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Covid-19 and the tourism industry: An early stage sentiment analysis of the impact of social media and stakeholder communication

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ABSTRACT

This paper examines tourist public responses to crisis communications during the early stages of Covid-19. Using the social-mediated crisis communication model, the paper explores the key factors that influence public sentiments during nascent periods of the crisis. The choice of data collection dates was determined by key milestones events with significant implications in relation to UK tourism. Sentiment analysis of data sets of public tweets and news articles were done in order to interrogate how the trends and performance of the airlines and the tourism sector have been shaped by the sentiments of the tourism publics, the crisis communication interventions from key institutional actors, and the news sentiments about tourism organizations, particularly airlines. Sentiment analysis, also known as opinion mining, falls under natural language processing (NLP) and is used to identify different sentiments and polarities in texts. Our findings indicate that institutional actors have a significant impact on the sentiments of tourism publics. Our study contributes to existing research on crisis communication by illuminating how public narrative about, and stakeholder responses to, crisis are shaped not just by organizational communication strategies but also institutional actors, on the one hand, and the interested publics too.

1. Introduction

Since its outbreak in late December 2019, Covid-19 has had an unprecedented impact across the world. As at present (8th July 2021), the pandemic has precipitated 4,005,635 deaths out of 185,325,890 confirmed cases (Johns Hopkins Coronavirus Resource Center, 2021). Following the initial outbreak in Hubei province, China (Sohrabi et al., 2020), the virus has affected over 200 countries and territories in the world, with the West (Europe and US), India and Brazil emerging as the epicentres. With the global spread of the virus, many countries were forced into lockdown. Coronavirus had severe economic and practical impacts on the global economy, with severe blows to financial markets and governments taking a range of drastic interventions to contain the impact. For instance, US second-quarter Gross Domestic Product (GDP) fell by 32.9% compared to the previous quarter, with small business revenues at 20% below pre-Covid-19 levels. Similarly, Europe witnessed the largest quarterly decline in the Eurozone history with a second-quarter GDP fall of 12.1% compared to the previous quarter (Morgan, 2020).

In response to the global pandemic, organizations and businesses made rapid, and at times drastic, changes to the way they operated in order to survive the unrelenting onslaught of Covid-19. Among others, companies sought to flexibly re-allocate labour to different activities, rapidly innovate around new needs, and increasingly employed social media to coordinate employees and partners (Reeves, Faeste, Chen, Carlsson-Szlezak, & Whitaker, 2020). Others significantly altered their recruitment patterns and put new policies and facilities in place to support remote working (JUST Capital, 2020; Koch et al., 2021). The tourism and hospitality industries have however been in the frontline of Covid-19 impact. It is estimated that the revenue loss of airlines globally due to Covid-19 in 2020 was $370 billion (Mazareanu, 2021). Furthermore, anticipations of a sustained drop in international tourism figures paint a bleak picture for the tourism industry (Fotiadis et al., 2021).

The majority of crisis communication studies have explored how organizations respond to crises emanating from within organizations, and for which responsibility is assigned, or accepted by, the organization. Further, while studies investigating the role of social media have gained traction in recent years, most crisis communication studies have tended to examine the use of traditional media (Welbers & Opgenhaffen, 2019). In addition, many of the studies are organization-centric, mainly focusing on organizational responses with relatively little attention given to stakeholder engagement (Cheng & Lee, 2019; Manias-Muñoz, Jin, & Re-

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ber, 2019). Moreover, there has been relatively little attention on the role of institutional actors who are neither business organizations nor associated publics, but whose roles and interventions in certain types of crises significantly influences the level of crises impacts on both organizations and the public. This was especially the case at the onset of the Covid-19 pandemic with organizations grappling with an externally originating crisis beyond their control, and government interventions shaping both the level of impact and crisis response strategies.

This study therefore bridges the gaps in two respects: First, it examines the special case of Covid-19, where a global pandemic has simultaneously cast organizations in the role of victims and responders with responsibilities to customers and clients in a crisis environment where governments play a key role. It also examines the role of social media in organizational crises communication strategies as well as stakeholders' engagement and response. In undertaking this research, our focus was primarily to investigate the key influences on public sentiments at the early crisis stage. In doing so, we employ the social-mediated crisis communication theory, as it provides a framework for incorporating both organizations and their primary publics in crisis response (Austin et al., 2012).

We also draw on sentiment analysis to analyze the polarity of tweets relating to Covid-19 and the tourism sector, and the polarity of related news articles. Sentiment analysis, as a deterministic tool for shaping organization decision-making and CRM strategies, has become increasingly popular with the increasing popularity of social media platforms (Kumar et al., 2021; Neogi et al., 2021).

The sentiment analysis technique falls under natural language processing (NLP), making it possible to analyze and mine opinions, sentiments and even emotions from texts. According to Garg et al., (2021), NLP algorithms allow for speedy transformation of unstructured data into actionable insights. Examples of the use of sentiment analysis for opinion mining include Neogi et al. (2021) who categorize and analyze protests by Indian farmers using twitter data. Mishra et al., (2019) and (2020) also used sentiment analysis in the development of recommendation systems.

The rest of the paper is organized as follows: first we review the crisis and communication strategies literature, focusing attention on the role of social media as a crisis communication channel and platform for the public to generate their own content. We then describe our empirical strategy and methodology, and follow this with an overview of the results and discussion of the findings. The paper concludes with reflections on practical and policy implications and recommendations for future studies.

2. Crisis and communication strategies

Crises can be construed as unexpected events which threaten to disrupt established norms (Coombs, 2007). At the organizational/industry level, such norms extend to operations, performance and reputation. Reputation is particularly significant to organizations due to its intangibility as a resource that is shaped by internal performance and more importantly, collective external perceptions (Lange et al., 2011). Macro-environmental events such as global crises can therefore act as key determinants in shaping perceived realities, as well as subsequent industry reputation and those of its constituent organizations (Gurtner, 2007). In a bid to understand stakeholder responses to crisis situations, scholars have developed a wide range of theories and approaches such as; the Image Repair Theory (IRT) (Austin et al., 2012; Cheng & Lee, 2019; Manias-Muñoz, Jin, & Reber, 2019), the Crisis and Emergency Risk Communication (CERC) framework (Reynolds & Seeger, 2005), Situational Crisis Communication Theory (SCCT) (Coombs, 2007, 2014; Coombs & Holladay, 2002), and the Social-Mediated Crisis Communication (SMCC) model (Austin et al., 2012). None of these theoretical approaches are without their challenges. For instance, while the image repair theory effectively specifies organizational strategies (Avraham, 2015; Harlow et al., 2011), it faces the criticism of not adequately accounting for differences in internally and externally generated crises, and how audiences and stakeholders respond (Holtzhausen & Roberts, 2009). Although the CERC model is useful in providing actionable risk and crisis information to the public (Reynolds & Seeger, 2005), its focus and emphasis on the developmental features of crisis and the various communication needs makes it unsuitable in our research context. Similarly, while the situational crisis communication theory (SCCT) has significant advantages in terms of its scope and analytical utility, it is limited in terms of its predominantly organization-centric approach. In addition, it inadequately explores the role of information in construction of public crisis communication responses (Austin et al., 2012; Cheng & Lee, 2019; Manias-Muñoz, Jin, & Reber, 2019).

For the purpose of this research, we adopt the social-mediated crisis communication (SMCC) model in order to address analytical gaps in other theoretical framings by incorporating both organizations and primary publics or key stakeholders in crisis response. Jin and Liu (2010) identified three key characteristics displayed by the primary publics in a crisis situation: they are most affected by the crisis; they have shared common interests in seeing the crisis resolved; and they have long-term interests on an organization's reputation and operation. Based on this, the SMCC highlights three types of key stakeholders who produce and consume information before, during and after a crisis: influential social media creators who create crisis information for others to consume; social media followers who consume the information; and social media 'inactives' who may consume the information indirectly through word of mouth communication with social media followers or through the traditional media who follow social media content creators or social media followers (Austin et al., 2012; Liu et al., 2012). The next section further elaborates on the relation between social media and crisis communication, and links this to our application of the SMCC framework.

2.1. Social media and crisis communication

The emergence of social media has significantly changed organization interactions with stakeholders (Kaplan & Haenlein, 2010). On the one hand, social media has provided organizations with a cost-efficient means of active interactions and engaged relationships with their stakeholders, while also enabling immediate access to real-time data created by their stakeholders (Roshan et al., 2016). On the other hand, the advent of social media has also created new challenges for organizations, empowering customers and stakeholders with the opportunity to bring their complaints to a wider audience, thereby threatening the image and reputation of the organization (Crijns et al., 2017; Gaspar et al., 2016; Triantafillidou & Yannas, 2020). Thus, in this new dynamic, empowered stakeholders on social media platforms have the capacity to aggravate existing crises or precipitate new crises for organizations, who in turn have little or no control over the content generated by customers and stakeholders on social media platforms (Etter et al., 2019; Welbers & Opgenhaffen, 2019; Zhai et al., 2019).

While social media has assumed a critical role in crisis response, organizations are still grappling with how best to leverage its use (Roshan et al., 2016). Recent studies have either sought to compare the relative effectiveness of social media platforms over traditional platforms; examined use and effectiveness of various crises response strategies on particular social media platforms; or explored interactions between crises response strategies and multiple social media platforms (Triantafillidou & Yannas, 2020). One of the key areas of interests among crisis communication scholars relates to how organizations can employ a dialogic communication approach in interacting with their key stakeholders on social media platforms (du Plessis, 2018; Wang & Yang, 2020). In such communications there is the expectation of intersubjectivity between parties in dialogue, which may give rise to disagreements but also a willingness to reach mutually satisfying positions (Kent & Taylor, 1998).

Dialogic communication further offers the opportunity for organizations to go beyond the immediate objectives during a crisis, which are usually oriented towards reputation repair and crisis mitigation, to a communication process that is more meaningful and more beneficial to stakeholders in the long term (du Plessis, 2018). As an orientation, dialogue comprises of five key features: mutuality, propinquity, empathy, risk, and commitment (Kent & Taylor, 2002). Thus, organizations can use social media dialogic communication to safeguard stakeholder support and relationships both during and after the crisis (du Plessis, 2018). This process of organizational engagement with key stakeholders on social media is characterized by five operational principles: dialogic loops, ease of interface, conservation of visitors, generation of return visits, and usefulness of information (Kent & Taylor, 1998). Social media dialogic communication thus enables organizations and institutions to harness the potential of social media platforms to not only repair or restore the image of the organization in the short term, but engage in a long term of process of relationship renewal with stakeholders.

Other theorists have drawn attention to the limitations inherent in the original SMCC model. First, some have argued that the original SMCC model focuses disproportionately on information transmission, with little attention on the processes and mechanisms by which the publics examine and verify the information, potentially seek additional information before manifesting any behavioural response (Lu & Jin, 2020). Others have suggested that the original model do not adequately account for the dynamic character of crisis situations, and how the publics are actively engaged in the process of crisis "regeneration", after the original crisis situation has changed (Mak & Song, 2019). The capacity, harnessed by the publics, to transmit large quantities of information on social media is a unique feature of secondary crisis communication (SCC) (Cheng, 2020).

Thus, bringing the foregoing discussions together, we introduce a modified model of social-mediated crisis communication (Fig. 1), building on the works of Austin et al., 2012, Lu & Jin, 2020, Mak & Song, 2019 and Cheng, 2020 . Our modified model recognizes the role of institutional actors as key players in a crisis such as the Covid-19 pandemic – a crisis that is both external to organizations and outside their direct control. Thus, we first distinguish between crises that are internally generated within organizations and those external in their origins. Next, we position institutional actors such as governments and multilateral agencies outside the organizational environments, from where their crisis communication interventions and direct strategies influence the level of crisis impact on, and coping strategies of organizations. Finally, the engagement of associated key stakeholders, and social media influencers, are cast within the operational environment of organizations, in this case the tourism business environment.

As crisis information is transmitted across both social and traditional media, the SMCC model enables a distinction between information source and information form (Austin et al., 2012). Information form generally refers to the media through which information is transmitted (e.g. social media, traditional media, or word of mouth). Information source on the other hand refers to origins of information and may include organizations as well as social media and traditional media actors. Given the global nature of some crises, such as the Covid-19 pandemic, the imperative of crisis response is not on one specific organization, but multiple organizations across different sectors, as well as institutional actors such as governments and multilateral agencies. This is particularly so for the tourism and travel sector as Škare et al., (2021) opine that the impact of Covid-19 is so significant that there will be need for concerted coordination of public and private policy support in order to facilitate return to pre-Covid-19 levels of the tourism and travel sector. However, unlike some other theories such as SCCT, SMCC inherently assumes that crisis originates within organizations. Also, we argue that it does not adequately account for crisis types and how they affect organizational reputation or influence organizational response. This distinction is important in our study context where the Covid-19 pandemic has had significant impact on organizations across a whole spectrum of sectors, and has also elicited responses and interventions from governments and multilateral agencies. In the next section, we provide a contextual review of crisis and crisis communications in relation to tourism.

2.2. Tourism and crises

Extensive research has shown that crisis situations generally have a direct impact on tourism. However, the nature of crisis impact may be determined by a variety of factors such as; crisis type, crisis frequency, culture, and tourist personality. The nature and frequency of crisis have significant impact on tourist response to the crisis situation. For instance, Wilder-Smith (2006) observed that the 2003 Severe Acute Respiratory Syndrome (SARS) epidemic in Asia, which was a health-related crisis had four or five times more impact on tourism in comparison to the September 2011 terrorism crisis in the United States. The crisis impact is however not always negative as the nature of the crisis can influence tourist perceptions. For instance, in their study of North Korean Missile tests between 2016 and 2017, Li et al., (2018a) determined that the crisis, which was a recurrent event contributed to a negative image of the country. Recurrent events can however have divergent impacts. In this instance, whilst the negative image generated by the crisis events made some tourists reluctant to visit the country, it also enhanced the 'mysterious' aura of the country and invariably stimulated intention of tourists to revisit.

According to Novelli et al., (2018), one explanation as to why recurrent crisis events positively impact tourism was the fact that repeated crises lead to normalization, which tends to desensitize individuals to risks associated with the crises. They however noted that unlike most other crises, health-related crises tend to have more of a negative impact and limit inbound tourism. The reason for this is attributable to the infrequency and rapid diffusion of health epidemics. Another factor responsible for attraction of tourists to crisis-affected regions is the amount of publicity given to the crisis events. In their study, Li et al., (2018b) observed an increase in post-disaster inbound tourism and attributed this primarily to the role of publicity accorded to the crisis. In this regard, both positive and negative publicity had the capacity to generate sufficient intrigue in the crisis context thereby attracting tourists.

Adopting appropriate communication strategies is not only important post-disaster but equally so during crises events. Aliperti and Cruz (2019) noted that given cultural and behavioural differences among inbound tourists, there is need for adaptive risk communication strategies in order to ensure appropriate reception of targeted communications. Such targeted communications are essential as segment of tourists demonstrate resistance to crisis events and as such are not limited in their outbound tourism choices by the occurrence of crises (Hajibaba et al., 2015). These 'crisis-resistant' tourists generally tend to have a high propensity for risk-taking and resistance to change. As such they are more intrigued by and inclined to explore crises events. The pattern of behaviour exhibited by potential tourists is equally influenced by the extent to which tourist perceive themselves as being prone to be impacted by the crisis event. This is particularly evident during health-related crises, where research indicates that individuals are more inclined to avoid travel in situations of perceived susceptibility and self-efficacy (Cahyanto et al., 2016).

Crisis communication is not limited to government agencies and responsible organizations but in more recent times, tourists have become very active participants in shaping crisis communication. Social media has provided a particularly enabling environment four tourists to express their views and shape the narratives (Zhai et al., 2020). From the perspective of potential tourists, the underlining intentions of their communications can have varying impact on travel intentions. In this regard, Zhai et al. (2020) observed that while aim-oriented communications can positively impact travel intentions, behaviour-oriented communications tend to yield an inverse impact. Kuo et al., (2008) alluded to the importance of effective communications in managing the impact of crises on tourism. They found that the actual recorded cases of the SARS outbreak

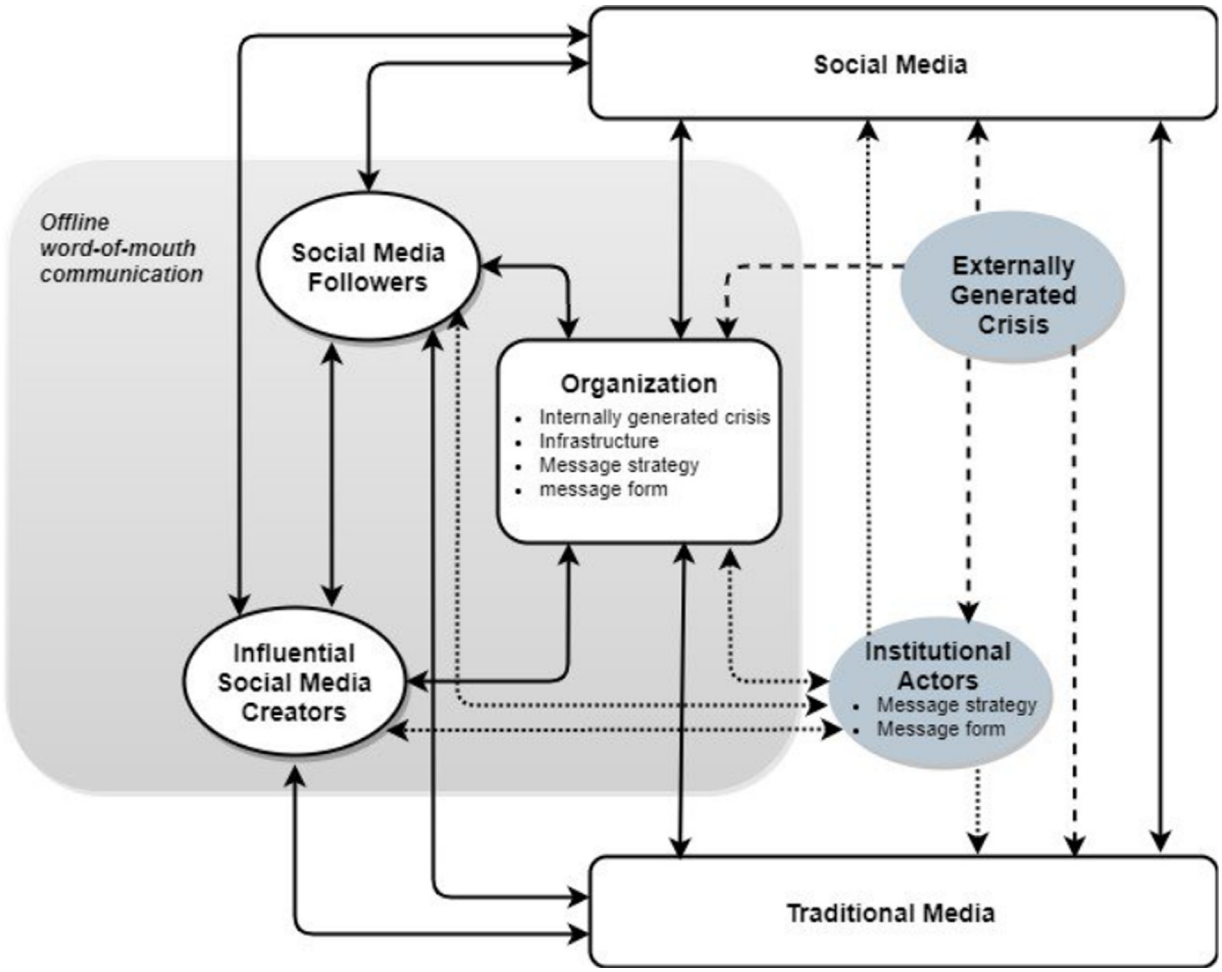


Fig. 1. Modified social-mediated crisis communication model (adapted from Austin et al., 2012).

in Asia had a significant impact on tourism to affected countries, but this was not the case for the Avian Flu outbreak. Interestingly, the latter had a much greater potential impact both from the actual Avian Flu outbreak and the subsequent pandemic influenza. In this instance, the effectiveness of communication between key stakeholders played key role in shaping perceptions of tourist and determining tourist intentions.

Using the adapted SMCC model, in this paper we attempt to gain insights into how communications influence tourist perceptions during an ongoing crisis, and the impact of these perceptions on the tourism sector. In this regard, we explore the communication dynamics between governments on the one hand and the media on the other, and how these shape public sentiments and affect the tourist industry. We further explore the mediating role of communications by non-institutional stakeholders in shaping the tourist publics' perceptions. In the next section, we outline the methodological approaches used in our investigation.

3. Methods

In this section we discuss the research methods and approach. Fig. 2 depicts the full research flow diagram with the process beginning with harvesting of Covid-19 related twitter data from two sources as discussed further below. As Twitter posts are short and constantly being generated in real time, they provide a rich source of data related to public sentiments. Twitter posts are also increasingly popular among scholars and the public alike, because twitter data is easier to extract on APIs (Ridhwan & Hargreaves, 2021). The other dataset used for the research is news articles. All the datasets are then processed, and sentiment analysis performed on them. From the outcomes, we undertake further analysis and draw out insights using the modified social-mediated crisis communication model.

3.1. Datasets

The dataset for the purpose of this research was collected using two mechanisms; for the first 7 days (13-19 March, 2020), we retrieved tweet data directly from Twitter using Python scripts, Tweepy (an open source Python library for accessing the Twitter Application Programming Interface (API)), and SQLite version 3 database management system. Additional tweet data was accessed via the Institute of Electrical and Electronics Engineers (IEEE) dataport (Lamsal, 2020). This was particularly useful as it provided ready access to CSV files holding a significant number of tweet IDs. Elements utilized from the IEEE dataset comprised of 14 CSV files holding tweet IDs of tweets gathered between 20-31 March 2020, and with the keyword 'corona'. The choice of data collection dates was determined based on key milestones dates. These dates were ones in which the UK and US governments made announcements with significant implications for tourism (see Table 2) in the early stages of the Covid-19 manifestations in the UK and wider Europe region. The motivation in this regard was also to capture initial communications and public perceptions regarding the crisis. In order to retrieve the full tweet information for these tweet IDs, we again used Python scripts and Tweepy. 11 tweet attributes were identified and utilized in the data retrieval process (see Appendix A). We also included an additional 'sentiment' field in the datasets collected, which returned the polarity of the actual tweets. To calculate the tweets sentiment polarity, we used TextBlob – an open source Python library for processing textual data (API Reference, n.d.).

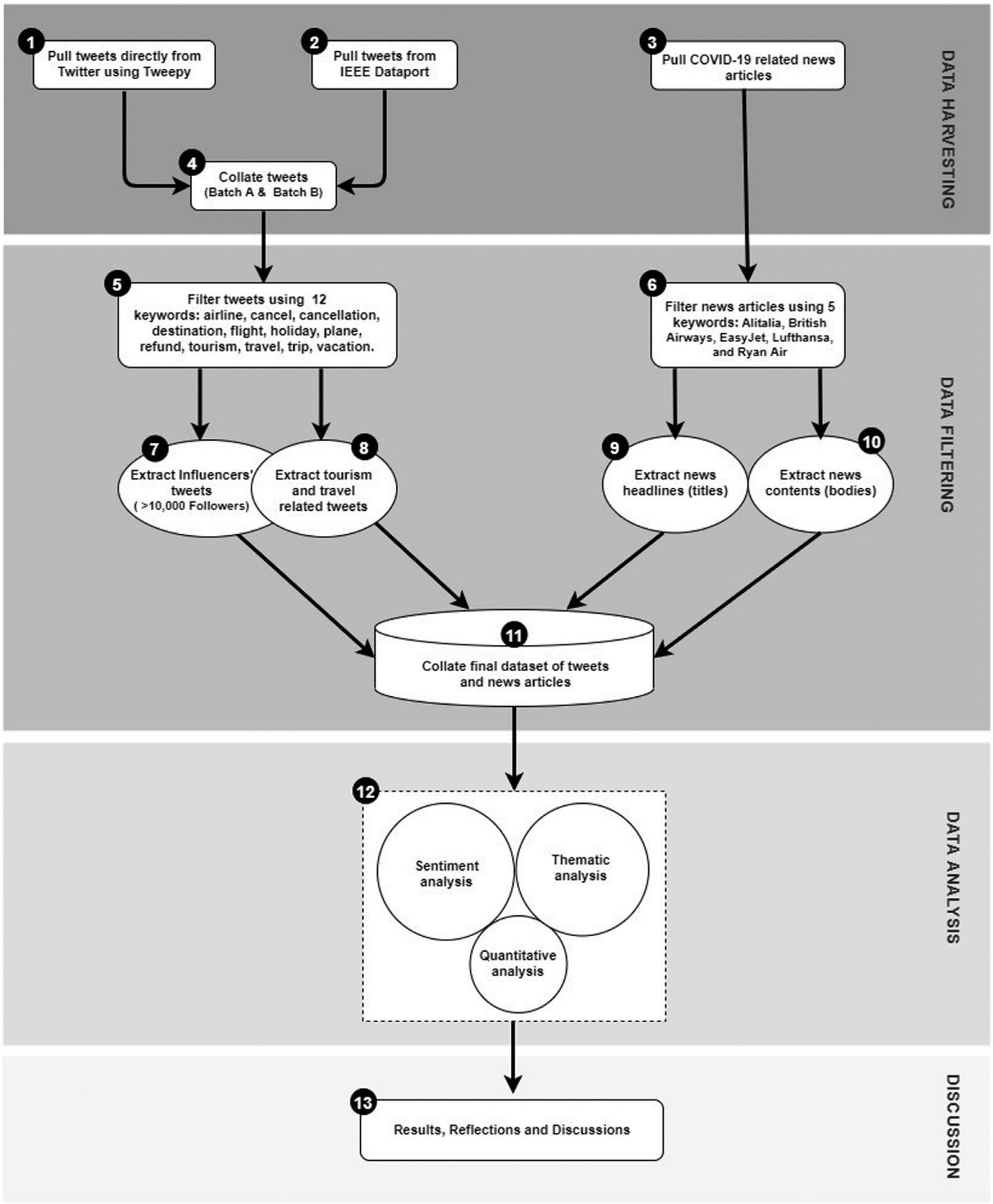


Fig. 2. Research flow diagram.

Table 1
Datasets and descriptors.

Dataset	Descriptor
Dataset 1 (Tourism/Travels)	135,940 (2% of total) tweets retrieved by filtering for tweets with at least one of 12 keywords: airline, cancel, cancellation, destination, flight, holiday, plane, refund, tourism, travel, trip, vacation.
Dataset 2 (Influencers)	Influencers – category of users with a count of 10,000 or more followers. Consists of 6551 tweets (4.8% of overall tourism tweets).

Table 2
Key milestones.

Date	Event
11-Mar	US blocks travel from European countries except UK for 30 days, as WHO declares the virus a pandemic and stock markets plunge.
17-Mar	a) UK advises against non-essential overseas travel b) EU bars most travelers from outside EU bloc for 30 days; c) US extends travel ban to UK and Ireland (actual announcement made on 14 March).
19-Mar	UK school closure announced.
23-Mar	UK nationwide lockdown announced.
26-Mar	UK announces economic interventions; taxable grant equivalent to 80% of average profits for self-employed workers.
27-Mar	Two top UK cabinet officials announce testing positive for COVID-19.
30-Mar	UK announces £75 million government spend on charter flights and airline tickets to repatriate up to 300,000 stranded Britons.

The sentiment polarity value ranges from -1 to +1 with zero representing neutral sentiments. Anything less than 0 represents negative sentiments and greater than 0, is positive.

Using the identified tweet identifications (IDs) we initially captured a total of 6,831,351 tweets; Batch 1 data was collected between 13-19 March and consisted of 6,750,202 tweets and Batch 2, collected between 20-31 March, had 81,149 tweets. From the original dataset, we were able to sequentially distil two categories vis-à-vis tourism/travel and influencers, totaling 142,491 tweets (see Table 1 below). As both datasets had a cluster of tweets around the period 16-18 March, we decided to focus on the three-day period and include a fourth (19 March) for further investigation.

In addition, we explored the sentiments from news outlets with the dataset obtained from News API provider – AYLIEN (AYLIEN, nd). The news dataset consisted of 528,848 coronavirus-related news articles. From this, we extracted 539 news articles. We identified 5 major UK/EU airlines to represent organizations for the tourism industry. These were; Alitalia, British Airways, EasyJet, Lufthansa, and Ryan Air. The mention of these organizations within the news content was the basis for news data selection. Through purposive sampling we further identified 40 news items, and evaluated these across four categories (demand reduction, job/income loss, organization financial loss, and interventions – Table 6 below). By triangulating data from Twitter, news APIs and Google Trends (see Appendix B), we were able gain a broader understanding on the sentiments across a whole spectrum of stakeholders in response to the major announcements around 17 March 2020.

For the purposes of analysis, we identified seven milestones dates between 11-30 March (see Table 2 below). These are dates in which the UK and US governments made announcements with significant implications for the tourism industry. Our aim was to investigate the effects of policy interventions on public sentiments as well as news sentiments on the tourism sector, using airline companies as proxies.

3.2. Sentiment analysis

There are various techniques and algorithms for sentiment analysis. These approaches can broadly be categorized into three; the lexicon-based, the machine learning based approach, and the hybrid approach (Chintalapudi et al., 2021; Sadia et al., 2018). Each of these have their advantages and disadvantages and the approach taken tends to be on a case-by-case basis. To carry out the sentiment analysis of both the twitter datasets and news articles in our research, we used TextBlob. TextBlob is a python library which provides API for many natural language processing tasks including sentiment analysis. TextBlob uses a lexicon-based approach to sentiment analysis and has two implementations; NaivesBayesAnalyzer which is trained on a movie reviews corpus and PatternAnalyzer based on a pattern library (API Reference, n.d.). For our research we have used the PatternAnalyzer as it has fewer limitations in relation to our datasets than the NaivesBayesAnalyzer which was trained on movie reviews. The sentiment analysis method provided by TextBlob returns two values – the polarity of the text and the subjectivity of the text. As our interest in this research was in the nature rather than objectivity of returned texts, we only used polarity of the text values. Returned polarity values range from -1 to +1. A polarity of zero represents a neutral sentiment, values greater than zero represent positive sentiments whilst values less than zero represent negative sentiments.

4. Results

Tweet sentiments were graded on a tripartite polarity scale; negative, neutral and positive. Table 3 and Fig. 3 below focus on tweets relating to the tourism industry (Dataset 1). In order to explore tourism-related sentiments during the pandemic, the tweet data were extracted using search terms synonymous with travel and tourism; airline, cancel, cancellation, destination, flight, holiday, plane, refund, tourism, travel, trip, and vacation. On three occasions, the tourism-related data showed significant (>50%) change in proportion of tweets across the polarity spectrum (15,16, and 19 March). Two of these were tweet reductions on the preceding day, while 16 March witnessed a huge (900-2400%) increase in tweets across the polarity spectrum. The huge spike in twitter activities was maintained through 17 and 18 March. Together, the period 16-18 March were the most active dates in the timeline, with the tweets in those three days accounting for 76% of twitter activities in the 19 consecutive dates. Furthermore, these dates closely aligned with possibly the most significant milestone date – 17 March; UK advised against non-essential travels, EU announced 30-day ban on travels from outside the zone, and US extended its travel ban to the UK. As is often the case, these announcements were previewed in many news outlets on the preceding day, 16 March. Interestingly, Google Trends provided independent reinforcement for the observed high tweet rate during this period as it showed the highest ever worldwide Google search on Coronavirus between 15-21 March 2020.

Table 4 and Fig. 4 represent tweets from Dataset 2: influencers – the category of users with 10,000 or more twitter followers. As with the tourism-related tweets, the period 16-18 March was the most active period in the timeline, with the proportion of influencer tweets in these three days accounting for 82% of twitter activities.

4.1. Comparison of tweet sentiments and news communications

We undertook a comparative evaluation of the public sentiments coupled with analysis of the disaggregated headlines from news contents data. Firstly, we observed a consistent upward trend in the proportion of negative sentiments across tweet categories (influencers and tourism) from the milestone date. Between 17-18 March, there was a 3.7% increase in the proportion of negative influencer tweets, similarly there was a 6.3% increase in the proportion of tourism tweets. The following day (19 March) witnessed a further 3.4% and 25.4% change in the proportion of negative influencer and tourism tweets respectively.

Additionally, news content sentiments for all the airlines were predominantly negative (see Table 5 and Fig. 5 below). The aggregated average negative sentiments for the five organizations was 69% but average negative sentiments for each organization were; British Airways –

Table 3
Tourism-related sentiment polarity by day

Date	Polarity										Day Total
	Negative	-ve %	Daily % Change	Neutral	Neut. %	Daily % Change	Positive	+ve %	Daily % Change	Diff. in Polarity % (+/-)	
13-Mar	2413	15.6	0.3	10538	68.2	26.7	2498	16.2	-27.1	0.6	15,449
14-Mar	1571	14.5	-1.1	6394	59	-9.2	2877	26.5	10.4	12.1	10,842
15-Mar	559	16	1.5	2249	64.4	5.5	683	19.6	-7	3.6	3491
16-Mar	5615	12.6	-3.5	22568	50.5	-14	16543	37	17.4	24.4	44,726
17-Mar	3686	15.8	3.2	12428	53.2	2.7	7256	31.1	-5.9	15.3	23,370
18-Mar	7320	22	6.3	18609	56	2.9	7286	21.9	-9.1	-0.1	33,215
19-Mar	630	47.5	25.4	389	29.3	-26.7	308	23.2	1.3	-24.3	1327
20-Mar	67	27.4	-20.1	89	36.3	7	89	36.3	13.1	9	245
21-Mar	34	28.8	1.5	56	47.5	11.1	28	23.7	-12.6	-5.1	118
22-Mar	14	20.9	-7.9	32	47.8	0.3	21	31.3	7.6	10.4	67
23-Mar	12	20.3	-0.6	19	32.2	-15.6	28	47.5	16.1	27.1	59
24-Mar	12	27.3	6.9	17	38.6	6.4	15	34.1	-13.4	6.8	44
25-Mar	16	29.6	2.4	18	33.3	-5.3	20	37	3	7.4	54
26-Mar	23	16.9	-12.7	31	22.8	-10.5	82	60.3	23.3	43.4	136
27-Mar	19	8.2	-8.8	173	74.3	51.5	41	17.6	-42.7	9.5	233
28-Mar	17	9.6	1.5	111	62.7	-11.5	49	27.7	10.1	18.1	177
29-Mar	14	3.5	-6.1	61	15.3	-47.5	325	81.3	53.6	77.8	400
30-Mar	10	10.8	7.3	37	39.8	24.5	46	49.5	-31.8	38.7	93
31-Mar	13	43.3	32.6	10	33.3	-6.5	7	23.3	-26.1	-20	30
Total											134,076

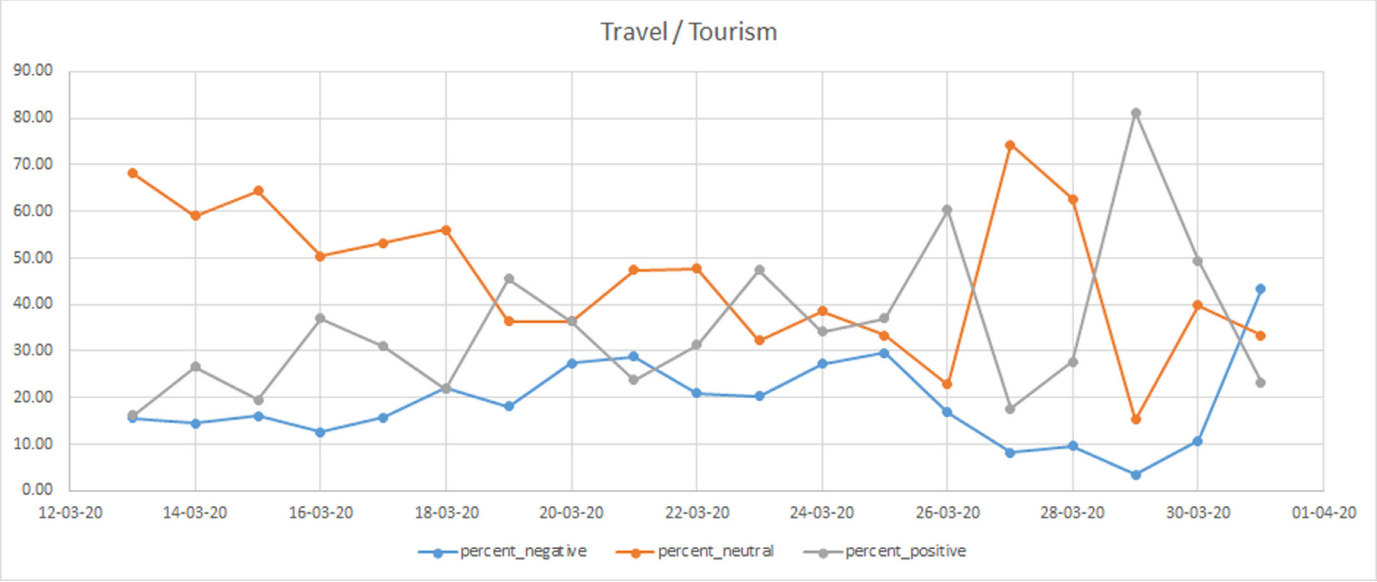


Fig. 3. Graphical representation of tourism sentiments.

74.6%, EasyJet – 73%, Ryan Air 69.3%, Lufthansa 58.4%, and Alitalia with the lowest at 52.7%. However, in contrast to the news content sentiments, we observed that the news headlines exhibited predominantly neutral sentiments. However, with respect to the news positive sentiments, there was a lack of consistency among the five organizations. Three of the five organizations (Alitalia, Lufthansa, and Ryan Air) showed reductions in the positive sentiments. However, both British Airways and EasyJet had increased positive sentiments over the research period. Finally, in reviewing Fig. 6, we observe a direct influence between news sentiments and tweets sentiments.

Furthermore, based on evaluation of news articles (see Table 6 for sample headline news), even at the very early stage of the pandemic, we observed a significant socio-economic impact on airline operators. Most airlines were forced to suspend flights; for instance, Lufthansa was recorded as set to cut 95% of all flights and Ryan equally grounding most of its fleet across Europe. The drastic reduction in flight demand would consequentially translate to financial loss for both the workforce and the organizations. There were concerns that many airlines may end up bankrupt as a result of global restrictions caused by the pandemic. This had led to speculations of strategic takeovers, which would see consolidations in the industry and calls for government interventions for financial bailouts. For instance, Lufthansa was intent on engaging the German government in intervention talks should the possibility of a hostile takeover arise. Equally, plans were being put in place by the Italian government to take control of Alitalia, and the UK government was in discussions for possible multi-billion-pound bailout plan for the airline industry. The individual level impact of the organizational challenges was that airlines were adopting a range of coping strategies from, salary reduction, to furloughing and in some instances lay-off of staff. For instance, British Airways pilots were expected to face up to 50% reductions in salary and EasyJet was asking staff to take three months unpaid leave.

Fig. 7 below shows the word clouds from the news articles; titles and article contents. A word cloud depicts the commonly used words in

Table 4
Influencers sentiment polarity by day

Date	Polarity										Day Total
	Negative	-ve %	Daily % Change	Neutral	Neut. %	Daily % Change	Positive	+ve %	Daily % Change	Diff. in Polarity % (+/-)	
13-Mar	94	20	1.1	256	54.5	13	120	25.5	-14.1	5.5	470
14-Mar	76	18.3	-1.7	193	46.4	-8.1	147	35.3	9.8	17.1	416
15-Mar	26	19.6	1.3	70	52.6	6.2	37	27.8	-7.5	8.3	133
16-Mar	356	18.5	-1.1	923	47.9	-4.8	649	33.7	5.8	15.2	1928
17-Mar	239	18.5	0	623	48.2	0.3	431	33.3	-0.3	14.9	1293
18-Mar	451	22.2	3.7	1073	52.8	4.6	510	25.1	-8.3	2.9	2034
19-Mar	12	25.5	3.4	24	51.1	-1.7	11	23.4	-1.7	-2.1	47
20-Mar	8	66.7	41.1	2	16.7	-34.4	2	16.7	-6.7	-50	12
21-Mar	3	60	-6.7	1	20	3.3	1	20	3.3	-40	5
22-Mar	1	100	40		0	-20		0	-20	-100	1
23-Mar		0	-100	1	100	100		0	0	0	1
24-Mar	4	66.7	66.7	2	33.3	-66.7		0	0	-66.7	6
25-Mar		0	-66.7	1	33.3	0	2	66.7	66.7	66.7	3
26-Mar	1	25	25	2	50	16.7	1	25	-41.7	0	4
27-Mar		0	-25	3	42.9	-7.1	4	57.1	32.1	57.1	7
28-Mar	1	6.3	6.3	12	75	32.1	3	18.8	-38.4	12.5	16
29-Mar		0	-6.3	3	33.3	-41.7	6	66.7	47.9	66.7	9
30-Mar		0	0	2	33.3	0	4	66.7	0	66.7	6
31-Mar		0	0		0	-33.3	1	100	33.3	100	1
											6392

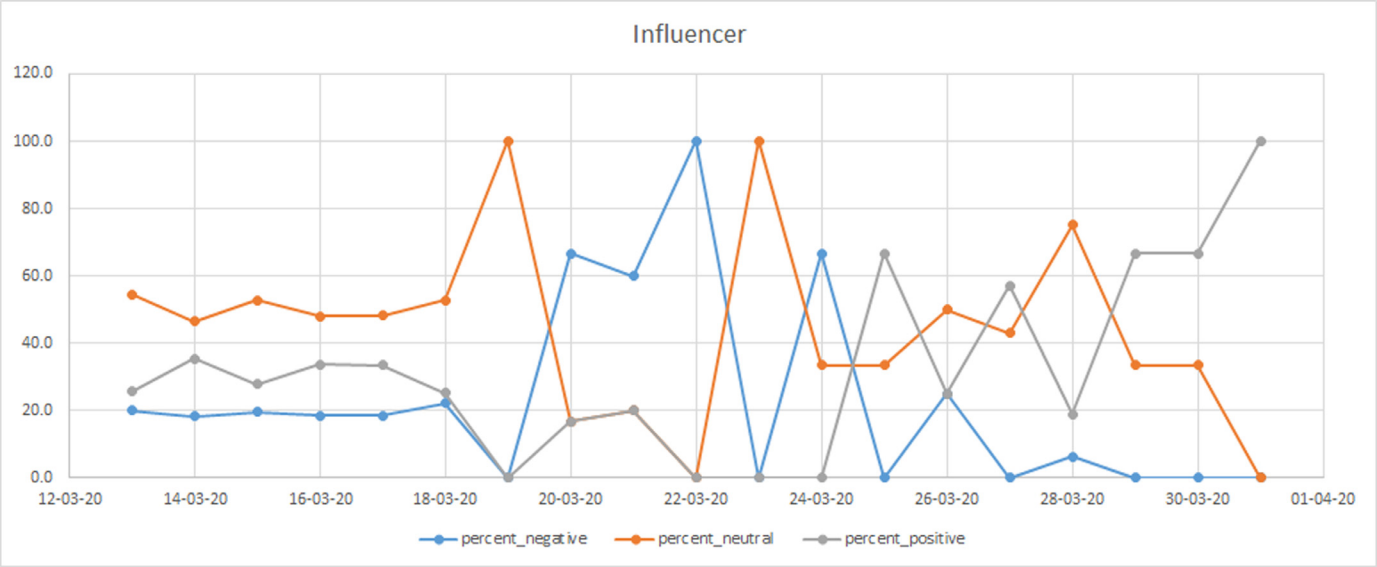


Fig. 4. Graphical representation of influencer sentiments.

Table 5
News sentiments on select organizations

Date	Polarity												Publication Total
	Negative				Neutral				Positive				
	Headline		Content		Headline		Content		Headline		Content		
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	
16-Mar	58	27.9	160	76.9	145	69.7	23	11.1	5	2.4	25	12	208
17-Mar	46	34.8	84	63.6	86	65.2	24	18.2	0	0	24	18.2	132
18-Mar	21	26.9	55	70.5	55	70.5	8	10.3	2	2.6	15	19.2	78
19-Mar	38	31.4	76	62.8	81	66.9	22	18.2	2	1.7	23	19	121
													539

a dataset and font sizes are also directly proportional to the frequency of the words. The word clouds supported additional evaluation of the news articles which resulted in Table 6. The table depicts four broad categories under which the news articles fall. Identification of these categories specifically relate to the tourism domain as it was done based on the extracted 539 tourism related news articles.

5. Discussion

In this paper, we have attempted to make sense of the sentiments of the tourism public in the immediate aftermath of critical communications during early stages of the pandemic crisis. While most previous studies have focused attention on how organizations respond to crises,

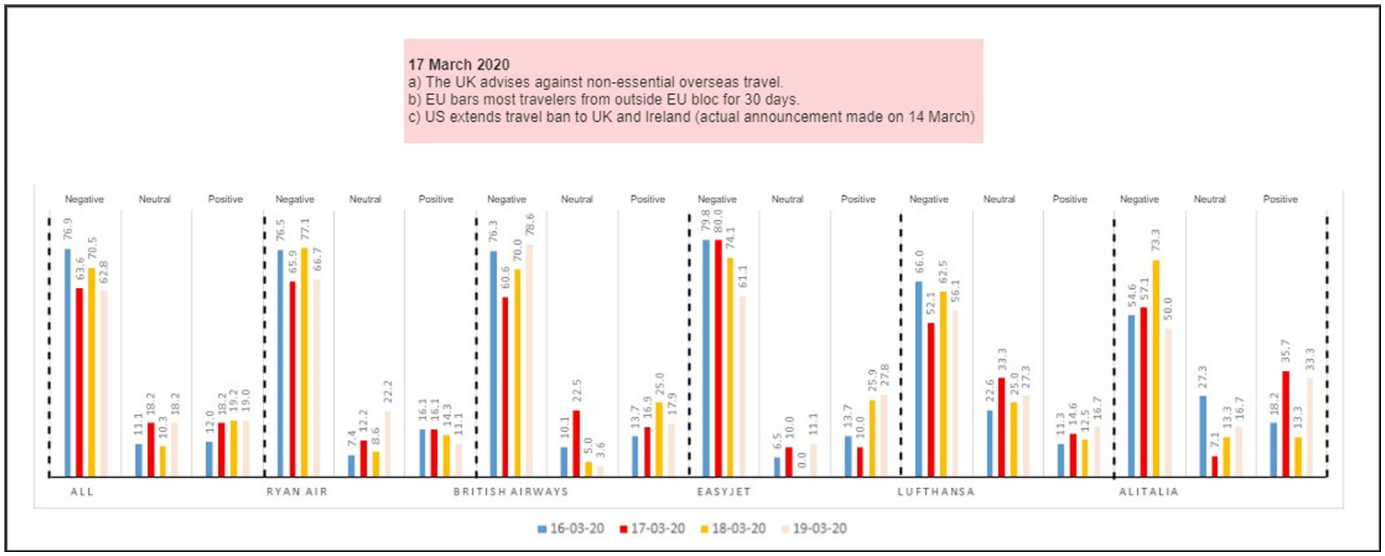


Fig. 5. Overview of organization news sentiments.

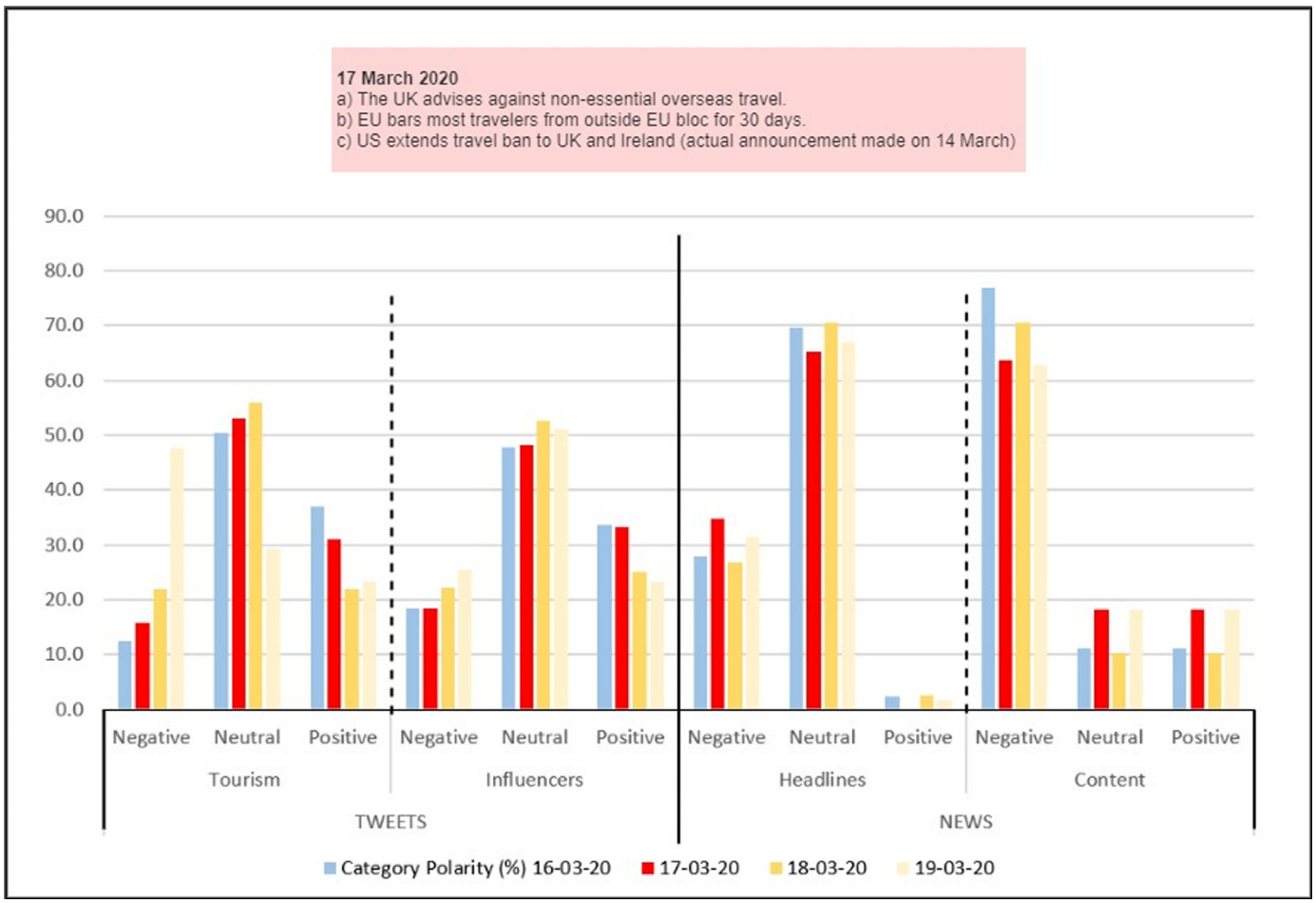


Fig. 6. Comparative view of tourism, influencer and news sentiments.

our study has expanded the focus by drawing attention to the role of institutional actors, external to the organizations. In particular, we have considered the impact of interventions by the UK government, as well as US government and EU officials, in response to the pandemic. This empirical lens enables us to gain a deeper look into organizational response to a crisis that is not only external to the organizations but also outside of their control- such as the Covid-19 pandemic. Thus, while our findings support the view in existing research that decisive and effective crisis communications have significant impacts on tourism (Kuo et al., 2008), it also illuminates how these impacts are shaped by institutional actors and factors. The interventions of institutional actors, exemplified by the major announcement on 17 March 2020, was driven by the higher

Table 6
Categorization of news items

Indicators	Representative headlines	Source
Demand reduction	Ryanair to cancel 'most if not all´ flights	Daily Mail/ Reuters
	Ryanair grounds most of its fleet across Europe for the next week	Reuters
	Major Airlines to suspend flights, lay off staff over coronavirus	Standardmedia.co.ke
	Coronavirus forces airlines to consider a once unthinkable possibility — halting US flights	CNBC
	Airline industry crisis deepens as coronavirus kills demand	Reuters
	Coronavirus: Lufthansa to cut 95% of flights as airlines go into survival mode	Straits Times
	Factbox: Airlines ground flights, count mounting costs of the coronavirus shock	Reuters/ Yahoo News
Job/income loss	Governments scramble to prop up airlines as virus forces more flight, job cuts	Reuters
	EasyJet staff asked to take three months unpaid leave due to coronavirus	BBC News/ The Sun
	Jobs up in the air as airlines enter survival mode	SMH.com.au
	British Airways pilots to face 50% pay cut over coronavirus	Reuters /Daily Mail
Organization financial loss	Coronavirus: Most airlines bankrupt by end of May, industry body warns	Irish Times
	Coronavirus-stricken airlines call for state aid to avert ruin	Reuters /Straits Times /Investing.com
	Europe's airports risk 'near total collapse' in face of Coronavirus outbreak	Independent.ie
	Coronavirus-stricken airlines call for aid to limit bankruptcies	Reuters /Daily Mail
	Single biggest shock': Airlines, airports battle Covid-19 cash crunch	Business-standard.com /Straits Times/ Reuters
	Airlines facing total shutdown as coronavirus woes deepen - Ryanair jets 'may be grounded within days'	Independent.ie
	BA owner, easyJet make drastic cuts to try to survive coronavirus	Reuters /MSN /Finance.yahoo.com
	Coronavirus will 'bankrupt nearly all of the world's airlines in weeks'	Mirror
Interventions	Governments offer financial lifelines to airlines, at a price	Reuters /Yahoo News/ Daily Mail
	Airline Industry Stands Shoulder to Shoulder. For Better or Worse. No One Wants to See Any Airline Fail	Forbes
	Lufthansa CEO Says in Case of Hostile Takeover, We Would Talks To Government To Prevent It	Reuters
	Airlines seek emergency aid as coronavirus brings industry to near-halt	Reuters/ Yahoo News/ Investing.com
	Italian government to take control of Alitalia: draft decree	Reuters
	UK to discuss support for aviation industry – minister	Reuters
	Ministers close in on multi-billion-pound airline bailout plan	Sky News/ Yahoo News

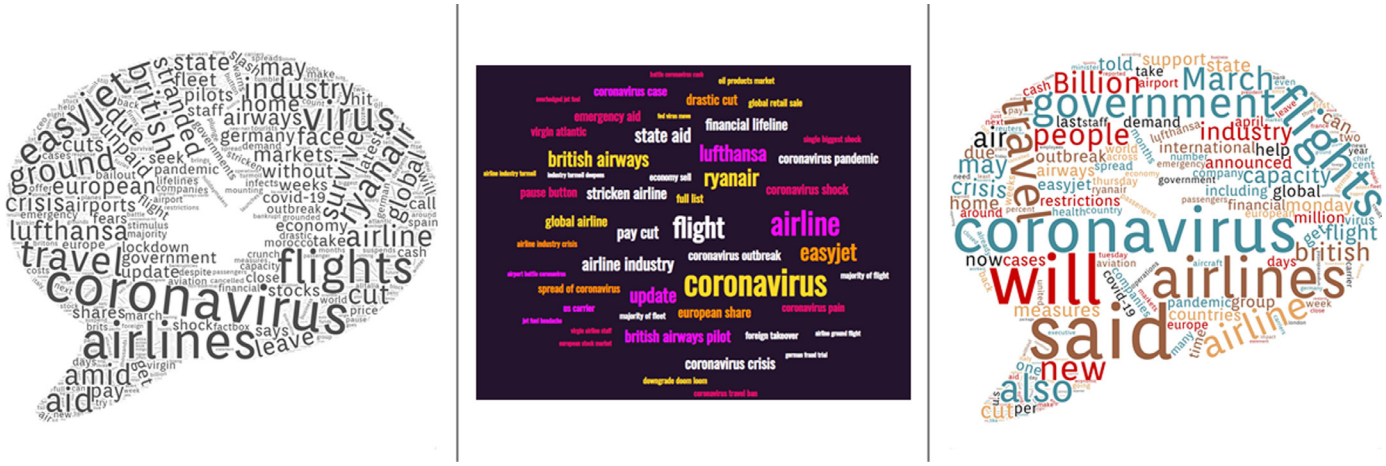


Fig. 7. Word clouds for news articles titles and contents.

imperative of public health and the need to contain the spread. However, it produced a negative impact on the tourism industry, with flights grounded to a halt, and holiday makers having to cancel their bookings. Our data indicate marginal percentage increases in the day-to-day proportion of negative sentiments following the milestone date whilst the majority of sentiments remained neutral between 17-18 March. The marginal negative sentiments may be associated with holidaymakers' dissatisfaction with forced cancellations of planned trips, and economic impacts felt by workers and business owners who had to cancel trips or grapple with other challenges in their supply chains. On the other hand, the high percentage of neutral sentiments may also be linked with the significance of the milestones on travellers' ability to seek and obtain full refunds on cancelled flights. In effect, much of the negative sentiments felt over forced travel cancellations may have been cancelled out by relief of full refund. Before this milestone announcement advising against all but essential travels, travellers could not seek refund from airlines or insurance firms. The high level of neutral tweets may also partly explain minimal impact of influencers on the tourism public. As mentioned in Section 4, the tourism publics did not quite follow the influencers' lead in negative sentiments, as the influencers' tweets indicate comparatively smaller levels of negative sentiments. It would appear that government intervention may have had a decisive impact. Interestingly, there was a significant percentage increase on 19 March (25.4%) over the previous day, but this was related to a much smaller absolute number of tweets. From a UK perspective, one explanation for this could be the decision to close all primary and secondary schools. Furthermore, our findings align with extant research that health-related crises negatively influence tourism (Novelli et al., 2018). Given the global nature of the pandemic, we argue that the crisis event is having a more significant impact on tourism than non-health-related crisis, primarily due to its direct impact on individuals (Wilder-Smith, 2006).

5.1. Theoretical contribution

With respect to the impact of communications on tourist dispositions, research indicates that the extent of publicity given to crisis is a

key factor in affecting tourism, both at mid-crisis and post-crisis stages (Li et al., 2018). However, given the extent of negative sentiments generated by the pandemic and the fact that it is a global phenom, we predict a slower turn around in public sentiments and lower inclination to engage in tourism. This is more so given continued communications of possible future recurrent peaks in the pandemic outbreak in different global regions. The normal expectation is that adoption of a decisive and measured approach to communications during crisis can be instrumental in ensuring favourable reception of communications and building tourists' resistance (Aliperti & Cruz, 2019; Hajibaba et al., 2015). However, given the high impact of the pandemic at the early stages, subsequent government interventions appeared to have done little to sway the tourism public's sentiments. Also, as the virus is highly communicable and accompanied by high mortality rates, measures taken by governments in dealing with the crisis may have drastically contributed to a prevalent fear culture, which further contributes to the negative impact on the tourism industry (Cahyanto et al., 2016; Kuo et al., 2008).

Furthermore, in applying sentiment analysis to news media communications on organization exposure to the crisis, we noted a disparity between headline sentiments and news content sentiments. Whilst headline sentiments were predominantly neutral, the actual news content sentiments were mostly negative. This runs contrary to the norm of sensationalized headlines geared towards eliciting wide readership. As Welbers and Opgenhaffen (2019) observed, this may be as a result of the increasing trend for media reporting to incorporate status messages that add to subjective expression of news on social media. In that case, the content will demonstrate more subjectivity in the expressed views. We further noted a direct association between the news content sentiments and tourism public tweet sentiments, which supports the view that social media engagement is increasingly amplifying public response to media communications (Sung & Hwang, 2014; Triantafillidou & Yannas, 2020).

5.2. Practical implications

In addition to the foregoing, we attribute individual variations in public sentiments to pre-existing organization reputations in terms of abilities for coping and responding to crises (Claeys et al., 2010; Lange et al., 2011). We however also acknowledge the role of time and regional variations in organizational exposure to the crisis. At the time of our reporting, for instance, British Airways had the highest average negative sentiments reported while Alitalia had the least. A plausible explanation for this is the timing in exposure of the respective home countries to the crisis; in one instance there was an upward trajectory in the crisis manifestation and in the other, more time had elapsed in attempting to manage the crisis situation. As our findings also suggest, seemingly positive communications may still be met with negative sentiments (e.g. the UK government's announcement of injection of funds towards repatriation and the commensurate increase in proportion of negative sentiments). We surmise that this 'net negative' sentiment is related to the proportionately high level of negative impact of the pandemic on the industry, such that bail-out measures announced by government ultimately had marginal impact. This also underlines the impact of the tourism publics as drivers of viral information, against the run of play prescribed by institutional actors (Kar & Aswani, 2021).

Finally, the gravity of impact of communications could be a function of prior/prolonged exposure to pre-existing negative sentiments. As Table 6 shows, the pandemic precipitated losses of jobs and income by tourism industry employees, with EasyJet forcing staff to take a three-month unpaid leave and British Airways pilot facing 50% pay cut. The crisis, and milestone announcement from the governments, also led to drastic reduction in demand and associated major revenue losses by airlines. This is further exemplified by both Ryanair and Lufthansa cancelling most of their flights as airlines were forced into survival mode. The impact of these heavy and sudden losses could not be effectively offset by government bailout interventions, hence the persistence of negative news sentiments associated with the airlines.

5.3. Limitations

Our paper highlights the limitations of the social-mediated crisis communication model, which has been explicated by previous scholars in terms of its heavy emphasis on the processes and patterns of information transmission, with less attention on the dynamics and nuances of information consumption (Lu & Jin, 2020). For example, by showing that publics sentiment do not always follow the lead of "influencers", our study reinforces the suggestions and findings of other scholars that the publics adopt a wide range of engagement and vetting strategies to authenticate information before manifesting any kind of behaviour in response to the information consumed (Lu & Jin, 2020; Mak & Song, 2019).

6. Conclusion

In conclusion, in this paper we have used the social-mediated crisis communication model to examine tourist public's response to the Covid-19 crises event and attendant communications, and the impact of these on the tourism industry. Our methodology entailed the use of sentiment analysis as a mechanism for gaining insight into the impact of key communications on public perceptions during the crisis. In this regard, we analyzed 142,491 tourist-related tweets and 539 related news articles. Whilst we acknowledge a potential limitation in this research being a representative snapshot of an ongoing/evolving crisis, we found that in relation to the global pandemic, key communications were driven by institutional actors and these in turn shaped organizational and public responses. Our finding thus contributes to existing research on crisis communication by illuminating how public narrative about, and stakeholder responses to, crisis are shaped not just by organizational communication strategies but also institutional actors, on the one hand, and the interested publics on the other. Social media platforms play a key role in facilitating active engagement of the publics, enabling them to take on the dual role of information receivers as well as influencers.

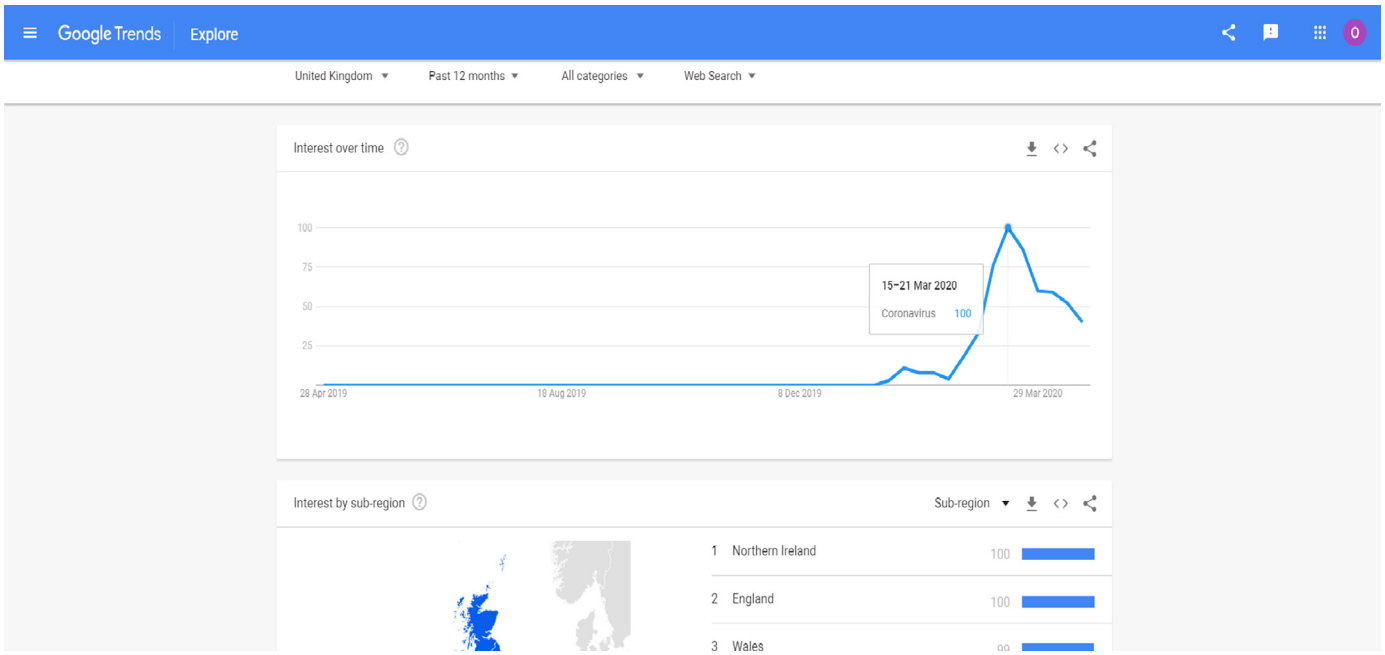
Based on our observations, we see a scope for further research to explore how regional variations in news headlines and content shape public sentiments across different sectors. Furthermore, we see additional scope for application of the modified social-mediated crisis communication model. With the increased popularity of social media platforms as a veritable information source, there is scope for further research to investigate the dynamic engagements of key stakeholders in early access, mining, and utilization of data for organizational strategic decision-making and for social benefit. We also envision the use of topic modelling, in particular Latent Dirichlet Allocation (cf. Min, Song, & Min, 2020), for further discovery and analyses of relevant themes in explored datasets.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A

Tweet attributes used in data retrieval



– tweet_id – *the unique id for each tweet*
– text – *the actual text of the tweet that was posted*
– retweet_count – *the number of times the tweet has been retweeted*
– created_at – *the date and time the tweet was created*
– lang – *the language in which the tweet was written*
– followers_count – *the number of followers the user who posted the tweets has*
– friends_count - *the number of friends the user who posted the tweets has*
– screen_name – *the twitter account screen name of the user*
– name - *the twitter account name of the user*
– id_str – *the tweet id string*
– location – *the location entered by the tweet user*

Appendix B

Google trends data on Coronavirus search

CRediT authorship contribution statement

Demola Obembe: Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing, Visualization. **Oluwaseun Kolade:** Conceptualization, Formal analysis, Writing – original draft, Writing – review & editing, Visualization. **Funmi Obembe:** Conceptualization, Methodology, Data curation, Formal analysis, Writing – original draft, Visualization. **Adebowale Owoseni:** Conceptualization, Methodology, Data curation, Formal analysis, Visualization, Writing – original draft. **Oluwasoye Mafimisebi:** Conceptualization, Formal analysis, Writing – original draft.

References

Aliperti, G., & Cruz, A. M. (2019). Investigating tourists' risk information processing. *Annals of Tourism Research, 79*, 46–60.

API Reference (N.D.). 'TextBlob 0.15.2 Documentation'. Available at: https://textblob.readthedocs.io/en/dev/api_reference.html.

Austin, L., Fisher Liu, B., & Jin, Y. (2012). How audiences seek out crisis information: Exploring the social-mediated crisis communication model. *Journal of Applied Communication Research, 40*, 188–207.

Avraham, E. (2015). Destination image repair during crisis: Attracting tourism during the Arab Spring uprisings. *Tourism Management, 47*, 224–232.

Cahyanto, I., Wiblishauser, M., Pennington-Gray, L., & Schroeder, A. (2016). The dynamics of travel avoidance: The case of Ebola in the US. *Tourism Management Perspectives, 20*, 195–203.

Cheng, Y., & Lee, C. J. (2019). Online crisis communication in a post-truth Chinese society: Evidence from interdisciplinary literature. *Public Relations Review, 45*, Article 101826.

Cheng, Y. (2020). The social-mediated crisis communication research: Revisiting dialogue between organizations and publics in crises of China. *Public Relations Review, 46*, Article 101769. 10.1016/j.pubrev.2019.04.003.

Chintalapudi, N., Battineni, G., Di Canio, M., Sagaro, G. G., & Amenta, F. (2021). Text mining with sentiment analysis on seafarers' medical documents. *International Journal of Information Management Data Insights, 1*(1), Article 100005. 10.1016/j.jjimei.2020.100005.

Claeys, A. S., Cauberghe, V., & Vyncke, P. (2010). Restoring reputations in times of crisis: An experimental study of the Situational Crisis Communication Theory and the moderating effects of locus of control. *Public Relations Review, 36*, 256–262. 10.1016/j.pubrev.2010.05.004.

Coombs, W. T. (2014). *Ongoing crisis communication: Planning, managing, and responding* (4th Ed). Thousand Oaks, CA.: Sage Publications.

Coombs, W. T., & Holladay, S. J. (2002). Helping crisis managers protect reputational assets: Initial tests of the situational crisis communication theory. *Management Communication Quarterly, 16*(2), 165–186.

Coombs, W. T. (2007). Protecting organization reputations during a crisis: The development and application of situational crisis communication theory. *Corporate Reputation Review, 10*, 163–176.

Crijns, H., Cauberghe, V., Hudders, L., & Claeys, A. S. (2017). How to deal with online consumer comments during a crisis? The impact of personalized organizational responses on organizational reputation. *Computers in Human Behavior, 75*, 619–631.

du Plessis, C. (2018). Social media crisis communication: Enhancing a discourse of renewal through dialogic content. *Public Relations Review, 44*, 829–838.

Etter, M., Ravasi, D., & Colleoni, E. (2019). Social media and the formation of organizational reputation. *Academy of Management Review, 44*, 28–52.

Fotiadis, A., Polyzos, S., & Huan, T. C. T. (2021). The good, the bad and the ugly on COVID-19 tourism recovery. *Annals of Tourism Research, 87*, Article 103117.

Garg, R., Kiwelekar, A. W., Netak, L. D., & Ghodake, A. (2021). i-Pulse: A NLP based novel approach for employee engagement in logistics organization. *International Journal of Information Management Data Insights, 1*(1), Article 100011. 10.1016/j.jjimei.2021.100011.

Gaspar, R., Pedro, C., Panagiotopoulos, P., & Seibt, B. (2016). Beyond positive or negative: Qualitative sentiment analysis of social media reactions to unexpected stressful events. *Computers in Human Behavior, 56*, 179–191.

Gurtner, Y. K. (2007). Phuket: Tsunami and Tourism – A preliminary investigation'. In E. Laws, B. Prideaux, & K. Chon (Eds.), *Crisis management in tourism* (pp. 217–233). Wallingford: CAB International.

Hajibaba, H., Gretzel, U., Leisch, F., & Dolnicar, S. (2015). Crisis-resistant tourists. *Annals of Tourism Research, 53*, 46–60.

Harlow, W. F., Brantley, B. C., & Harlow, R. M. (2011). BP initial image repair strategies after the Deepwater Horizon spill. *Public Relations Review, 37*, 80–83.

Holtzhausen, D. R., & Roberts, G. F. (2009). An investigation into the role of image repair theory in strategic conflict management. *Journal of Public Relations Research, 21*, 165–186.

Jin, Y., & Liu, B. F. (2010). The blog-mediated crisis communication model: Recommendations for responding to influential external blogs. *Journal of Public Relations Research, 22*, 429–455.

Johns Hopkins Coronavirus Resource Center. (2021). *Coronavirus COVID-19 global cases [WWW Document]* URL https://coronavirus.jhu.edu/map.html (accessed last on 8th July 2021).

JP Morgan. (2020). *Assessing the fallout from the coronavirus pandemic J.P. Morgan [WWW Document]* URL https://www.jpmorgan.com/global/research/coronavirus-impact (accessed last on 8th July 2021).

JUST Capital. (2020). *Capitalism meets coronavirus: How companies are responding [WWW Document]* Other https://justcapital.com/news/capitalism-meets-coronavirus-how-companies-are-responding/ (accessed last on 8th July 2021).

Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of Social Media. *Business Horizons, 53*, 59–68.

Kar, A. K., & Aswani, R. (2021). How to differentiate propagators of information and misinformation–Insights from social media analytics based on bio-inspired computing. *Journal of Information and Optimization Sciences, 42*(6), 1307–1335. 10.1080/02522667.2021.1880147.

Kent, M. L., & Taylor, M. (1998). Building dialogic relationships through the World Wide Web. *Public Relations Review, 24*, 321–334.

Kent, M. L., & Taylor, M. (2002). Toward a dialogic theory of public relations. *Public Relations Review, 28*, 21–37.

Koch, J., Plattfaut, R., & Kregel, I. (2021). Looking for talent in times of crisis – The impact of the Covid-19 pandemic on public sector job openings. *International Journal of Information Management Data Insights, 1*(1), Article 100014. 10.1016/j.jjimei.2021.100014.

Kumar, S., Kar, A. K., & Ilavarasan, P. V. (2021). Applications of text mining in services management: A systematic literature review. *International Journal of Information Management Data Insights, 1*(1), Article 100008.

Kuo, H-I., Chen, C-C., Tseng, W-C., Ju, L-F., & Huang, B-W. (2008). Assessing impact of SARS and Avian Flu on international tourism demand to Asia. *Tourism Management, 29*, 917–928.

Lamsal, R. (2020). *Corona Virus (COVID-19) Tweets Dataset. IEEE Dataport* Available at:(accessed: Apr. 03, 2020) http://dx.doi.org/10.21227/781w-ef42..

Lange, D., Lee, P. M., & Dai, Y. (2011). Organizational reputation: A review. *Journal of Management, 37*, 153–184. 10.1177/0149206310390963.

Li, F., Wen, J., & Ying, T. (2018a). The influence of crisis on tourists perceived destination image and revisit intention: An exploratory study of Chinese tourists to North Korea. *Journal of Destination Marketing & Management, 9*, 104–111.

Li, H., Yin, X., Yang, Y., Luo, M., & Huang, S. (2018). Blessing in disguise": The impact of the Wenchuan earthquake on inbound tourist arrivals in Sichuan, China. *Journal of Hospitality and Tourism Management, 42*, 58–66.

Liu, B. F., Jin, Y., Briones, R., & Kuch, B. (2012). Managing turbulence in the blogosphere: Evaluating the blog-mediated crisis communication model with the american red cross. *Journal of Public Relations Research, 24*, 353–370.

Lu, X., & Jin, Y. (2020). Information vetting as a key component in social-mediated crisis communication: An exploratory study to examine the initial conceptualization. *Public Relations Review, 46*(2), Article 101891. 10.1016/j.pubrev.2020.101891.

Mak, A. K. Y., & Song, A. O. (2019). Revisiting social-mediated crisis communication model: The Lancôme regenerative crisis after the Hong Kong Umbrella Movement. *Public Relations Review, 45*(4), Article 101812. 10.1016/j.pubrev.2019.101812.

Manias-Muñoz, I., Jin, Y., & Reber, B. H. (2019). The state of crisis communication research and education through the lens of crisis scholars: An international Delphi study. *Public Relations Review, 45*(4), Article 101797. 10.1016/j.pubrev.2019.101797.

Mazareanu, E. (2021). *Coronavirus: Impact on the aviation industry worldwide - Statistics & facts [WWW Document]* URL https://www.statista.com/topics/6178/coronavirus-impact-on-the-aviation-industry-worldwide/ (accessed last on 8th July 2021).

Min, K., Song, S., & Min, J. (2020). Topic modeling of social networking service data on occupational accidents in Korea: Latent Dirichlet allocation analysis. *Journal of Medical Internet Research, 22*(8), Article e19222. 10.2196/19222.

Mishra, R. K., Urolagin, S., & Jothi, J. A. A. (2019). A Sentiment analysis-based hotel recommendation using TF-IDF Approach. In *2019 International conference on computational intelligence and knowledge economy (ICCIKE)* (pp. 811–815). 10.1109/ICCIKE47802.2019.9004385.

Mishra, R. K., Urolagin, S., & Jothi, J. A. A. (2020). Sentiment Analysis for POI Recommender Systems. In *Seventh international conference on information technology trends (ITT)* (pp. 174–179). 10.1109/ITT51279.2020.9320885.

Neogi, A. S., Garg, K. A., Mishra, R. K., & Dwivedi, Y. K. (2021). Sentiment analysis and classification of Indian farmers' protest using twitter data. *International Journal of Information Management Data Insights, 1*(1), Article 100008.

Novelli, M., Burgess, L. G., Jones, A., & Ritchie, B. W. (2018). No Ebola…still doomed' – The Ebola-induced tourism crisis. *Annals of Tourism Research, 70*, 76–87.

Reeves, M., Faeste, L., Chen, C., Carlsson-Szlezak, P., & Whitaker, K. (2020). How Chinese companies have responded to coronavirus. *Harvard Business Review*. URL https://hbr.org/2020/03/how-chinese-companies-have-responded-to-coronavirus . (accessed last on 8th July 2021).

Reynolds, B., & Seeger, M. (2005). Crisis and emergency risk communication: An integrative model. *Journal of Health Communication, 10*(1), 43–55.

Ridhwan, M. K., & Hargreaves, C. A. (2021). Leveraging Twitter data to understand public sentiment for the COVID-19 outbreak in Singapore. *International Journal of Information Management Data Insights, 1*(2), Article 100021. 10.1016/j.jjimei.2021.100021.

Roshan, M., Warren, M., & Carr, R. (2016). Understanding the use of social media by organisations for crisis communication. *Computers in Human Behavior, 63*, 350–361.

Sadia, A., Khan, F., & Bashir, F. (2018). An overview of lexicon-based approach for sentiment analysis. *3rd International Electrical Engineering Conference (IEEC 2018)*.

Škare, M., Soriano, D. R., & Porada-Rochoń, M. (2021). Impact of COVID-19 on the travel and tourism industry. *Technological Forecasting and Social Change, 163*, Article 120469.

Sohrabi, C., Alsafi, Z., O'Neill, N., Khan, M., Kerwan, A., Al-Jabir, A., … Agha, R. (2020). World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). *International Journal of Surgery, 76*, 71–76.

Sung, M., & Hwang, J.-S. (2014). Who drives a crisis? The diffusion of an issue through social networks. *Computer in Human Behavior, 36*, 246–257. 10.1016/j.chb.2014.03.063.

Triantafillidou, A., & Yannas, P. (2020). Social media crisis communication in racially charged crises: Exploring the effects of social media and image restoration strategies. *Computers in Human Behavior, 106*, Article 106269. 10.1016/j.chb.2020.106269.

Wang, Y., & Yang, Y. (2020). Dialogic communication on social media: How organizations use Twitter to build dialogic relationships with their publics. *Computers in Human Behavior, 104*, Article 106183.

Welbers, K., & Opgenhaffen, M. (2019). Presenting news on social media. *Digital Journalism, 7*(1), 45–62. 10.1080/21670811.2018.1493939.

Wilder-Smith, A. (2006). The severe acute respiratory syndrome: Impact on travel and tourism. *Travel Medicine and Infectious Disease, 4*, 53–60.

Zhai, X., Luo, Q., & Wang, L. (2020). Why tourists engage in online collective actions in times of crisis: Exploring the role of group relative deprivation. *Journal of Destination Marketing & Management, 16*, Article 100414.

Zhai, X., Zhong, D., & Luo, Q. (2019). Turn it around in crisis communication: An ABM approach. *Annals of Tourism Research, 79*, Article 102807.