36 at: <https://www.zendesk.com/blog/zendesks-benchmark-snapshot-impact-covid-19-cx/>.
37 Accessed on June 15th, 2020.
38

39 Zenker, S., & Kock, F. (2020). The coronavirus pandemic—A critical discussion of a tourism
40 research agenda. *Tourism Management*, 81, 104164.