

COMPARATIVE ANALYSIS OF KEY SERVICE ATTRIBUTES BETWEEN COVID-19 QUARANTINE HOTELS AND GENERAL HOTELS BY ONLINE REVIEW MINING

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ABSTRACT. *Due to the COVID-19 pandemic, some countries require a mandatory quarantine for up to 21 days. Hotels have become alternative quarantine sites due to the shortage of government facilities. Quarantine procedures adopted by hotels have overlooked the guests' comfort and well-being. Quarantined guests have complained about the deterioration of their physical and mental health caused by being confined in an enclosed space. The objective of this study is to discover critical quarantine service attributes and to have a deep understanding of quarantined guests' sentiments. A combination of LDA and Skip-Gram was used to identify, cluster, and analyze quarantine service attributes. A comparative analysis was conducted between general and quarantine hotels and the results show an overall similarity of only 15.79%. A case study on 23 quarantine hotels in Hong Kong was analyzed and managerial implications were presented to highlight best practices and manage service failures.*

Keywords: Text mining, Natural language processing, LDA, Skip-Gram, Quarantine hotels

1. Introduction. The proliferation of the COVID-19 pandemic brought about the creation of protocols on social distancing and self-isolation in order to mitigate the spread of the virus. Specifically, in Hong Kong, anyone who arrived overseas is obligated to undergo mandatory quarantine for 7 to 21 days depending on the vaccination status, citizenship, and occupation. A Polymerase Chain Reaction (PCR) test should be performed at the airport and test results should be negative before checking out of the hotel. The government has arranged for staff at the airport to assist people arriving in Hong Kong, get the PCR test, and transport them to the designated hotel. Hotels have taken on the role of being a quarantine site due to the shortage of government facilities. Although there are measures adopted by hotels to perform quarantine procedures, the hotel guests' comfort and well-being are neglected. There is an information gap on the quarantine hotel services and the guests' sentiments during this isolation period. For example, in the news article [1], quarantine hotels are referred to as 'prison-like' conditions with rising concerns about the quality of food, social distancing protocols, and lack of fresh air. Many guests have complained about the deterioration of their physical and mental health caused by being confined in an enclosed space. The brand image of the hotel may also be in jeopardy due to this situation. Hotels are not originally designed to become quarantine facilities, but because of uncontrollable circumstances, they have to adapt and innovate. It is imperative for quarantine hotels to assess their current services by maintaining good practices and correcting service failures. Although quarantine protocols are being lifted, it is important to know the key issues and understand guest sentiments because it will have an effect on the overall image of these hotels.

Several studies have dealt with quarantine hotels' services. [2] was about the isolation experience of being quarantined in a hotel. They found a pervasive psychological effect in which the guests claim to experience symptoms of anxiety and depression. It was recommended to further analyze the integration of behavioral health in caring for isolated quarantined guests. Another study [3] showed that the major health issues presented in quarantine hotels were anxiety, suicidal ideation, psychosis, and behavioral disturbances. These mental health issues are confirmed to affect both guests and quarantine hotel workers. In [4], the hotel workers were challenged with frequently changing protocols, the hassle of wearing protective gear, constant cleaning and disinfecting of shared spaces such as elevators and hallways, and implementation of quarantine services. These new protocols heightened their stress levels and it was recommended that hotel management should provide mental health assistance programs to their employees. In [5], they assessed the role of Corporate Social Responsibility (CSR) in the perspective of quarantine hotels. The hotels were presented with the dilemma of volunteering to be quarantine facilities that could potentially improve their positive CSR but run the risk of scaring off their patrons due to the increased possibility of getting infected. In [6], they investigated the experiences of 54 hotel guests during quarantine by conducting a questionnaire-type survey. Guests mentioned windows, ventilation, and natural lighting as important factors. Furthermore, these guests expressed their unwillingness to return to their quarantined hotel, which could be detrimental to the future of quarantine hotels in a post-pandemic setting. Although there are several studies analyzing the service of quarantine hotels, most are focused primarily on the condition of the quarantined guests and the quarantine policies adopted. There is a lack of effective methodologies for practical analysis which has hindered the proper monitoring of the guests' evaluation of the hotels. In order to derive more comprehensive and objective insights based on evaluations made by quarantined guests, mining of online reviews will be utilized. A systematic approach is developed using natural language processing techniques in order to evaluate these online reviews. The insights gained can be used to identify and differentiate key service factors and guest sentiments between general hotels versus quarantine hotels, as well as to present managerial implications.

The main contributions of this paper include 1) comparative analysis of the critical service attributes between general hotels and quarantine hotels, and 2) identification of salient reviews of quarantine hotels to uncover insights that have managerial implications. The aim is to provide a practical analysis of service quality evaluation through review mining. This study is organized as follows. Section 2 investigates the theoretical background and Section 3 presents the research methodology. Section 4 presents the results and findings from the case study. Section 5 consists of the managerial implications. Section 6 gives the conclusion.

2. Theoretical Background. This section investigates the theoretical background of Natural Language Processing (NLP) and its involved techniques applied in this paper. NLP is a branch of artificial intelligence with the objective of enabling computers to decode, interpret, and understand human languages. It can provide advanced insights for marketing analytics that were originally unfeasible due to the large volumes of data. Languages consist of large sets of vocabularies that would be unfeasible for humans to label and process manually. Hence, it would necessitate machine learning to identify and understand the relationship between words. One NLP technique applied in this paper is Latent Dirichlet Allocation (LDA). It is a common method for topic modeling with the ultimate goal of categorizing abstract "topics" from a group of documents [7]. It is an unsupervised text-mining tool to uncover hidden semantic structures. Findings from LDA are used to understand the topic distribution, especially for online reviews where users convey their personal opinions using their own vernacular. The objective of LDA

is to understand what topic or category a document is associated with based on the words in it. The words contained in each topic are ordered based on the frequency it occurs. These words have a high probability to belong to a certain topic compared to the probability of occurrence across all topics grouped together. The other NLP method is word embedding. It converts words to numeric forms (vectors) that are used as inputs in deep neural networks. One method of word embedding is Word2Vec. It is a neural network probabilistic language model developed by Google to compute the vector representations of words [8]. The main concept of Word2Vec is that it extracts words with high similarity based on semantic context using the data training set provided. This algorithm exhibits high efficiency and relatively high accuracy in predicting semantic similarity. In [9], the Word2Vec model was used to analyze aspects of hotel reviews and yielded high accuracy in measuring the similarity of context words. There are two main algorithms under Word2Vec that can be used in predicting other words in a vector: CBOW (Continuous Bag-Of-Words) and Skip-Gram. CBOW predicts the target word using previous and subsequent words while Skip-Gram predicts the context using the target words. These target words are used to train data sets and discover which words are highly correlated to them. Skip-Gram is used for small data sets, represents infrequent words, and predicts relevant context.

The limitation of LDA is that it only uncovers the underlying topics within the collection of documents. It does not cluster the topics based on their semantic context. LDA also does not capture specific details such as low-frequency keywords and newly emerging terms. Some important context words and salient terms might be missed because of this. In [10,11], a combination of both LDA and Skip-Gram would reach a higher level of classification accuracy as opposed to using them individually. The integration of the two techniques was done for the purpose of sourcing contextual information within a corpus. The results are much more distinguished compared to those generated solely through LDA. This fusion model can perform with higher discrimination and classification. Therefore, a combination of LDA and Skip-Gram was chosen in this study.

3. Research Methodology. The proposed methodology is represented in Figure 1 and consists of three main steps. The data-preprocessing step is the preliminary part while the feature extraction and comparative analysis form the backbone of the framework.

Data Source

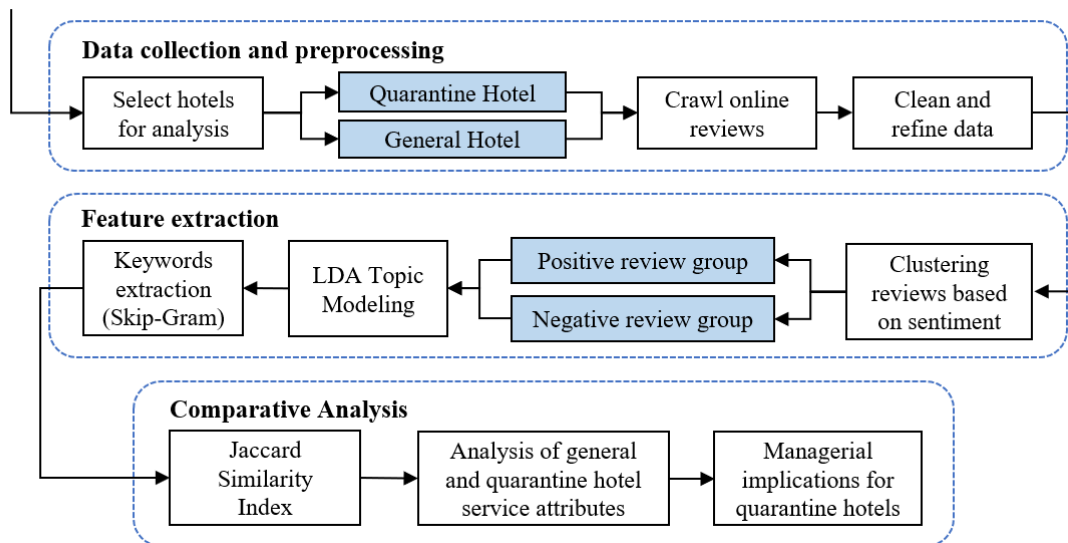


FIGURE 1. Methodological flowchart

First, data collection is performed using the ‘*RSelenium*’ package provided by the R programming language [12]. We extract reviews from the travel website (e.g., TripAdvisor.com) for both quarantine and general hotels, split online reviews into sentences and refine all sentences by removing punctuations and stop words. It is then clustered based on positive or negative sentiment. We then utilize LDA to categorize the words into specific topics. The word sets per topic are used as data training sets and transformed into vectors for Skip-Gram analysis. The extracted words from the vectors are used for the comparative analysis.

In general, a single review may contain multiple sentences even on the same subject, and a single sentence also can include multiple opinions even in the same entity. Thus, for having a more fine-grained view of the different opinions as well as deriving the various feelings from reviews, the sentiments of the online reviews are clustered on a sentence-based level. The online reviews of both the quarantine and general hotels are clustered whether they have positive or negative sentiments. The procedure of categorizing the reviews into positive and negative groups is suggested in [13]. A sentiment dictionary is divided into 2, which are positive and negative lexicons. As a result, the hotel reviews are divided into two sentiment groups, which are the positive review group and the negative review group.

The next step is feature extraction. This is accomplished by performing LDA to identify the underlying service attributes that users consider important in evaluating hotel services. In online reviews, hotel guests select words from their own vernacular to convey their personal opinions. Using LDA, we identify the main service attributes and they will be used as training data for the Skip-Gram algorithm. In this study, the context of each service attribute is represented by a Skip-Gram of words. These word representations illustrate the relationship between the context words and the service attributes identified. Words with higher correlation scores will have a bigger impact on the service attribute. This combination is befitting to extract the service attribute contexts in online reviews. Through the combination of LDA and Skip-Gram, we will be able to extract the most salient and distinct keywords in the context of quarantine and general hotels. The final step is the comparative analysis of the features extracted between quarantine hotels and general hotels. The words extracted for each hotel type, each service attribute, and each sentiment review group are analyzed using the Jaccard similarity index. The Jaccard similarity measure is often used to measure the semantic similarity of texts and documents. The computation of the semantic similarity measure is provided in [14]. Lastly, an in-depth analysis is conducted by reviewing the online reviews based on the top distinct and salient words extracted from the LDA and Skip-Gram analysis. The managerial implications are then presented by identifying service failures and recommending best practices for quarantine hotels.

4. Case Study. This study focused on single-location data due to the vast differences and varying development of the COVID-19 pandemic across different areas and countries. This will ensure that regional variances will not impact the study. This study focused on quarantine hotels in Hong Kong since there is a sizable number of online reviews and the issues regarding quarantine are still relevant. The list of quarantine hotels was sourced from the Hong Kong government [15]. A total of 23 quarantine hotels in Hong Kong were selected based on the list provided by the Hong Kong government. We extracted 3,003 online reviews for quarantine hotels and 19,574 online reviews for the top 10 general hotels in the period December 2019 to April 2022 from TripAdvisor. All reviews for quarantined hotels and general hotels were split into 22,946 and 66,515 sentences, respectively. LDA was conducted and the optimal number of topics found is 7. As a result, the key service attributes are summarized as Views, Location, Stay, Check-in, Staff, Room, and Food. The top words of each probability distribution are then used as the training data set for the

Skip-Gram algorithm. This is performed for each hotel type, each sentiment review group, and each service attribute. The extracted words will reflect the most salient terms in the context of hotel type, service attribute type, and sentiment grouping. The Jaccard Index is calculated to measure the similarities between general hotels and quarantine hotels, which is shown in Table 1. Based on the Jaccard index scores, the overall similarity score is 15.79%. The similarity score is 15.53% for the positive review group and 13.49% for the negative review group. There is only a small percentage of similarity between general and quarantine hotels across all categories. The results indicate that the two sets are dissimilar.

TABLE 1. Jaccard similarity index score

	Views	Location	Stay	Check-in	Staff	Room	Food
Positive	18.28%	18.92%	15.18%	15.18%	21.55%	15.79%	16.40%
Negative	11.11%	14.58%	11.11%	6.28%	13.40%	8.37%	11.68%

The most distinct and salient terms for the positive review group and negative review group are shown in Tables 2 and 3 respectively. These extracted keywords are used to conduct an in-depth analysis of the online reviews to better understand the differences between quarantine hotels and general hotels. Some of the extracted words were left unmodified even if it contains typographical errors and used British English spelling.

TABLE 2. Top extracted words from Skip-Gram analysis for positive review groups

General hotel														
No	Views		Location		Stay		Check-in		Staff		Room		Food	
1	Breathtaking	0.99	Close	0.96	Pleasure	0.96	Early	0.92	Friendly	0.99	Suite	0.96	Japanese	0.94
2	Spectacular	0.99	Strategic	0.96	Enjoyable	0.94	Seamless	0.92	Helpful	0.98	Upgraded	0.95	Cafe	0.94
3	Panoramic	0.95	Subway	0.95	Experience	0.94	Speedy	0.90	Professional	0.98	Superior	0.92	Highend	0.94
4	Skyline	0.95	Mtr	0.95	Friends	0.93	Shortly	0.88	Accommodating	0.97	Roomy	0.90	Breakfast	0.94
5	Overlooking	0.95	Near	0.95	Trip	0.91	Granted	0.88	Smiling	0.95	Kitchenette	0.86	Cafeteria	0.93
Quarantine hotel														
No	Views		Location		Stay		Check-in		Staff		Room		Food	
1	Harbour	0.99	Situated	0.94	Positive	0.90	Whatsapp	0.98	Attentive	0.97	Spacious	0.96	Variety	0.98
2	Sea	0.94	Proximity	0.93	Manageable	0.90	Seamless	0.92	Caring	0.95	Clean	0.96	Vegetarian	0.94
3	Balcony	0.93	Nearby	0.93	Proud	0.89	Proactive	0.91	Responsive	0.93	Rooms	0.95	Selections	0.94
4	Lit	0.91	Restaurants	0.92	Completed	0.88	Escorted	0.90	Informative	0.93	Tidy	0.94	Foodpanda	0.93
5	Terrace	0.90	Accessible	0.92	Memorable	0.88	Speedy	0.89	Manner	0.92	Bright	0.94	Delivery	0.93

TABLE 3. Top extracted words from Skip-Gram analysis for negative review groups

General hotel														
No	Views		Location		Stay		Check-in		Staff		Room		Food	
1	Cloudy	0.91	Far	0.93	Doubt	0.93	Delayed	0.90	Rude	0.95	Complaint	0.90	Mediocre	0.94
2	Floor	0.89	Hustle	0.91	Hesitate	0.90	Cancellation	0.90	Unfriendly	0.92	Bedding	0.89	Style	0.91
3	Exclusive	0.87	Bustle	0.90	Worst	0.89	Due	0.89	Communicating	0.92	Smoking	0.89	Pricey	0.91
4	Appointed	0.87	Craziness	0.89	Stopover	0.89	Delays	0.89	Doormen	0.91	Smelt	0.88	Grounds	0.90
5	Obscured	0.87	Distance	0.89	Typhoon	0.88	Protests	0.85	Barrier	0.90	Damp	0.88	Shortage	0.90
Quarantine hotel														
No	Views		Location		Stay		Check-in		Staff		Room		Food	
1	Building	0.97	Away	0.93	Worries	0.96	Exhausted	0.92	Documents	1.00	Blocked	1.00	Containers	1.00
2	Crowded	0.87	Impossible	0.88	Prison	0.95	Cancellations	0.90	Delayed	1.00	Walls	1.00	Portions	1.00
3	Streets	0.86	Dreadful	0.87	Physical	0.94	Handling	0.88	Ordering	1.00	Small	0.99	Selections	0.99
4	Repulse	0.86	Stops	0.86	Lock	0.94	Needless	0.86	Changing	1.00	Assigned	0.99	Range	0.99
5	Funky	0.86	Little	0.85	Anxious	0.92	Difficulty	0.86	Shame	1.00	Trapped	0.99	Limited	0.97

Based on the extracted words from the positive review group, it can be seen that the words used to describe each service attribute are different for general and quarantine hotels. For “Views”, general hotel guests highlight the overlooking skylines and rooftops.

However, this is not possible for quarantined guests as they are sequestered in their rooms. The quarantined guests value balconies, lofts, and terraces as they provide additional spaces to receive sunlight and fresh air as well as to appreciate views from the sea and harbor. As for “Location”, general hotel guests prefer hotels that are strategically located and within walking distance of the train station, while quarantined guests prefer the accessibility to terminals for quicker transport from the airport and the proximity to restaurants to be able to quickly order food via delivery. For the topic “Stay”, general guests highlighted their experiences with staycations with family and friends. The quarantined guests mentioned their experiences with the mandatory stay, zoom activities such as yoga group exercise, and receiving gifts from the hotel after completing the quarantine. Quarantined guests also gave a more positive outlook by having a sense of accomplishment and being proud to be able to finish the ordeal. For the topic “Check-in”, general guests praised the early, speedy, and flexible booking procedures while quarantined guests highlighted the quick response for bookings using the WhatsApp instant messaging application which is widely used in Hong Kong. Quarantined guests also highlighted the swift and straightforward procedures and the personal escort upon check-in. For the topic “Staff”, there are more positive similarities between general and quarantine hotels as they share a lot of synonymous adjectives to describe the employee’s demeanor. However, quarantined guests highlighted the use of WhatsApp for quick and constant communication with the hotel staff. Certain traits such as being caring, attentive, and informative can make the guests feel more at ease while in quarantine. As for the “Room”, general guests specially mentioned room upgrades while quarantined guests praised rooms that are clean, sanitized, and well-equipped. Having windows and a lit room is essential for quarantined guests. With regard to “Food”, general guests mentioned different cuisines such as Japanese, Italian, and Thai food. On the other hand, quarantined guests mentioned the provision of healthy, vegetarian, and halal options as well as delivery apps like Deliveroo and Food Panda.

There are more contextual differences in the negative review groups. For the topic “Views”, general guests complained about having obstructed, cloudy, and smog-filled views while quarantined guests mentioned the mediocre views of buildings and highways. Quarantined guests also mentioned the crowds that were protesting in the streets which escalated during the beginning of the pandemic. As for “Location”, general guests complained about the hustle and bustle of the city while quarantined guests complained about the hassle of being in crowded shuttle services especially if the hotel is located far from the airport. As for “Stay”, general guests mainly complained about bad experiences during stopovers and typhoons. Quarantined guests mentioned negative sentiments such as being confined, frustrated, and lonely during isolation, which indicates mental health issues. As for the topic of “Check-in”, general guests mainly complained about issues with their luggage and delays while quarantined guests undergo a different check-in procedure which would make them feel more exhausted and stressed. As for “Staff”, general guests have issues with rude, unfriendly, and unhelpful hotel employees while quarantined guests mainly complained about documentation problems, maintenance problems, ordering issues, and constant changing of quarantine protocols. As for “Room”, general guests have issues with the smell, particularly with smoke and mustiness. Quarantined guests complained about the small room size, poor ventilation, and insufficient supply of furniture. They also mentioned about feeling trapped and having issues with their assigned room due to them not being able to change rooms upon checking in. Lastly, for “Food”, general guests complained about the mediocre taste, overpriced food, and the shortage of selections in the hotel buffet. On the other hand, quarantined guests expressed negative sentiments about the repetitive and limited selections, small food portions, and issues with food containers due to dining in-room.

5. Managerial Implications for Quarantine Hotels. In order to formulate the managerial implications, we collated the online reviews based on the extracted words from the Skip-Gram model. A representation of some online reviews of quarantine hotels is presented in Table 4. The findings are divided by service attributes and we identified service failures as sentiments based on the negative review group and best practices as sentiments in the positive review group.

For the service attribute stay, the service failure was the disregard for guests' mental health. Mental health issues during this isolation period are consistent with previous studies. It is reaffirmed that taking care of quarantined guests' mental health is pivotal to repressing negative sentiments in online reviews. It is recommended to engage more with the quarantined guests by hosting Zoom group activities such as yoga and providing small gifts and treats during the course of the quarantine. Rebranding the quarantine experience in a positive way would be beneficial as some guests mentioned that they felt a sense of accomplishment in completing the mandatory quarantine.

As for the room, guests praised hotels that prioritized providing clean, sanitized, and well-equipped rooms. Several guests mentioned that they have to work online while in quarantine. Hotel managers could give better service to these types of guests by providing work desks, web cameras, and printers. When we look at the staff, the service failures were issues regarding documentation, booking changes, and delays. The best practices mainly focused on the hotel staff's demeanor towards the guests. They have praised employees for their attentiveness and responsiveness. WhatsApp Messenger was also a highlight for communicating with the staff and for check-ins. A proper communication channel specially catered to quarantined guests could help mitigate documentation issues and help staff monitor the individual concerns of guests. The location and views are also mentioned as important for quarantined guests. They prefer rooms and areas that have fresh air and sunlight. Not all rooms have actual windows or balconies, so providing artificial skylights and indoor plants would make a big difference. Hotels should also provide better shuttle service as this is one of their top concerns.

Finally, the last critical attribute is the food and delivery options. Service failures were the lack of diversity, repetitiveness, and delayed orders. The hotels should formulate healthy and diverse meal plans that can cater to guests with dietary or religious restrictions. Hotels can partner with local restaurants and food delivery apps to provide wider food selections and ensure on-time deliveries.

6. Conclusion. The purpose of this study is to have a comparative analysis of general hotels and quarantine hotels in order to differentiate the guest sentiments between them based on the seven service attributes, namely Views, Location, Stay, Check-in, Staff, Room, and Food. Utilizing NLP techniques such as LDA and Skip-Gram can aid in understanding quarantined guests' sentiments, especially for extracting contextual information. Based on the findings, it is confirmed that general hotels and quarantine hotels have different guest sentiments, contexts, and experiences. Distinct and salient contextual findings like the ones in this research can aid hotel management in analyzing the root cause of specific service failures.

Although there was a disproportional number of positive versus negative sentiments, this study could still identify the service failures in the negative review groups due to the Skip-Gram algorithm. A shortcoming of this study is the subjective interpretation of the topics and word correlations formed using LDA and Skip-Gram. Since this study mainly focuses on managerial implications, there was no qualitative evaluation of each hotel based on each service attribute. Rather, this study merely highlights the most saliently discussed service failures and best practices. The satisfaction rating and weight of each service attribute were not considered and the accuracy in extracting the keywords was not measured; this will be conducted in future studies. It is also recommended to utilize other

TABLE 4. Representative reviews of extracted features for quarantine hotels

Topic	Positive review group	Negative review group
Views	nice view of the end of a runway and the <u>sea</u> and mountains... watching the <u>sunrise</u> was a great experience... it was a joy each morning to wake up watching the <u>sunrise</u> over Victoria <u>Harbour</u> with the view of factories and near a <u>highway</u> , it's very noisy at night... the whole quarantine floor overlooks the <u>highway</u> and noisy... surrounded by other <u>buildings</u> so sunlight is an issue
Location	Spent my 14-day mandatory quarantine... easily <u>accessible</u> location with plenty of restaurants close by... <u>ideal</u> location directly in the airport <u>terminal</u> no need wait for shuttle bus	One needs to wait with the <u>crowds</u> for transportation... hotel location is not accessible and <u>impossible</u> for outside food delivery... we were packed in the Quarantine <u>Shuttle</u> Bus...
Stay	I have <u>completed</u> a 21 day quarantine here... a very <u>memorable</u> experience... <u>finished</u> the 21 days quarantine and I am <u>proud</u> this is supposed to be quarantine, not <u>prison</u> ... thought of being <u>confined</u> is depressing sometimes... feeling <u>anxious</u> constantly about my family and counting down days until I can see them...
Check-in	<u>WhatsApp</u> message to Reception I usually get a reply within 5 mins... attended to our check-in requests via their <u>whatsapp</u> chat	... <u>exhausted</u> after landing to HK... <u>hassle</u> with checkin and out process had to wait for 2hrs for quarantine clearance... <u>difficulty</u> to print out your hotel booking, vaccination cert & pre departure PCR.
Staff	... was extremely <u>responsive</u> and has ensured all my requests were met. The staff has also been very <u>attentive</u> to all my requests... the team is very <u>responsive</u> (via both <u>Whatsapp</u> and phone)...	... their conduct has prompted me to wonder if the hotel management has any sense of <u>shame</u> ... this is <u>shockingly</u> unprofessional... staff not helpful and I had to find out this information myself in the <u>documents</u>
Room	... the room is <u>cleaned</u> and <u>sanitised</u> three times during the stay... room is <u>spacious</u> and the large <u>windows</u> really help fill the room with natural light... my room was <u>clean</u> , <u>bright</u> and airy...	Everything in the room is old and nasty, no proper <u>ventilation</u> ... we did hear <u>noises</u> from corridor and other rooms... I did not like the room <u>assigned</u> to me and could not change it.
Food	... I requested egg free <u>vegetarian</u> food... I did do a few <u>food panda delivery</u> (delivered to the room immediately)... The hotel also has a nice <u>vegetarian</u> /vegan dining menu...	... Food is disastrously bad. Plastic <u>containers</u> food-tub worker... food <u>portion</u> is small and the menu is <u>repetitive</u> ... all food served in cardboard <u>containers</u> and after a week it does get a little <u>repetitive</u>

online travel websites and different regions to increase accuracy by gathering reviews from more sources. Furthermore, an analysis of topic prevalence based on time phases from pre-pandemic, pandemic, and post-pandemic may give more insights into the evolution and adaptation of services in the hotel industry. There are other NLP techniques that can

be used to get the word correlations and extract the context of the service attributes. A comparison study on different NLP techniques may be done to measure which technique is more accurate and reliable. Lastly, defining the proper evaluation method can be addressed in future research.

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