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Abstract: This study explores the evolutionary process of corporate crisis communication to understand how international hotel enterprises respond to the COVID-19 crisis. Corpus linguistics was used as a computer-aided approach in assessing a large collection of naturally occurring texts. Press releases from hotel corporations listed in Fortune 500 within the period of January to March 2020 were curated and built into three corpora. Lexical patterns that evolved over the course of the first quarter of 2020 reveal that the lodging industry did not fully prepare for the crisis until March, while management was still dwelling on their past achievements even in February 2020. The overall tone, pre-crisis, reflected top management's demonstration of success and performance, attributed to the CEOs themselves; while it completely changed during the crisis. This study draws upon crisis management and organizational communication streams of work to advance prevailing theoretical accounts of organizational crisis communication.

Dear Professor Hsu and Associate Editor,

We are pleased to submit our latest research entitled “**COVID-19 Organizational Crisis Communications in the Lodging Industry: A Corpus Linguistics Approach**” to *Tourism Management* for publication consideration. This study explores the evolutionary process of corporate crisis communication to understand how international hotel enterprises respond to the COVID-19 crisis. Corpus linguistics was used as a computer-aided approach in assessing a large collection of naturally occurring texts. Press releases from hotel corporations listed in Fortune 500 within the period of January to March 2020 were curated and built into three corpora. The core contribution of this study lies in an important understanding of corporate crisis communication by demonstrating evolutionary phases of how international service enterprises respond to crisis. By taking a crisis-as-process perspective, it illustrates some evolutionary features in confronting severe adversity. We wish to express our gratitude for handling the manuscript.

Sincerely,

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Research Note:

COVID-19 Organizational Crisis Communications: A Corpus Linguistics Approach

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The contribution of the study lies in its novel approach in assessing the evolution of organizational crisis communication through the lens of computation linguistics. As such, lexical items manifested through a large volume of the corpus were used to delineate how crisis-as-process emerged from responses enacted by international hotel conglomerates. We draw upon crisis management and organizational communication streams of work to advance prevailing theoretical accounts of organizational crisis communication. By fusing these two streams of work, we add new nuances to the tourism management literature pertinent to the evolutionary features in responding to severe adversity. This study further showcases the evolution of organizational crisis communication with respect to how lodging firms capitalize on the public media to reassure stakeholder confidence and to regain status quo legitimacy through framing the management's experience and the organization's ad hoc capabilities in coping with the COVID-19 outbreak.

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Research Note:

**COVID-19 Organizational Crisis Communications in the Lodging Industry: A
Corpus Linguistics Approach**

Abstract

This study explores the evolutionary process of corporate crisis communication to understand how international hotel enterprises respond to the COVID-19 crisis. Corpus linguistics was used as a computer-aided approach in assessing a large collection of naturally occurring texts. Press releases from hotel corporations listed in Fortune 500 within the period of January to March 2020 were curated and built into three corpora. Lexical patterns that evolved over the course of the first quarter of 2020 reveal that the lodging industry did not fully prepare for the crisis until March, while management was still dwelling on their past achievements even in February 2020. The overall tone, pre-crisis, reflected top management’s demonstration of success and performance, attributed to the CEOs themselves; while it completely changed during the crisis. This study draws upon crisis management and organizational communication streams of work to advance prevailing theoretical accounts of organizational crisis communication.

Keywords: Coronavirus, corpus linguistics, hotel, crisis, organizational communication

23 **Introduction**

24 The global outbreak of COVID-19 has had an unprecedented socio-economic
25 impact around the world, severely disrupting the entire global economy (Craven,
26 Mysore, Singhal, Smit, & Wilson, 2020; Reeves, Fæste, Chen, Carlsson-Szlezak, &
27 Whitaker, 2020). With prolonged social distancing policies, city lockdowns,
28 stay-home ordinances, and travel restrictions around the globe, the tourism-hospitality
29 industry, which is exemplified by the lodging sector, has been hit especially hard,
30 with empty rooms and tables, cancelled meetings, and closure of properties (STR,
31 2020). As the COVID-19 pandemic continues to lead the world into chaos with
32 paralyzing terror and panic, the crisis, however, represents “an opportunity for
33 managers to communicate with stakeholders, display leadership, so as to facilitate the
34 organization’s progression through stages of recovery to reduce the negative effect of
35 the crisis” (Williams, Gruber, Sutcliffe, Shepherd, & Zhao, 2017, p. 738).

36 Given the importance of corporate communication in crisis management
37 (Coombs, 2018; Ritchie, 2004; Su, Stepchenkova, & Kirilenko, 2019), it is prudent to
38 harness a mechanism that can effectively respond to adversity (Williams, et al., 2017).
39 The foci of the study rest on understanding the response mechanism as the crisis
40 continues. The study seeks to illustrate an evolutionary process that articulates
41 changes to organizational structures and practices during the process of combating the
42 crisis, by answering the following questions: What are the major themes discussed in
43 the press releases during the crisis? How have these themes changed diachronically?

44 An innovative methodology (i.e., corpus linguistics) from the field of linguistics was
45 adopted here for data analysis. This computation-oriented approach is based on a
46 computerized corpus that is a large collection of naturally occurring texts (Berger et
47 al., 2020; Pollach, 2012). Press releases from hotel corporations listed in Fortune 500
48 within the period of January to March 2020 were curated and built into three corpora.
49 Corpus comparisons were conducted via *Wmatrix* and *LanCSBox*, while salient
50 linguistic themes were identified with changes during the pandemic.

51 The contribution of the study lies in its novel approach in assessing the
52 evolution of organizational crisis communication through the lens of computation
53 linguistics (Humphreys & Wang, 2017; Pollach, 2012). As such, lexical items
54 manifested through a large volume of the corpus were used to delineate how
55 crisis-as-process emerged from responses enacted by international hotel
56 conglomerates. We draw upon crisis management (Aliperti et al., 2019; Coombs,
57 2018; Jiang, Ritchie, & Benckendorff, 2019; Williams, et al., 2017) and
58 organizational communication (Kucukusta, Perelygina, & Lam Wing, 2019; Riel &
59 Fombrun, 2007; Wan, 2008; Yates & Orlikowski, 1992) streams of work to advance
60 prevailing theoretical accounts of organizational crisis communication. By fusing
61 these two streams of work, we add new nuances to the tourism management literature
62 pertinent to the evolutionary features in responding to severe adversity.

63 **Theoretical Background**

64 *Global crisis management*

65 Crisis management is defined as “a set of factors designed to combat crises
66 and to lessen the actual damage inflicted by a crisis” (Coombs, 2007, p. 5). There are
67 two primary bodies of literature pertinent to this domain of inquiry: crisis-as-event
68 and crisis-as-process (Williams, et al., 2017). This study draws on the second tradition,
69 which focuses on development of crisis in multiple phases over time (i.e., pre-crisis
70 and during the crisis). The process view of crisis puts further emphasis on “explor[ing]
71 the incubation of crises as well as the evolutionary features of crises” (Williams, et al.,
72 2017, p. 736). This evolutionary process often requires an integration of
73 taken-for-granted institutional practices with ad hoc organizational efforts to cope
74 with uncertainties and complexity surrounding these crises (Çakar, 2018; Gurtner,
75 2016; Pearson & Clair, 1998; Ritchie, 2004).

76 Yet, globalization of international business operations has inconceivable
77 consequences to crisis management. As enterprises expand beyond national and
78 cultural boundaries, there is an urgent need to circumvent major disruptions through
79 “international public discourses on potential crises, ongoing crises and post-crises”
80 (Schwarz, Seeger, & Auer, 2016, p. 34). Despite the importance of the topic, the
81 extant literature on global crisis management remains rather scant, with only a few
82 empirical studies conducted in a truly global arena as Coombs and Laufer (2018)
83 assert. For example, Fainshmidt, Nair, and Mallon (2017) assessed how multinational
84 enterprise’s in-crisis performance was associated with the pre-crisis development of
85 asset management capabilities in the context of the global financial crisis of 2008.
86 Leong et al. (2008) explored consumer animosity during the 1997 Asian economic

87 crisis, based on survey data from five affected countries. Other inquiries focused on
88 how multinational corporations cope with crises in host countries, including the
89 impact of adaptation on MNCs' sustainable operations (Zhao, Park, & Zhou, 2014)
90 and on the role of geography in foreign subsidiary survival in host countries afflicted
91 by political conflict (Dai, Eden, & Beamish, 2013). Further efforts focused on
92 marketing-related strategy for a crisis coping mechanism, including the role of a
93 spokesperson during the product harm crisis (Laufer, Garrett, & Ning, 2018); media
94 coverage of the same crisis in different countries (Schultz, Kleinnijenhuis, Oegema,
95 Utz, & van Atteveldt, 2012; Su, et al., 2019); and the role of culture in crisis
96 communication (Dhanesh & Sriramesh, 2018; Turner, 2020).

97 *Organizational Crisis Communication*

98 Organization communications represent a key conduit in bridging the
99 boundary between internal and external communications in order to create a favorable
100 corporate impression for stakeholders (Kucukusta, et al., 2019; Yates & Orlikowski,
101 1992). By orchestrating messages issued by an organization, the management seeks to
102 fortify credibility, confidence, and even legitimacy through the eye of the beholders
103 (Çakar, 2018; Riel & Fombrun, 2007). An organization's efforts towards crisis
104 communication are an integral part of crisis management, as they are engaged in "the
105 process of active communication with stakeholders to mitigate impact on affected
106 parties and minimize damage to the organization's image or reputation" (Dhanesh &
107 Sriramesh, 2018, p. 207).

108 Crisis communication focuses on prevention and reduction of harm. Pattala
109 and Vos's (2012) process view of crisis communication accentuates the goals of crisis
110 communication including (1) organizational empowerment and citizens behaviors, (2)
111 societal understanding of risks through public participation and debate, and (3)
112 response activities through the media. Yates and Orlikowski (1992) further assert that
113 corporate communication necessitates a structuration process that enacts an
114 organization's norms, rules, and structures. Thus, messages disseminated through the
115 corporate website, press release, and other media for example, are often imbued with
116 meanings and normative values that can help instill confidence of the investors and
117 other stakeholders such as employees and customers (Liu, Pennington-Gray, &
118 Klemmer, 2015; Riel & Fombrun, 2007). These media are an effective avenue for
119 organizations to reframe their crisis management capabilities, to harness public
120 understanding, and to seek further corporate and strategic alliances (Park, Kim, &
121 Choi, 2019; Pearson & Clair, 1998).

122 **Methods**

123 Corpus linguistics is a computer-aided analysis method for a large volume of
124 textual data. "The word corpus is Latin for body (plural corpora), and in linguistics a
125 corpus is a collection of texts (a 'body' of language) stored in an electronic database"
126 (Baker, Hardie, & McEnery, 2006, p. 48). It is a branch of modern linguistics
127 (Tognini-Bonelli, 2001), combining linguistics theory and computing techniques. It
128 mainly focuses on the computer-assisted language study of naturally occurring textual
129 patterns on large computerized corpora (Pollach, 2012). Corpus linguistics has been

130 used in the field of management for more than 10 years to explore metonymy as a
131 conventional way of understanding organizations, to evaluate narratives in company
132 annual reports, and to interpret business communications (Humphreys & Wang, 2017).
133 There are three classic types of corpus-based analyses: keyword analysis,
134 concordance analysis, and collocation analysis. *Keyword* refers to a lexical item and is
135 used to “reveal the textual patterns or ‘styles’ in particular data” (Culpeper, 2009, p.
136 33). *Keywords* are words that are statistically more frequent than expected in one text
137 when compared with another. Keyword analysis is often conducted through
138 comparison of two corpora. One is used as a reference corpus and serves as the norm
139 (or reference) for the textual features. The other corpus is compared to the norm (i.e.,
140 the reference corpus) and quantitatively identifies the differences of textual features
141 that deviate from the norm. The overuse and underuse of keywords in the corpus
142 relative to the reference corpus are calculated based on statistical measures to show
143 the textual differences (Pollach, 2012). Concordance analysis helps identify key
144 textual themes. It is closely related to keyword analysis, and they are often conducted
145 together. Concordances (often called “keyword-in-context”) is the immediate textual
146 context of the keywords that occurred in the corpus (Pollach, 2012). Concordance
147 analysis investigates a collection of concordance lines of a searched word, with a
148 predetermined span of length of words, from a standardized 80 words in corpus tool
149 *Wmatrix* (Brezina, Timperley, & McEnery, 2018) to the full context that the word is
150 used. Collocation analysis is a corpus-assisted analysis to identify the statistically
151 significant co-occurrence of two lexical items of a search term (Humphreys & Wang,

152 2017; Pollach, 2012). Collocation analysis allows a quantitative exploration of the
153 linkages and developments of a large amount of meaningful linguistic items at a
154 discursive level.

155 Since this study focuses on the hotel industry, the hotel chains listed in the
156 2019 Fortune 500 list were chosen for data collection. Six enterprises were retained,
157 including Marriott International, Las Vegas Sands, MGM Resorts International,
158 Hilton Worldwide Holdings, Caesars Entertainment, and Wynn Resorts. All of them
159 are US-based companies with their headquarters located in the US. Of the six
160 enterprises, four of them operated gaming business in Las Vegas (i.e., MGM, Caesars,
161 Wynn, and Sands), while five of them had a strong global presence with properties
162 located in China and other Asian countries.

163 Press releases of these companies published during the period of January to
164 March 2020 were collected. This time period was chosen because COVID-19 was
165 first reported in January, and the crisis turned into a global pandemic in March. In
166 total, 141 press releases, containing 70,318 words, were obtained. These press
167 releases were compiled into three corpora: *January Press Release Corpus* (22,106
168 words); *February Press Release Corpus* (22,828 words) and *March Press Release*
169 *Corpus* (25,384 words). Two types of analyses were performed through keyword
170 analysis and collocation analysis using *Wmatrix* and *LanCSBox* (Brezina, et al., 2018),
171 respectively. Also, stop words and company names were removed from further
172 analysis in order to focus on the lexical patterns and to reduce bias from the sampled
173 data, respectively.

174 **Findings**

175 *Keyword analysis*

176 The February Corpus was compared to the January Corpus (i.e., norm), to
177 identify the key differences in textual features. The keywords were sorted based on
178 the Log Likelihood significance test, using a cut-off value of 15.13 with a 99.99%
179 confidence ($p < .001$). There is no overused word that exceeds the LL value 15.13,
180 and there are 11 underused words in February relative to January. In both of the
181 corpora, there is nothing mentioned related to COVID-19 or health issues. The textual
182 features of the two corpora are quite similar, except for a few underused words; they
183 include “VICI,” “buyer,” “entertainment,” “lease,” “magazine,” “corporate,”
184 “transaction,” “closing,” “newsweek,” and “entertainment.” Due to space concerns,
185 details of the analysis are presented in Appendix 1.

186 Next, we compared keywords of the March corpus relative to that of February.
187 Here, the keyword analysis shows the underused words with $LL > 15.13$ ($p < 0.0001$)
188 in March relative to February. The more frequent lexical items (i.e., keywords) are
189 those towards the top of the table with higher LL values. There are a few words that
190 are heavily underused in the March corpus such as “adjusted,” “five-star,” “quarter,”
191 “totaled,” “diluted,” “fourth,” and more (see Table 1).

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193 *Insert Table 1 here*
194 -----

195 Underused keywords mainly revolved around themes of business growth and
196 performance (e.g., “business,” “five-star,” “higher,” and more). Here, the keyword
197 analysis shows the overused words with $LL > 15.13$ ($p < 0.001$). The more frequent

198 lexical items are those towards the top of the table with higher LL value. There are a
199 few keywords that dominate the March corpus, such as “COVID-19,” “close,”
200 “cleaning,” “health,” “health and safety,” and “employees” (see Table 2).

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202 *Insert Table 2 here*
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204 *Concordance analysis*

205 The overused keywords were further explored through the concordance
206 analysis, which is a way to identify key textual themes (Baker, et al., 2008).
207 Concordances (often called “keyword-in-context”) is the immediate textual context of
208 the keywords that occurred in the corpus (Pollach, 2012). The keywords were
209 extracted in predetermined contextual span of 80 words for further thematic
210 exploration. Concordance analysis investigates a collection of concordance lines of
211 a searched word. Lexical items or keywords are identified to be clustered around four
212 themes: “crisis,” “cleaning,” “closure,” and “operations” (see Tables 3). Crisis is the
213 most dominant theme, to include keywords such as “COVID-19,” “pandemic,”
214 “crisis,” “monitoring,” “health,” “safety,” and more. The cleaning theme describes
215 issues relating to “protocol,” “guidance,” “procedure,” and “contact” as
216 organizational endeavors to ensure a clean and disinfected environment. The third and
217 fourth themes, germane to closure and operations, refer to the actual response of
218 hotels with keywords such as “close,” “temporarily,” “as soon as,” and “date,” as well
219 as “employee” and “information,” to address impacts of the crisis within their
220 business operations. Exemplary statements are presented in Table 4.

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Insert Tables 3 and 4 here

224 *Collocation analysis*

225 Collocation analysis is further conducted through the corpus software:
226 *LancsBox*. Collocation analysis is a corpus-assisted analysis to identify the
227 statistically significant co-occurrence of two lexical items in a text, with a
228 predetermined span and, in this case, five words on either side of the searched term
229 (Pollach, 2012). The findings from Table 5 reveal that the crisis theme mainly
230 co-occurs with coronavirus-related keywords (e.g. crisis, cases, reported, coronavirus),
231 health-related keywords (e.g., concern, wellbeing), person-related keywords (e.g.,
232 employees, team, members, public, guest), and prevention-related keywords (e.g.,
233 measures and monitor). This theme co-occurs with words of multiple meanings, while
234 the keywords of cleaning themes co-occur with words mainly expressing cleanliness,
235 like “hygiene,” “sanitizing,” and “protocol.” The keywords of the closure theme
236 co-occur with words expressing the meaning of shutdown (e.g., suspend) and timing
237 for reopening (e.g. date, appropriate, soon, scheduled). The keywords of the operation
238 theme mainly co-occur with words related to people (e.g., communities, families,
239 their, guests), the coronavirus (e.g., contact, disease, and policy) and business
240 functions (e.g., operations, working, board). The collocation analysis provides a more
241 rigorous exploration of hotels’ response to the coronavirus.

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Insert Tables 5 here

245 **Discussion**

246 In summary, the above analyses reveal lexical patterns that evolved over the
247 course of the first quarter in 2020. The hotel industry, exemplified by the six selected
248 companies in this study, were fairly sluggish in responding to the pandemic even after
249 it was first reported by China and the WHO back on January 3rd, and while the
250 coronavirus was widespread globally in February. This lag may be attributed to
251 organizational inertia and poor crisis management deployed (Prayag, 2018), as
252 organizations often place a strong emphasis on past success (Williams, et al., 2017),
253 especially during the annual report announcement season, with a goal to improve their
254 stakeholders' confidence. As such, their complacency is reflected in lexical items
255 such as "growth," "increase," "gains," "development," "RevPAR," "EPS," "Forbes,"
256 "higher," and "income" that express confidence and optimism for their businesses.

257 Unfortunately, while the management dwelled on their past achievement in
258 2019, the pandemic eventually became a global crisis and hit the US extremely hard,
259 despite all the warnings around the globe (Craven, et al., 2020). As procrastination is
260 the father of failure, these hoteliers have faced devastating consequences such as
261 single digit occupancy (STR, 2020) and a health crisis within their properties since
262 March. The complications were manifested in their press release with keywords such
263 as "COVID-19," "crisis," and "pandemic" that were awash also in the public domain.
264 The management was calling for extreme measures to maintain the status quo, with
265 words such as "protocol," "procedure," "guidance," "cleaning," "health," "safety,"
266 and "hygiene." Although these measures were necessary, slow responses to the

267 pandemic at the national and enterprise level, coupled with social distancing and
268 travel bans, resulted not only in cancelation of “reservation[s]” but also “closing”
269 their “operations.” The “closure” of some hotel properties is cast as “temporarily,”
270 where there is still optimism to reopen them “as soon as” the outbreak is contained;
271 words such as “ensure” manifest the management’s confidence.

272 There are also some subtle differences in how the management frames their
273 business. In the first two months, the tone of communications reflected top
274 management’s demonstration of success and performance, attributed to the CEOs
275 themselves, with words such as “me” and “my.” Then the tone completely changed
276 with emphasis on “we,” “employee,” “human,” and “working [together],” words that
277 put attention on social support, togetherness, and shared responsibility.

278 ***Research Implications***

279 The core contribution of this study lies in an important understanding of
280 corporate crisis communication by demonstrating evolutionary phases of how
281 international hotel enterprises respond to crisis. By taking a crisis-as-process
282 perspective (Williams, et al., 2017), it illustrates some evolutionary features in
283 confronting severe adversity. For example, the management’s attitude and hence, their
284 strategic attention recorded a radical change from optimism in February, amid
285 growing signs of devastating events leading to total pessimism in March. The tone of
286 the communication protocol also transformed, with the urge to jettison

287 self-complacency and to recast management's sincerity in soliciting support and
288 understanding.

289 In essence, this study showcases a novel approach in assessing the evolution
290 of organizational crisis communication through the lens of computational linguistics
291 (Humphreys & Wang, 2017; Pollach, 2012). Using a large corpus of textual data,
292 findings demonstrate how lodging firms capitalize on the public media to reassure
293 stakeholder confidence and to regain status quo legitimacy through framing the
294 management's experience and the organization's ad hoc capabilities in coping with
295 the COVID-19 outbreak. As an impression management tactic (Avraham, 2015;
296 Hooghiemstra, 2000), these framed messages not only imbue connotative meanings
297 that signify care and empathy, they also fortify the image of organizational resilience
298 in combating the crisis.

299 However, despite the abovementioned organizational initiatives in managing
300 crisis communication, businesses will need to reframe their taken-for-granted
301 business models with a very different crisis management and resilience scheme
302 (Paraskevas & Quek, 2019; Prayag, 2018). A radical approach is urgently needed,
303 with emphasis on proactive enactment and ad hoc solutions that facilitate tourism
304 providers to move quickly through the various phases of crisis management, including
305 rapid and perhaps computer-assisted (i.e., AI-based) single detection, preparation
306 prevention, containment, recovery, and (re)learning (Zhao, Lu, & Wang, 2013).

307 Unfortunately, based on the cases from the hoteliers presented above, the hope
308 to achieve a state of rapid and effective crisis management is rather slim, as there is

309 no evidence to illustrate that the hotel industry, for example, is ready for damage
310 control and other recovery measures thus far. There is a good likelihood that the
311 world will face a prolonged period of travel restrictions and social distancing that
312 could put most tourism-hospitality firms in a dire situation (Craven, et al., 2020). As
313 we are only seeing the dawn of the stay-at-home economy, there is a real concern for
314 how the tourism-hospitality industry will survive. It is indeed time to unlearn and then
315 relearn what works and what does not work through constant reframing of mental and
316 business models and plans (Reeves, et al., 2020).

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Table 1: Underuse Keywords of March Relative to February

<i>Keywords</i>	<i>O1</i> <i>(Mar.)</i>	<i>1%</i>	<i>O2</i> <i>(Feb.)</i>	<i>2%</i>	<i>LL</i>	<i>%Diff</i>
five-star	1	0	47	0.23	55.47	-97.81
fourth	0	0	38	0.18	51.57	-100
adjusted	1	0	38	0.18	43.68	-97.29
totaled	0	0	25	0.12	33.93	-100
EPS	0	0	22	0.11	29.85	-100
net	0	0	21	0.1	28.5	-100
diluted	0	0	21	0.1	28.5	-100
diversity	4	0.02	35	0.17	27.37	-88.23
comparable	0	0	20	0.1	27.14	-100
rooms	4	0.02	33	0.16	25.1	-87.52
2019	4	0.02	33	0.16	25.1	-87.52
spa	3	0.01	30	0.15	24.85	-89.7
consecutive	0	0	18	0.09	24.43	-100
Forbes	0	0	17	0.08	23.07	-100
supplier	1	0	22	0.11	23.04	-95.32
increase	1	0	22	0.11	23.04	-95.32
compared	1	0	22	0.11	23.04	-95.32
2019_fourth	0	0	16	0.08	21.71	-100
income	2	0.01	24	0.12	21.3	-91.42
growth	5	0.02	32	0.15	21.2	-83.91
me	3	0.01	24	0.12	17.98	-87.13
development	6	0.03	31	0.15	17.76	-80.07
fees	2	0.01	21	0.1	17.74	-90.19
expenses	2	0.01	21	0.1	17.74	-90.19
diverse	2	0.01	21	0.1	17.74	-90.19
RevPAR	2	0.01	21	0.1	17.74	-90.19
military	0	0	13	0.06	17.64	-100
gains	0	0	13	0.06	17.64	-100
base	0	0	13	0.06	17.64	-100
businesses	1	0	17	0.08	16.76	-93.94
my	11	0.05	40	0.19	16.67	-71.68
family	4	0.02	25	0.12	16.32	-83.52
higher	0	0	12	0.06	16.28	-100
content	0	0	12	0.06	16.28	-100
basis	0	0	12	0.06	16.28	-100
assumes	0	0	12	0.06	16.28	-100
FTG	0	0	12	0.06	16.28	-100

Note: O1 and O2 are the observed frequency in March and February corpora, respectively. The %1 and %2 values show relative frequencies in the texts. The “+” indicates overuse and “&” indicates underuse in O1 relative to O2. The table is sorted on log-likelihood (LL) value = 15.13.

Table 2: Overuse Keywords Analysis of March Relative to February Corpus

<i>Keywords</i>	<i>O1</i>	<i>1%</i>	<i>O2</i>	<i>2%</i>	<i>LL</i>	<i>%Diff</i>
COVID-19	48	0.24	1	0	59.56	5.63
cleaning	34	0.17	0	0	48.14	6.13
we	206	1.03	99	0.48	41.57	1.1
employees	34	0.17	2	0.01	35.41	4.13
close	29	0.14	1	0	33.65	4.9
Health and_safety	23	0.11	0	0	32.57	5.57
gaming	35	0.17	4	0.02	29.19	3.17
temporarily	20	0.1	0	0	28.32	5.36
health	24	0.12	1	0	26.94	4.63
crisis	24	0.12	1	0	26.94	4.63
donated	19	0.09	0	0	26.9	5.29
safety	17	0.08	0	0	24.07	5.13
pandemic	17	0.08	0	0	24.07	5.13
ensure	20	0.1	1	0	21.64	4.36
date	20	0.1	1	0	21.64	4.36
protocols	15	0.07	0	0	21.24	4.95
reservations	28	0.14	4	0.02	20.96	2.85
operations	28	0.14	4	0.02	20.96	2.85
information	53	0.26	17	0.08	20.51	1.68
Public health	14	0.07	0	0	19.82	4.85
Human rights	14	0.07	0	0	19.82	4.85
guidance	14	0.07	0	0	19.82	4.85
contact	14	0.07	0	0	19.82	4.85
closing	14	0.07	0	0	19.82	4.85
procedures	13	0.06	0	0	18.41	4.74
closure	13	0.06	0	0	18.41	4.74
as_soon_as	13	0.06	0	0	18.41	4.74
CDC	13	0.06	0	0	18.41	4.74
monitoring	17	0.08	1	0	17.7	4.13
meals	17	0.08	1	0	17.7	4.13
betting	25	0.12	4	0.02	17.56	2.69
measures	12	0.06	0	0	16.99	4.63
hygiene	12	0.06	0	0	16.99	4.63
human	12	0.06	0	0	16.99	4.63
appropriate	12	0.06	0	0	16.99	4.63
working	39	0.19	12	0.06	15.86	1.74
changes	11	0.05	0	0	15.58	4.5

Table 3. Major Themes

<i>Themes</i>	<i>Keywords used</i>
crisis	COVID-19, pandemic, health and safety, health, safety, crisis, public health, monitoring, CDC
cleaning	cleaning, protocol, guidance, procedure, contact
closure	close, closure, closing, temporarily, as soon as, date
operations	gaming, employee, operation, information

Table 4. Keyword-in-Context: Exemplary Statements for the Themes

<i>Themes</i>	<i>Concordance lines</i>
Crisis	<ol style="list-style-type: none">1. There have been no reported Covid-19 at Caesars Entertainment.2. The health and safety of our team members and guests are always a priority3. This is a unique and unprecedented public health crisis.4. The Company has also given thousands of protective gloves and surgical masks to local nursing homes and law enforcement facilities that are battling supply shortages related to the pandemic.5. We are closely monitoring the World Health Organization (WHO), the Centers for Disease Control and Prevention (CDC), and local health agencies for the latest developments related to COVID-19.
Cleaning	<ol style="list-style-type: none">1. Caesars has implemented enhanced cleaning and sanitizing protocols throughout our facilities, based on recommendations of the Centers for Disease Control.2. Daily, our hotels around the world are working to ensure that they meet the latest guidance from the CDC.3. We had implemented social distancing protocol and enhanced cleaning procedures this past weekend.4. Close contact is defined as being within six feet of someone who is symptomatic for a prolonged period of time.
Closure	<ol style="list-style-type: none">1. Reservations during this temporary closure will be cancelled.2. We will reopen as soon as it is appropriate and safe to do so.3. To date, there have not been any reported cases of covid-19.
operations	<ol style="list-style-type: none">1. All licensed gaming and racing operations in Indiana will close at 6:00 a.m. on Monday, March 16, 2020.2. We will work hard to mitigate the impact this will have on our employees and communities.3. This led us to focus on mitigating potential risks in hotel operations.4. More information on those protocols is available here.

Table 5: Collocation Analysis for March Corpus Overuse Keywords

<i>Theme</i>	<i>Keywords</i>	<i>Collocates and frequency</i>
Crisis	COVID-19	cases 18; coronavirus 18; reported 13; novel 10; pandemic 10; health 6; impact 5;
	health and safety	team 9, members 9, measures 5, date 5;
	health	safety 32, public 21, local 11; prevention 10, team 10, district 8, world 8, date 7, guests 7, southern 7, Nevada 6; concern 6, COVID-19 6, crisis 5, agencies 5; department 5; measures 5, organization 5, wellbeing 5;
	safety	health 32, team 11, members 9, associates 7, guests 7, employees 5, measures 5,
	crisis	health 5, public 5, unprecedented 5
	public health	concern 6, crisis 5
	Pandemic	COVID-19
CDC	prevention 5;	
Monitoring		
Cleaning	cleaning	protocols 13, enhanced 8, guest 8; our 8 implement 7, procedures 7, room 7 hygiene 6, disinfecting 5, sanitizing 5 products 5; use 5; area 5
Closure	close	Temporarily 16; beginning 8; casino 8; operations 8, public 7, Monday 7
	closure	temporary 24 ; announces 9; resorts 8; international 7; statement 7; today 6; gaming 5; march 5
	closing	process 9; smooth 8
	temporarily	close 16; operations 6; announced 5; closed 5; effective 5, resort 5; suspend 5; today 5.
	as soon as	appropriate 12; reopen 12; date 8; establish 8; reopening 8; gaming 7; determines 5
date	establish 8; reopening 8; reservations 8; soon 8; arrival 7; health 7; COVID-19 5; officials 5; scheduled 5	
Operation	gaming	commission 17; Indiana 14; board 11; operations 9; racing 8; determines 7; ordered 7; smooth 7; soon 7; appropriate 6; all 6; Illinois 6; kiosks 6; suspend 6; announced 5; closure 5; licensed 5; Louisiana 5; mississippi 5; sates 5; working 5
	employee	guests 15; their 8; families 6; communities 5; safety 5
	operation	suspend 13; gaming 9; close 8; temporarily 6; beginning 5
	information	more 15; additional 8; disease 7; most 7; contact 5; policy 5

Appendix 1: Keyword Analysis of February Relative to January Corpus

<i>Keywords</i>	<i>O1 (Feb.)</i>	<i>1%</i>	<i>O2 (Jan.)</i>	<i>2%</i>	<i>LL</i>	<i>%Diff</i>
VICI	0	0	7	0.62	41.39	-100
buyer	0	0	6	0.53	35.48	-100
entertainment	8	0.04	9	0.79	30.56	-95.12
Reno	1	0	6	0.53	29.84	-99.09
lease	0	0	4	0.35	23.65	-100
magazine	1	0	4	0.35	18.75	-98.63
corporate	17	0.08	8	0.71	17.77	-88.34
transaction	0	0	3	0.26	17.74	-100
closing	0	0	3	0.26	17.74	-100
Newsweek	0	0	3	0.26	17.74	-100
environmental	4	0.02	5	0.44	17.63	-95.61




Note: O1 and O2 are the observed frequency in February and January Corpus, respectively.

%1 and %2 values show relative frequencies in the texts.
The table is sorted on log-likelihood (LL) value = 15.13

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<p>Juanjuan Ou</p>	 A portrait of a woman with long, straight black hair, wearing a white collared shirt. The background is a solid light blue.	
<p>IpKin Anthony Wong</p>	 A portrait of a man with short dark hair and glasses, wearing a grey suit jacket, a dark shirt, and a blue patterned tie. The background is a blurred outdoor setting with greenery.	
<p>Andrew Wilson</p>	 A portrait of a man with short brown hair, smiling. He is wearing a green jacket. The background is a plain, light-colored wall.	

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Author contribution:

Juanjuan Ou embarked on data planning, data collection, data analysis, and manuscript write up. IpKin Anthony Wong engaged mostly manuscript write up and the overall design of the study. Andrew Wilson contributed in study design and data analysis.