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Differences in Chinese and Western tourists faced with Japanese hospitality: A natural language processing approach

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Abstract We analyzed expectations and satisfaction factors in Chinese and Western cultures, comparing soft attributes, such as service, with hard attributes, such as location and facilities, and studied different price ranges. We collected our data with web crawling, labeled a sample, applied Shannon's entropy to extract these factors, and then used them to classify a more extensive data set with an SVM. We then used dependency parsing and part-of-speech tagging to extract the nouns that were tied to positive adjectives. We found that Chinese tourists are concerned more with room quality than hospitality, whereas, Western tourists are delighted more by the staff behavior. We also found that the lack of a Chinese-friendly environment for Chinese customers and the smell of cigarettes for Western ones can be disappointing factors of their stay. As one of the first studies in the tourism field to use the high-standard Japanese hospitality environment for this analysis, our cross-cultural study contributes to both the theoretical understanding of satisfaction and suggests practical applications and strategies for hotel managers.

Keywords Sentiment Analysis · Hotels and Lodging · Text Mining · Chinese · English · Satisfaction and Dissatisfaction Factors

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1 Introduction

Inbound international tourism has been increasingly affecting Japanese economy (Jones et al. 2009). A year-on-year growth rate of 19.3% was observed in 2017, with 28,691,073 inbound tourists (Japan National Tourism Organization 2019).

Japan's hospitality has been known historically to be of the highest quality. *Omotenashi*, which describes the spirit of Japanese hospitality, with roots in Japanese history and tea ceremony, is celebrated worldwide (Al-alsheikh and Sato 2015). Consequently, it would stand to reason that tourists visiting Japan would have this hospitality as their first and foremost satisfaction factor. However, it is known that customers from different countries and cultures have different expectations (Engel et al. 1990). Thus, it could be theorized that their satisfaction factors should be different. The Japanese tourist market is gradually becoming diverse because of multicultural tourist populations. This diversity means that the expectations when staying at a hotel will be varied. Therefore, hotel management must cater to these expectations to increase customer satisfaction, maintain a good reputation, and generate positive word-of-mouth.

Our study focuses on Western and Chinese tourists, considering their numbers. Chinese tourists accounted for 25.63% of the tourist population. On the other hand, Western countries accounted for 11.4% of the total, and 7.23% were countries where English is the official or the de facto national language (Japan National Tourism Organization 2019). The effect of Chinese tourists on international economies is increasing, along with the number of studies on this phenomenon (Sun et al. 2017). Despite this, many tourist-behavior analyses have been performed only involving Western subjects. As such, a knowledge gap existed until recent decades.

In studies involving Asian populations in the analysis, Chinese-tourist behaviors have been evaluated most commonly (e.g. Liu et al. 2019; Chang et al. 2010; Dongyang et al. 2015). The few studies reporting comparisons between Asian and Western tourists' behaviors (e.g. Choi and Chu 2000) are typically survey- or interview-based, using small samples. These studies, although valid, can have limitations, namely, the scale and sampling. In the past, survey-based studies have provided a theoretical background for a few specific tourist populations of a single culture or traveling with a single purpose. These studies' limited scope often leads to difficulties in observing cultural and language differences in a single study. This creates a need for large-scale cross-cultural studies for the increasing Asian and Western tourist populations. It could be said that Westerners account for a smaller portion of the tourist population compared to Asians. However, according to Choi and Chu (2000), Westerners are known as "long-haul" customers, spending more than 45% of their budget on hotels. In comparison, their Asian counterparts only spend 25% of their budget on hotels. Therefore, it is essential to study Asian and Western tourist populations, their differences, and the contrast with the existing literature results. For this, we used a data-driven approach to our analysis.

Owing to the advent of Web 2.0 and customer review websites, researchers realized the benefits of online reviews for research, sales (Ye et al. 2009; Basuroy et al. 2003), customer consideration (Vermeulen and Seegers 2009) and perception of services and products (Browning et al. 2013), among other effects of online interactions between customers (e.g. Xiang and Gretzel 2010; Ren and Hong 2019). Consequently, information collected online is being used in tourism research for data mining analysis, such as opinion mining (e.g. Hu et al. 2017), predicting hotel demand from online traffic (Yang et al. 2014), recommender systems (e.g. Loh et al. 2003), and more. Data mining and machine learning technologies can increase the number of manageable samples in a study from hundreds to hundreds of thousands. These technologies can not only help confirm existing theories but also lead to finding new patterns and to knowledge discovery (Fayyad et al. 1996).

In this study, we evaluate the satisfaction factors of two essential tourist populations that are culturally different from Japan: Chinese and Western tourists. We take advantage of the wide availability of online reviews of Japanese hotels by both Mainland Chinese tourists posting on *Ctrip* and Western, English-speaking tourists posting on *TripAdvisor*. Based on these data, we can confirm existing theories regarding the differences in tourists' behavior and discover factors that could have been overlooked in the past. We use machine learning to automatically classify sentences in the online reviews as positive or negative opinions on the hotel. We then perform a statistical extraction of the topics that most concern the customers of each population.

2 Research objective

This study aims to determine the difference in factors influencing satisfaction and dissatisfaction between Chinese and English-speaking tourists in the context of high-grade hospitality of Japanese hotels across several price ranges. We use machine learning to classify the sentiment in texts and natural language processing to study commonly used word pairings. More importantly, we also intend to measure how hard and soft attributes influence customer groups' satisfaction and dissatisfaction. We define hard attributes as attributes relating to physical and environmental aspects, such as the hotel's facilities, location, infrastructure, and surrounding real estate. In contrast, soft attributes are the hotel's non-physical attributes related to services, staff, or management.

3 Theoretical background and hypothesis development

3.1 Japanese hospitality and service: *Omotenashi*

The spirit of Japanese hospitality, or *Omotenashi*, has roots in the country's history, and to this day, it is regarded as the highest standard (Ikeda 2013; Al-alsheikh and Sato 2015). There is a famous phrase in customer service

in Japan: *okyaku-sama wa kami-sama desu*, meaning "The customer is god." Some scholars say that *omotenashi* originated from the old Japanese art of the tea ceremony in the 16th century, while others found that it originates in the form of formal banquets in the 7th-century (Aishima et al. 2015). The practice of high standards in hospitality has survived throughout the years. Presently, it permeates all business practices in Japan, from the cheapest convenience stores to the most expensive ones. Manners, service, and respect towards the customer are taught to workers in their training. High standards are always followed to not fall behind in the competition. In Japanese businesses, including hotels, staff members are trained to speak in *sonkeigo*, or "respectful language," one of the most formal of the Japanese formality syntaxes. They are also trained to bow differently depending on the situation, where a light bow could be used to say "Please, allow me to guide you." Deep bows are used to apologize for any inconvenience the customer could have faced, followed by a very respectful apology. Although the word *omotenashi* can be translated directly as "hospitality," it includes both the concepts of hospitality and service (Kuboyama 2020). This hospitality culture permeates every type of business with customer interaction in Japan. A simple convenience shop could express all of these hospitality and service standards, which are not exclusive to hotels.

It stands to reason that this cultural aspect of hospitality would positively influence customer satisfaction. However, in many cases, other factors such as proximity to a convenience store, transport availability, or room quality might be more critical to a customer. In this study, we cannot directly determine whether a hotel is practicing the cultural standards of *omotenashi*. Instead, we consider it as a cultural factor that influences all businesses in Japan. We then observe the customers' evaluations regarding service and hospitality factors and compare them to other places and business practices in the world. In summary, we consider the influence of the cultural aspect of *omotenashi* while analyzing the evaluations on service and hospitality factors that are universal to all hotels in any country.

Therefore, we pose the following research question:

Research Question 1a: *To what degree are Chinese and Western tourists satisfied with Japanese hospitality factors such as staff behavior or service?*

However, Japanese hospitality is based on the Japanese culture. Different cultures interacting with it could provide a different evaluation of it. Some might be impressed by it, whereas some might consider other factors more important to their stay in a hotel. This point leads us to a derivative of the aforementioned research question:

Research Question 1b: *Do Western and Chinese tourists have a different evaluation of Japanese hospitality factors such as staff behavior or service?*

3.2 Customer satisfaction and dissatisfaction towards individual factors during hotel stay

Customer satisfaction in tourism has been analyzed since decades past, Hunt (1975) having defined customer satisfaction as the realization or overcoming of expectations towards the service. Oliver (1981) defined it as an emotional response to the provided services in retail and other contexts, and Oh and Parks (1996) reviewed the psychological processes of customer satisfaction for the hospitality industry. It is generally agreed upon that satisfaction and dissatisfaction stem from the individual expectations of the customer. As such, Engel et al. (1990) states that each customer's background, therefore, influences satisfaction and dissatisfaction. Previous studies on the dimensions of culture that influence differences in expectations have been performed in the past Donthu and Yoo (1998). Western and Chinese customers then have very different backgrounds and cultures. These varying backgrounds will lead to varying expectations of the hotel services, the experiences they want to have while staying at a hotel, and the level of comfort that they will have. In turn, these different expectations will determine the distinct factors of satisfaction and dissatisfaction for each kind of customer and the order in which they prioritize them.

Because of their different origins, expectations, and cultures, it stands to reason Chinese and Western tourists could have completely different factors to one another. Therefore, it could be that some factors do not appear in the other reviews at all. For example, between different cultures, it can be that a single word can express some concept that would take more words in the other language. Therefore, we must measure their differences or similarities at their common ground as well.

However, in this study, we study not overall customer satisfaction but the satisfaction and dissatisfaction that stem from individual-specific expectations, be they conscious or unconscious. For example, if a customer has a conscious expectation of a comfortable bed and a wide shower, and it is realized during their visit, they will be satisfied with this matter. However, suppose that same customer with a conscious expectation of a comfortable bed experienced loud noises at night. In that case, they can be dissatisfied with a different aspect, regardless of the satisfaction towards the bed. Then, the same customer might have packed their toiletries, thinking that the amenities might not include those. They can then be pleasantly surprised with good quality amenities and toiletries, satisfying an unconscious expectation. This definition of satisfaction does not allow us to examine overall customer satisfaction. However, it will allow us to examine the factors that a hotel can revise individually and how a population perceives them as a whole. In our study, we consider the definitions in Hunt (1975) that satisfaction is a realization of an expectation, and we posit that customers can have different expectations towards different service aspects. Therefore, in our study, we define satisfaction as the emotional response to the realization or overcoming of conscious or unconscious expectations towards an individual aspect or factor of a service. On the other hand,

dissatisfaction is the emotional response to the lack of a realization or underperformance of these conscious or unconscious expectations towards specific service aspects.

Studies on customer satisfaction (e.g. Truong and King 2009; Romão et al. 2014; Wu and Liang 2009) commonly use the Likert scale (Likert 1932) (e.g. 1 to 5 scale from strongly dissatisfied to strongly satisfied) to perform statistical analysis of which factors relate most to satisfaction on the same dimension as dissatisfaction (e.g. Chan et al. 2015; Choi and Chu 2000). The Likert scale's use leads to correlation analyses where one factor can lead to satisfaction, implying that the lack of it can lead to dissatisfaction. However, a binary distinction (satisfied or dissatisfied) could allow us to analyze the factors that correlate to satisfaction and explore factors that are solely linked to dissatisfaction. There are fewer examples of this approach, but studies have done this in the past (e.g. Zhou et al. 2014). This method can indeed decrease the extent to which we can analyze degrees of satisfaction or dissatisfaction. However, it has the benefit that it can be applied to a large sample of text data via automatic sentiment detection techniques using artificial intelligence.

Previous research has also focused more on soft attributes, with little focus on hard attributes, if only focusing on facilities (e.g. Shanka and Taylor 2004; Choi and Chu 2001). However, hard factors, which are uncontrollable by the hotel staff, can play a part in the customers' choice behavior and satisfaction. Examples of these factors include the hotel's surroundings, location, language immersion of the country as a whole, or touristic destinations, and the hotel's integration with tours available nearby, among other factors.

This leads to another couple of research questions:

Research Question 2a: *To what degree does satisfaction and dissatisfaction stem from hard and soft attributes of the hotel?*

Research Question 2b: *How differently do Chinese and Western customers perceive hard and soft attributes of the hotel?*

The resulting proportions of hard attributes to soft attributes for each population could measure how much the improvement of management in the hotel can increase future satisfaction in customers.

3.3 Chinese and Western tourist behavior

In the past, social science and tourism studies focused extensively on Western tourist behavior in other countries. Recently, however, with the rise of Chinese outbound tourism, both academic researchers and businesses have decided to study Chinese tourist behavior, with rapid growth in studies following the year 2007 (Sun et al. 2017). However, studies focusing on only the behavior of this subset of tourists are the majority. To this day, studies and analyses specifically comparing Asian and Western tourists are scarce, and even fewer are the number of studies explicitly comparing Chinese and Western tourists.

One example is a study by Choi and Chu (2000), which found that Western tourists visiting Hong Kong are satisfied more with room quality, while Asians are satisfied with the value for money. Another study by Bauer et al. (1993) found that Westerners prefer hotel health facilities, while Asian tourists were more inclined to enjoy the Karaoke facilities of hotels. Both groups tend to have high expectations for the overall facilities. Another study done by Kim and Lee (2000) found American tourists to be individualistic and motivated by novelty, while Japanese tourists were collectivist and motivated by increasing knowledge and escaping routine.

One thing to note with the above Asian vs. Western analyses is that they were performed before 2000 and not Chinese-specific. Meanwhile, the current Chinese economic boom is increasing the influx of tourists of this nation. The resulting increase in marketing and the creation of guided tours for Chinese tourists could have created a difference in tourists' perceptions and expectations. In turn, if we follow the definition of satisfaction in Hunt (1975), the change in expectations could have influenced their satisfaction factors when traveling. Another note is that these studies were performed with questionnaires in places where it would be easy to locate tourists, i.e., airports. However, our study of online reviews takes the data that the hotel customers uploaded themselves. This data makes the analysis unique in exploring their behavior compared with Western tourists via factors that are not considered in most other studies. Furthermore, our study is unique in observing the customers in the specific environment of high-level hospitality in Japan.

More recent studies have surfaced as well. A cross-country study (Francesco and Roberta 2019) using posts from U.S.A. citizens, Italians, and Chinese tourists, determined using a text link analysis that customers from different countries indeed have a different perception and emphasis of a few predefined hotel attributes. According to their results, U.S.A. customers perceive cleanliness and quietness most positively. In contrast, Chinese customers perceive budget and restaurant above other attributes. Another couple of studies (Jia 2020; Huang 2017) analyze differences between Chinese and U.S. tourists using text mining techniques and more massive datasets, although in a restaurant context.

These last three studies focus on the U.S.A. culture, whereas our study focuses on the Western culture. Another difference with our study is that of the context of the study. The first study (Francesco and Roberta 2019) was done within the context of tourists from three countries staying in hotels across the world. The second study chose restaurant reviews from the U.S.A. and Chinese tourists eating in three countries in Europe. The third study analyzed restaurants in Beijing.

On the other hand, our study focuses on Western culture, instead of a single Western country, and Chinese culture clashing with the hospitality environment in Japan, specifically. Japan's importance in this analysis comes from the unique environment of high-grade hospitality that the country presents. In this environment, customers could either hold their satisfaction to this hospitality regardless of their culture or value other factors more depending on

their cultural differences. Our study measures this at a large scale across different hotels in Japan.

Other studies have gone further and studied people from many countries in their samples and performed a more universal and holistic (not cross-culture) analysis. Choi and Chu (2001) analyzed hotel guest satisfaction determinants in Hong Kong with surveys in English, Chinese and Japanese translations, with people from many countries in their sample. Choi and Chu (2001) found that staff service quality, room quality, and value for money were the top satisfaction determinants. As another example, Uzama (2012) produced a typology for foreigners coming to Japan for tourism, without making distinctions for their culture, but their motivation in traveling in Japan. In another study, Zhou et al. (2014) analyzed hotel satisfaction using English and Mandarin online reviews from guests staying in Hangzhou, China coming from many countries. The general satisfaction score was noticed to be different among those countries. However, a more in-depth cross-cultural analysis of the satisfaction factors was not performed. As a result of their research, Zhou et al. (2014) thus found that customers are universally satisfied by welcome extras, dining environments, and special food services.

Regarding Western tourist behavior, a few examples can tell us what to expect when analyzing our data. Kozak (2002) found that British and German tourists' satisfaction determinants while visiting Spain and Turkey were hygiene and cleanliness, hospitality, the availability of facilities and activities, and accommodation services. Shanka and Taylor (2004) found that English-speaking tourists in Perth, Australia were most satisfied with staff friendliness, the efficiency of check-in and check-out, restaurant and bar facilities, and lobby ambiance.

Regarding outbound Chinese tourists, academic studies about Chinese tourists have increased (Sun et al. 2017). Different researchers have found that Chinese tourist populations have several specific attributes. According to Ryan and Mo (2001) and their study of Chinese tourists in New Zealand, Chinese tourists prefer nature, cleanliness, and scenery in contrast to experiences and activities. Dongyang et al. (2015) studied Chinese tourists in the Kansai region of Japan and found that Chinese tourists are satisfied mostly with exploring the food culture of their destination, cleanliness, and staff. Studying Chinese tourists in Vietnam, Truong and King (2009) found that Chinese tourists are highly concerned with value for money. According to Liu et al. (2019), Chinese tourists tend to have harsher criticism compared with other international tourists. Moreover, as stated by Gao et al. (2017), who analyzed different generations of Chinese tourists and their connection to nature while traveling, Chinese tourists prefer nature overall. However, the younger generations seem to do so less than their older counterparts.

Although the studies focusing only on Chinese or Western tourists have a narrow view, their theoretical contributions are valuable. We can see that depending on the study and the design of questionnaires and the destinations; the results can vary greatly. Not only that, but while there seems to be some overlap in most studies, some factors are completely ignored in one study but

not in the other. Since our study uses data mining, each factor's definition is left for hotel customers to decide en masse via their reviews. This means that the factors will be selected through statistical methods alone instead of being defined by the questionnaire. Our method allows us to find factors that we would not have contemplated. It also avoids enforcing a factor on the mind of study subjects by presenting them with a question that they did not think of by themselves. This large variety of opinions in a well-sized sample, added to the automatic findings of statistical text analysis methods, gives our study an advantage compared to others with smaller samples. This study analyzes the satisfaction and dissatisfaction factors cross-culturally and compares them with the existing literature.

Undoubtedly previous literature has examples of other cross-culture studies of tourist behavior and may further highlight our study and its merits. A contrast is shown in Table 1. This table shows that older studies were conducted with surveys and had a different study topic. These are changes in demand (Bauer et al. 1993), tourist motivation (Kim and Lee 2000), and closer to our study, satisfaction levels (Choi and Chu 2000). However, our study topic is not the levels of satisfaction but the factors that drive it and dissatisfaction, which is overlooked in most studies. Newer studies with larger samples and similar methodologies have emerged, although two of these study restaurants instead of hotels (Jia 2020; Huang 2017). One important difference is the geographical focus of their studies. While Francesco and Roberta (2019) , Jia (2020) and Huang (2017) have a multi-national focus, we instead focus on Japan. The focus on Japan is important because of its top rank in hospitality across all types of businesses. Our study brings light to the changes, or lack thereof, in different touristic environments where an attribute can be considered excellent. The number of samples in other text-mining studies is also smaller than ours in comparison. Apart from that, every study has a different text mining method.

Table 1: Comparison between cross-culture or cross-country previous studies and our study.

	Bauer et.al (1993)	**Choi and Chu (2000)**	**Kim and Lee (2000)**	**Huang (2017)**	**Francesco and Roberta (2019)**	**Jia (2020)**	**Our study**
Comparison objects	Asians vs Westerns	Asians vs Westerners	Anglo-Americans vs Japanese	Chinese vs English-speakers	USA vs China vs Italy	Chinese vs US tourists	Chinese vs Westerners
Study topic	Changes in demand	Satisfaction Levels	Tourist Motivation	Dining experience of Roast Duck	Perception and Emphasis	Motivation and Satisfaction	**Satisfaction and Dissatisfaction**
Geographical focus	Asia Pacific region	Hong Kong	Global	Beijing	Multi-national	Multi-national	**Japan**
Industry	Hotels	Hotels	Tourism	Restaurant (Beijing Roast Duck)	Hotels	Restaurants	Hotels
Study subjects	Hotel managers	Hotel customers	Tourists arriving in airport	Diners online reviews	Hotel customers online reviews	Diners online reviews	Hotel customers online reviews
Sample method	surveys	surveys	survey	text mining	text mining	text mining	text mining
Number of samples	185 surveys	540 surveys	165 Anglo-American 209 Japanese	990 Chinese reviews 398 English reviews	9000 reviews (3000 per country)	2448 reviews (1360 Chinese) (1088 English)	**89,207 reviews** **(48,070 Chinese)** **(41,137 English)**
Study method	statistics	VARIMAX	MANOVA	Semantic Network Analysis	Text Link Analysis	Topic modeling (LDA)	**SVM,** **Dependency Parsing** **and POS tagging**
Subject nationality	Asians: China, Fiji, Hong Kong, Indonesia, Malaysia, Singapore, Taiwan, Guam, Tahiti, Thailand Westerners: Australia, New Zealand	Asians: China, Taiwan, Japan, South Korea, South-East Asia Westerners: North America, Europe, Australia, New Zealand	USA, Japan	English-speakers: U.K., U.S., Australia, New Zealand, Canada, Ireland Chinese-speakers: China	USA, China, Italy	USA, China	Chinese-speakers: China English-speakers: (U.K., U.S., Australia, New Zealand, Canada, Ireland)

3.4 Data mining, machine learning, knowledge discovery and sentiment analysis

In the current world, data is presented to us in larger and larger quantities. Today's data sizes were commonly only seen in very specialized large laboratories with supercomputers a couple of decades ago. However, they are now standard for market and managerial studies, independent university students, and any scientist connecting to the Internet. Such quantities of data are available to study now more than ever. Nevertheless, it would be impossible for researchers to parse all of this data by themselves. As Fayyad et al. (1996) summarizes, data by itself is unusable until it goes through a process of selection, preprocessing, transformation, mining, and evaluation. Only then can it be established as knowledge. With the tools available to us in the era of information science, algorithms can be used to detect patterns that would take researchers too long to recognize. These patterns can, later on, be evaluated to generate knowledge. This process is called Knowledge Discovery in Databases.

Now, there are, of course, many sources of numerical data to be explored. However, perhaps what is most available and interesting to managerial purposes is the resource of customers' opinions in text form. Since the introduction of Web 2.0, an unprecedented quantity of valuable information is posted to the Internet at a staggering speed. Text mining has then been proposed more than a decade ago to utilize this data (e.g. Rajman and Besançon 1998; Nahm and Mooney 2002). Using Natural Language Processing, one can parse language in a way that translates to numbers so that a computer can analyze it. Since then, text mining techniques have improved over the years. This has been used in the field of hospitality as well for many purposes, including satisfaction analysis from reviews (e.g Berezina et al. 2016; Xu and Li 2016; Xiang et al. 2015; Hargreaves 2015; Balbi et al. 2018), social media's influence on travelers (e.g. Xiang and Gretzel 2010), review summarization (e.g. Hu et al. 2017), perceived value of reviews (e.g Fang et al. 2016), and even predicting hotel demand using web traffic data (e.g Yang et al. 2014).

More than only analyzing patterns within the text, researchers have found how to determine the sentiment behind a statement based on speech patterns, statistical patterns, and other methodologies. This method is called sentiment analysis or opinion mining. A precursor of this method was attempted decades ago (Stone et al. 1966). With sentiment analysis, one could use patterns in the text to determine whether a sentence was being said with a positive opinion, or a critical one. This methodology could even determine other ranges of emotions, depending on the thoroughness of the algorithm. Examples of sentiment analysis include ranking products through online reviews (e.g Liu et al. 2017; Zhang et al. 2011), predicting political poll results through opinions in Twitter (O'Connor et al. 2010), and so on. In the hospitality field, it has been used to classify reviewers' opinions of hotels in online reviews (e.g. Kim et al. 2017; Al-Smadi et al. 2018).

Our study used an algorithm for sentiment analysis called a Support Vector Machine (SVM), a supervised machine learning used for binary classification.

Machine learning is a general term used for algorithms that, when given data, will automatically use that data to "learn" from its patterns and apply them for improving upon a task. Learning machines can be supervised, as in our study, where the algorithm has manually labeled training data to detect patterns in it and use them to establish a method for classifying other unlabeled data automatically. Machine learning can also be unsupervised, where there is no pre-labeled data. In this latter case, the machine will analyze the structure and patterns of the data and perform a task based on its conclusions. Our study calls for a supervised machine since text analysis can be intricate. Many patterns might occur, but we are only interested in satisfaction and dissatisfaction labels. Consequently, we teach the machine through previously labeled text samples.

Machine learning and data mining are two fields with a significant overlap since they can use each other's methods to achieve the task at hand. Machine learning methods focus on predicting new data based on known properties and patterns of the given data. Data mining, on the other hand, is discovering new information and new properties of the data. Our machine learning approach will learn the sentiment patterns of our sample texts showing satisfaction and dissatisfaction and using these to label the rest of the data. We are not exploring new patterns in the sentiment data. However, we are using sentiment predictions for knowledge discovery in our database. Thus, our study is a data mining experiment based on machine learning.

Because the methodology for finding patterns in the data is automatic and statistical, it is both reliable and unpredictable. Reliable in that the algorithm will find a pattern by its nature. Unpredictable in that since it has no intervention from the researchers in making questionnaires, it can result in anything that the researchers could not expect. These qualities determine why, similar to actual mining; data mining is mostly exploratory. One can never be sure that one will find a specific something. However, we can make predictions and estimates about finding knowledge and what kind of knowledge we can uncover. The exploration of large opinion datasets with these methods is essential. The reason is that we can discover knowledge that could otherwise be missed by observing a localized sample rather than taking a holistic view of every user's opinion. In other words, a machine algorithm can find the needles in a haystack that we did not know were there by examining small bundles of hay at a time.

4 Methodology

We extracted a large number of text reviews from the site *Ctrip*, with mostly mainland Chinese users, and the travel site *TripAdvisor*. We then determined the most commonly used words that relate to positive and negative opinions in a review. We did this using Shannon's entropy to extract keywords from their vocabulary. These positive and negative keywords allow us to train an optimized Support Vector Classifier (SVC) to perform a binary emotional

classification of the reviews in large quantities, saving time and resources for the researchers. We then applied a dependency parsing to the reviews and a Part of Speech tagging (POS tagging) to observe the relationship between adjective keywords and the nouns they refer to. We split the dataset into price ranges to observe the differences in keyword usage between lower-class and higher-class hotels. We observed the frequency of the terms in the dataset to extract the most utilized words in either review. We show an overview of this methodology in Figure 1, which is an updated version of the methodology used by Alemán Carreón et al. (2018). Finally, we also observed if the satisfaction factors were soft or hard attributes of the hotel.

4.1 Data collection

In the *Ctrip* data collection, reviews from a total of 5774 hotels in Japan were collected. From these pages, we extracted a total of 245,919 reviews, from which 211,932 were detected to be standard Mandarin Chinese. Since a single review can have sentences with different sentiments, we separated sentences using punctuation marks. The Chinese reviews were comprised of 187,348 separate sentences.

In the *TripAdvisor* data collection, we collected data from 21,380 different hotels. In total, we collected 295,931 reviews, from which 295,503 were detected to be in English. Similarly to the Chinese data, we then separated these English reviews into 2,694,261 sentences using the *gensim* python library. For the language detection in both cases we used the *langdetect* python library.

However, to make the data comparisons fair, we filtered both databases only to contain reviews from hotels in both datasets, using their English names to do a search match. We also filtered them to be in the same date range. In addition, we selected only the hotels that had pricing information available. We extracted the lowest and highest price possible for one night as well. The difference in pricing can be from better room settings, such as double or twin rooms or suites, depending on the hotel. Regardless of the reason, we chose the highest-priced room since it can be an indirect indicator of the hotel's class. After filtering, the datasets contained 557 hotels in common. The overlapping date range for reviews was from July 2014 to July 2017. Within these hotels,

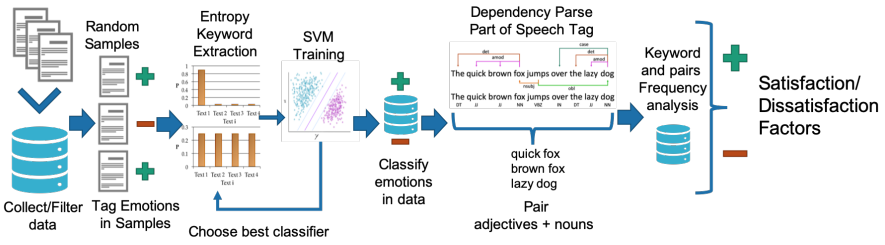
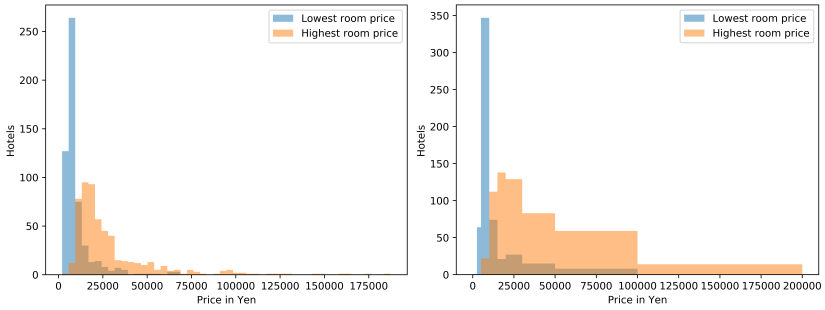


Fig. 1: Overview of the methodology to quantitatively rank satisfaction factors.

from *Ctrip* there was 48,070 reviews comprised of 101,963 sentences, and from *TripAdvisor* there was 41,137 reviews comprised of 348,039 sentences.

The price for a night in these hotels ranges from cheap capsule hotels at 2000 yen per night to high-end hotels 188,000 yen a night at the far ends of the bell curve. Customers' expectations can vary greatly depending on the pricing of the hotel room they stay at. Therefore, we made observations on the distribution of pricing in our database's hotels and binned the data by price ranges, decided by consideration of the objective of stay. We show these distributions in Figure 2. The structure of the data after division by price is shown in Table 2. This table also includes the results of emotional classification after applying our SVC, as explained in 4.3. The first three price ranges (0 to 2500 yen, 2500 to 5000 yen, 5000 to 10,000 yen) would correspond to low-class hotels or even hostels on the lower end and cheap business hotels on the higher end. Further on, there are business hotels in the next range (10,000 to 15,000 yen). After that, the stays could be at Japanese style *ryokan* when traveling in groups, high-class business hotels, luxury love hotels, or higher class hotels (15,000 to 20,000 yen, 20,000 to 30,000 yen). Further than that is more likely to be *ryokan* or high class resorts or five-star hotels (30,000 to 50,000 yen, 50,000 to 100,000 yen, 100,000 to 200,000 yen). Note that because of choosing the highest price per one night in each hotel, the cheapest two price ranges (0 to 2500 yen, 2500 to 5000 yen) are empty, despite some rooms being priced at 2000 yen per night. Because of this, other tables will omit these two price ranges.



(a) 50 equal lenght bins (b) manually set 9 price ranges

Fig. 2: Price for one night distribution, blue: lowest price, orange: highest price.

4.2 Text processing

We needed to analyze the grammatical relationship between words, be it English or Chinese, to understand the connections between adjectives and nouns. For all these processes, we used the Stanford CoreNLP pipeline developed

Table 2: Collected data and structure after price range categorizing.

Price range	Data collected	Ctrip database	Tripadvisor database
0: All Prices	Hotels	557	557
	Reviews	48,070	41,137
	Sentences	101,963	348,039
	Positive sentences	88,543	165,308
	Negative sentences	13,420	182,731
1: 0 to 2500 yen	Hotels	0	0
	Reviews	0	0
2: 2500 to 5000 yen	Hotels	0	0
	Reviews	0	0
3: 5000 to 10,000 yen	Hotels	22	22
	Reviews	452	459
	Sentences	1,108	3,988
	Positive sentences	924	1,875
	Negative sentences	184	2,113
4: 10,000 to 15,000 yen	Hotels	112	112
	Reviews	2,176	2,865
	Sentences	4,240	24,107
	Positive sentences	3,566	11,619
	Negative sentences	674	12,488
5: 15,000 to 20,000 yen	Hotels	138	138
	Reviews	7,043	4,384
	Sentences	14,726	37,342
	Positive sentences	12,775	17,449
	Negative sentences	1,951	19,893
6: 20,000 to 30,000 yen	Hotels	129	129
	Reviews	11,845	13,772
	Sentences	24,413	115,830
	Positive sentences	21,068	55,381
	Negative sentences	3,345	60,449
7: 30,000 to 50,000 yen	Hotels	83	83
	Reviews	8,283	7,001
	Sentences	17,939	58,409
	Positive sentences	15,642	28,493
	Negative sentences	2,297	29,916
8: 50,000 to 100,000 yen	Hotels	59	59
	Reviews	16,670	9,646
	Sentences	36,255	81,940
	Positive sentences	31,638	38,217
	Negative sentences	4,617	43,723
9: 100,000 to 200,000 yen	Hotels	14	14
	Reviews	1,601	3,010
	Sentences	3,282	26,423
	Positive sentences	2,930	12,274
	Negative sentences	352	14,149

by the Natural Language Processing Group at Stanford University (Manning et al. 2014). In order to separate Chinese words for analysis, we used the Stanford Word Segmenter (Chang et al. 2008). In English texts, however, only using spaces is not enough to correctly collect concepts. The English language is full of variations and conjugations of words depending on the context and tense. Thus, a better segmentation is achieved by using lemmatization, which returns each word's dictionary form. For this purpose, we used the *gensim* library for the English texts.

A dependency parser analyzes the grammatical structure, detecting connections between words, and describing the action and direction of those connections. We show an example of these dependencies in Figure 3. This study uses the Stanford NLP Dependency Parser, as described by Chen and Manning (2014). A list of dependencies used by this parser is detailed by de Marneffe and Manning (2008). In more recent versions, they use an updated dependency tag list from Universal Dependencies (Zeman et al. 2018). In our study, this step was necessary to extract adjective modifiers and their subject. We did that by parsing the database and extracting instances of a few determined dependency codes. One of these dependency codes is "amod", which stands for "adjectival modifier". This is used when an adjective modifies a noun directly (e.g., A big apple). The other dependency code we used was "nsubj", or nominal subject, the class's syntactic subject. We used this one for cases where the adjective is modifying the noun indirectly through other words (e.g., The apple is big). This dependency does not necessarily only include a combination of adjectives and nouns. However, it can also be connected with copular verbs, nouns, or other adjectives. We saw it necessary also to perform a Part of Speech (POS) tagging of these clauses.

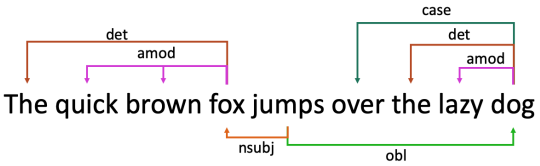


Fig. 3: Example of dependency parsing.

A Part of Speech (POS) tagger is a program that assigns word tokens with tags identifying the part of speech. An example is shown in Figure 4. A Part of Speech is a category of lexical items that serve similar grammatical purposes, for example, nouns, adjectives, verbs, or conjunctions. In our study, we used the Stanford NLP POS tagger software, described by Toutanova and Manning (2000) and Toutanova et al. (2003), which uses the Penn Chinese Treebank tags (Xia 2000).

Fig. 4: Example of POS tagging with the Penn Treebank tags.

In this study, we were interested in identifying combinations of adjectives, some verbs, and nouns. We also needed to filter away bad combinations that were brought by the versatility of nominal subject dependencies. For this purpose, we identified the tags for nouns, verbs, and adjectives in Chinese and En-

glish, with the English tags being a bit more varied. What would be called adjectives in English corresponds more to stative verbs in Chinese, so we needed to extract those as well. We show a detailed description of the chosen tags in Table 3. We also show a detailed description of the tags we needed to filter. We selected these tags heuristically by observing commonly found undesired pairs in Table 4.

Table 3: Target Parts of Speech for extraction and pairing.

Language	POS Tag	Part of Speech	Examples
Chinese target tags	NN	Noun (general)	酒店 (hotel)
	VA	Predicative Adjective (verb)	干净 的 (clean)
	JJ	Noun modifier (adjectives)	干净 (clean)
	VV	Verb (general)	推荐 (recommend)
English target tags	NN	Noun (general)	room
	NNS	Noun (plural)	beds
	JJ	Adjective	big
	JJS	Adjective (superlative)	best
	JJR	Adjective (comparative)	larger
	VB	Verb (base form)	take
	VBP	Verb (single present)	take
	VBN	Verb (past participle)	taken
	VBG	Verb (gerund / present participle)	taking

Table 4: Filtered out Parts of Speech to aid pairing.

Language	POS Tag	Part of Speech	Examples
Commonly filtered tags	DT	Determiner	a, an
	PN	Pronoun	I, you, they
	CD	Cardinal Number	1, 2, 3, 4, 5
	PU	Punctuation	.!?
Chinese filtered tags	DEV	Particle	地 (Japan) (adverbial particle)
	NR	Noun (proper noun)	日本 (Japan)
	M	Measure word	个 (general classifier), 公里 (kilometer)
	SP	Sentence-final particle	他 (he), 好 (good)
	IJ	Interjection	啊 (ah)
English target tags	NNP	Noun (proper noun)	Japan
	PRP$	Possessive Pronoun	My, your, her, his
	WP	Wh-pronoun	What, who

Once we had these adjective + noun or verb + noun pairs, we could determine what the customers referred to in their reviews. With what frequency they use those pairings positively or negatively.

4.3 Sentiment analysis using a Support Vector Classifier

The sentiment analysis was performed using the methodology described by Alemán Carreón et al. (2018). Keywords are determined by a comparison of Shannon's entropy (Shannon 1948) between two classes by a factor of α for one

class and α' for the other, and then they are used in an SVC (Cortes and Vapnik 1995), optimizing keywords to select the best performing classifier using the F_1-measure (Powers 2011). The selected SVC keywords would then clearly represent the user driving factors leading to positive and negative emotions. We also performed experiments to choose the best value of the parameter C used in the SVC. C is a constant that affects the optimization process when minimizing the error of the separating hyperplane. Low values of C give some freedom of error, which minimizes false positives but can also increase false negatives. Inversely, high C values will likely result in minimal false negatives but a possibility of false positives. SVC performance results are displayed in Tables 5 and 6. Examples of tagged sentences are shown in Table 7.

Table 5: Best performing SVC 5-fold cross-validation Chinese text classifiers.

Keyword List	**Classifier emotion**	**C**	F_1 μ	F_1 σ
Satisfaction keywords ($\alpha = 2.75$)	Satisfaction	2.5	0.91	0.01
Negative keywords ($\alpha' = 3.75$)	Dissatisfaction	0.5	0.67	0.11
Combined ($\alpha = 2.75$, $\alpha' = 3.75$)	**Satisfaction**	**0.5**	**0.95**	**0.01**

Table 6: Best performing SVC 10-fold cross-validation English text classifiers.

Keyword List	**Classifier emotion**	**C**	F_1 μ	F_1 σ
Satisfaction keywords ($\alpha = 1.5$)	Satisfaction	1.75	0.82	0.02
Dissatisfaction keywords ($\alpha' = 4.25$)	Dissatisfaction	3	0.80	0.03
Combined ($\alpha = 1.5$, $\alpha' = 4.25$)	**Satisfaction**	**2**	**0.83**	**0.02**

Shannon's entropy can be used to observe the probability distribution of each word inside the corpus. A word included in many documents will have a high entropy value for that set of documents. Opposite to this, a word appearing in only one document will have an entropy value of zero.

An SVC is trained to classify data based on previously labeled data, generalizing the data's features by defining a separating (p-1)-dimensional hyperplane in p-dimensional space. Each dimension is a feature of the data in this space. The separating hyperplane, along with the support vectors, divides the multi-dimensional space and minimizes classification error.

Our study used a linear kernel for the SVC, defined by the formula (1) below. Each training sentence is a data point, a row in the vector x. Each column represents a feature; in our case, the quantities of each of the keywords in that particular sentence. The labels of previously known classifications (1 for positive, 0 for negative) for each sentence comprise the $f(x)$ vector. The Weight

Table 7: Examples of positive and negative sentences used for training SVM.

Language	Emotion	Sentences
Chinese	Positive	酒店 的 服务 很 好 和 我 住 过 的 所有 日本 酒店 一样 各 种 隐形 服务 非常 厉害 (translated as: "The service of the hotel is very good. All the services of the Japanese hotels I have stayed in are extremely good.")
		有 一 个 后门 到 地铁站 非常 近 周边 也 算 方便 酒店 服务 和 卫生 都 很 好 (translated as: "There is a back door to the subway station very close to it. The surrounding area is also convenient hotel service and health are very good")
	Negative	酒店 旁边 很 荒凉 连个 便利 店 都 要 走 很远 (translated as: "The hotel is very bleak, and you have to go very far to go to the nearest convenience store.")
		唯一 不 足 是 价格 太高 (translated as: "The only negative is that the price is too high.")
English	Positive	It was extremely clean, peaceful and the hotel Hosts made us feel super welcome
		Location is very good, close to a main road with a subway station, a bakery, a 7 eleven and a nice restaurant that is not too expensive but serves good food
	Negative	The only downside. Our room was labeled 'non-smoking' but our duvet reeked of smoke.
		A bit pricey though

Vector w is comprised of the influences each point has had in the training process to define the hyperplane angle. The bias coefficient b determines its position.

During the SVC learning algorithm, each data point classified incorrectly alters the weight vector to correctly classify new data. These changes to the weight vector are greater for features close to the separating hyperplane. These features have stronger changes because they needed to be taken into account to classify with a minimal error. Sequentially, the weight vector can be interpreted as a numerical representation of each feature's effect on each class's classification process. Below we show the formula for the weight vector w (2), where x is the training data and each vectorized sentence x_i in the data is labeled y_i. Each cycle of the algorithm alters the value of w by α to reduce the number of wrong classifications. This equation shows the last value of α after the end of the cycle.

$$f(x) = w^\top x + b \tag{1}$$

$$w = \sum_{i=1}^{N} \alpha_i y_i x_i \tag{2}$$

We tagged 159 Chinese sentences and 2357 English sentences as positive or negative for our training data. The entropy comparison factors α and α' were tested from 1.25 to 6 in intervals of 0.25. We applied this SVC to classify the rest of our data collection. Subsequently, the positive and negative sentence counts shown in Table 2 result from applying our SVC for classification.

5 Data Analysis

5.1 Frequent keywords in differently priced hotels

We observed the top 10 satisfaction and dissatisfaction keywords with the highest frequencies of emotionally positive and negative statements to study. The keywords are the quantitative rank of the needs of Chinese and English-speaking customers. We show the top 10 positive keywords for each price range comparing English and Chinese in Table 8. For the negative keywords, we show the results in Table 9.

We can observe that the most used keywords for most price ranges in the same language are similar, with a few changes in priority for the keywords involved. For example, in Chinese, we can see that the customers praise cleanliness first in cheaper hotels, whereas the size of the room or bed is praised more in hotels of higher class. Another example is that in negative English reviews, complaints about price appear only after 10,000 yen hotels. After this, it climbs in importance following the increase in the hotel's price.

5.2 Frequently used adjectives and their pairs

Some keywords in these lists are adjectives, such as the word "大 (big)" mentioned before. To understand those, we performed the dependency parsing and part of speech tagging explained in section 4.2. While many of these connections, we only considered the top 4 used keyword connections per adjective per price range. We show the most used Chinese adjectives in positive keywords in Table 10, and for negative Chinese adjective keywords in Table 11. Similarly, for English adjectives used in positive sentences we show the most common examples in Table 12, and for adjectives used in negative sentences in Table 13.

Table 8: English and Chinese comparison of the top 10 positive keywords.

Price range	Chinese keyword	Counts in Ctrip	English keyword	Counts in Tripadvisor
0: All Prices	不错 (not bad)	12892	good	19148
	大 (big)	9844	staff	16289
	干净 (clean)	6665	great	16127
	交通 (traffic)	6560	location	11838
	早餐 (breakfast)	5605	nice	11615
	近 (near)	5181	clean	9064
	地铁 (subway)	4321	helpful	5846
	购物 (shopping)	4101	excellent	5661
	推荐 (recommend)	3281	comfortable	5625
	环境 (environment)	3258	friendly	5606
3: 5000 to 10,000 yen	不错 (not bad)	139	good	206
	干净 (clean)	114	staff	181
	早餐 (breakfast)	112	clean	174
	大 (big)	76	nice	166
	交通 (traffic)	72	great	143
	地铁 (subway)	66	location	91
	近 (near)	55	comfortable	79
	地铁站 (subway station)	51	helpful	70
	远 (far)	41	friendly	64
	附近 (nearby)	34	recommend	59
4: 10,000 to 15,000 yen	不错 (not bad)	601	good	1399
	干净 (clean)	455	staff	1165
	大 (big)	348	great	961
	近 (near)	323	nice	808
	早餐 (breakfast)	270	location	800
	卫生 (health)	201	clean	656
	交通 (traffic)	196	excellent	412
	地铁 (subway)	164	friendly	400
	远 (far)	158	helpful	393
	附近 (nearby)	150	comfortable	391
5: 15,000 to 20,000 yen	不错 (not bad)	1925	good	2242
	干净 (clean)	1348	staff	1674
	大 (big)	1277	great	1414
	交通 (traffic)	1058	clean	1204
	近 (near)	1016	nice	1175
	地铁 (subway)	801	location	1109
	早餐 (breakfast)	777	comfortable	621
	地铁站 (subway station)	639	friendly	615
	附近 (nearby)	572	free	581
	购物 (shopping)	516	helpful	552
6: 20,000 to 30,000 yen	不错 (not bad)	3110	good	6550
	大 (big)	2245	staff	5348
	交通 (traffic)	1990	great	5074
	干净 (clean)	1940	location	4414
	近 (near)	1433	nice	3451
	地铁 (subway)	1073	clean	3364
	早餐 (breakfast)	1007	shopping	1992
	购物 (shopping)	979	helpful	1970
	周边 (surroundings)	837	comfortable	1941
	附近 (nearby)	825	friendly	1915
7: 30,000 to 50,000 yen	不错 (not bad)	2291	good	3407
	大 (big)	1913	staff	2867
	干净 (clean)	1159	great	2620
	交通 (traffic)	1105	location	2186
	近 (near)	935	nice	2160
	早餐 (breakfast)	846	clean	1750
	推荐 (recommend)	638	helpful	1147
	购物 (shopping)	636	train	1040
	周边 (surroundings)	552	subway	1034
	环境 (environment)	541	friendly	1001
8: 50,000 to 100,000 yen	不错 (not bad)	4451	great	4425
	大 (big)	3670	good	4350
	早餐 (breakfast)	2422	staff	3777
	交通 (traffic)	2012	nice	2991
	购物 (shopping)	1764	location	2439
	新 (new)	1634	clean	1655
	棒 (great)	1626	excellent	1555
	地铁 (subway)	1604	helpful	1313
	干净 (clean)	1577	comfortable	1246
	近 (near)	1354	friendly	1238
9: 100,000 to 200,000 yen	不错 (not bad)	375	great	1488
	大 (big)	315	staff	1277
	棒 (great)	189	good	994
	早餐 (breakfast)	171	nice	864
	环境 (environment)	157	location	799
	交通 (traffic)	127	excellent	631
	选择 (select)	112	beautiful	455
	推荐 (recommend)	109	large	404
	赞 (awesome)	101	helpful	401
	购物 (shopping)	98	wonderful	372

Table 9: English and Chinese comparison of the top 10 negative keywords.

Price range	Chinese keyword	Counts in Ctrip	English keyword	Counts in Tripadvisor
0: All Prices	价格 (price)	1838	pricey	462
	一般 (general)	1713	poor	460
	中文 (Chinese)	733	dated	431
	地理 (geography)	691	disappointing	376
	距离 (distance)	434	worst	327
	陈旧 (obsolete)	319	minor	258
	老 (old)	297	uncomfortable	253
	华人 (Chinese)	15	carpet	240
			annoying	220
			sense	220
3: 5000 to 10,000 yen	价格 (price)	31	worst	6
	一般 (general)	28	walkway	5
	距离 (distance)	11	unable	4
	地理 (geography)	10	worse	4
	中文 (Chinese)	9	annoying	3
	老 (old)	2	dirty	3
			funny smell	3
			poor	3
			renovation	3
			carpet	2
4: 10,000 to 15,000 yen	价格 (price)	98	dated	40
	一般 (general)	91	poor	29
	距离 (distance)	43	disappointing	26
	陈旧 (obsolete)	34	worst	24
	地理 (geography)	31	uncomfortable	23
	老 (old)	30	cigarette	22
	中文 (Chinese)	26	pricey	22
			minor	21
			paper	19
			unable	19
5: 15,000 to 20,000 yen	价格 (price)	296	poor	57
	一般 (general)	218	dated	41
	地理 (geography)	125	disappointing	38
	中文 (Chinese)	93	annoying	36
	距离 (distance)	84	worst	36
	陈旧 (obsolete)	43	cigarette	31
	老 (old)	26	rude	28
	华人 (Chinese)	3	uncomfortable	26
			paper	25
			pricey	24
6: 20,000 to 30,000 yen	一般 (general)	504	poor	136
	价格 (price)	472	dated	131
	地理 (geography)	164	pricey	120
	中文 (Chinese)	155	disappointing	112
	距离 (distance)	116	uncomfortable	103
	陈旧 (obsolete)	75	minor	93
	老 (old)	55	smallest	88
	华人 (Chinese)	2	worst	86
			cigarette	79
			annoying	70
7: 30,000 to 50,000 yen	价格 (price)	326	poor	92
	一般 (general)	311	pricey	92
	地理 (geography)	110	dated	65
	中文 (Chinese)	94	worst	64
	陈旧 (obsolete)	71	carpet	55
	距离 (distance)	68	uncomfortable	55
	老 (old)	45	dirty	51
	华人 (Chinese)	2	disappointing	50
			cigarette	46
			unable	43
8: 50,000 to 100,000 yen	价格 (price)	561	pricey	163
	一般 (general)	510	dated	150
	中文 (Chinese)	337	disappointing	129
	地理 (geography)	239	poor	124
	老 (old)	134	worst	98
	距离 (distance)	97	walkway	82
	陈旧 (obsolete)	90	carpet	71
	华人 (Chinese)	8	minor	63
			sense	63
			outdated	58
9: 100,000 to 200,000 yen	价格 (price)	54	pricey	40
	一般 (general)	51	sense	34
	中文 (Chinese)	19	minor	33
	距离 (distance)	15	lighting	20
	地理 (geography)	12	disappointing	19
	陈旧 (obsolete)	6	poor	19
	老 (old)	5	annoying	16
			mixed	15
			disappointment	14
			paper	14

Table 10: Top 4 words related to the mainly used adjectives in positive Chinese texts.

Price range	不错 (not bad)	大 (big)	干净 (clean)	近 (near)	新 (new)	棒 (great)
0: All Prices	不错 (not bad) : 12892 不错 酒店 (nice hotel) : 1462 不错 位置 (nice location) : 1426 不错 服务 (nice service) : 869 不错 环境 (nice environment) : 714	大 (big) : 9844 大 房间 (big room) : 3197 大 床 (big bed) : 772 大 酒店 (big hotel) : 379 大 超市 (big supermarket) : 232	干净 (clean) : 6665 干净 房间 (clean room) : 1224 干净 酒店 (clean hotel) : 737 干净 卫生 (clean and hygienic) : 464 干净 环境 (clean environment) : 61	近 (near) : 5181 近 酒店 (near hotel) : 453 近 桥 (near bridge) : 144 近 地铁站 (near subway station) : 122 近 站 (near station) : 108	新 (new) : 2775 新 设施 (new facility) : 363 新 酒店 (new hotel) : 246 新 装修 (new decoration) : 116 新 房间 (new room) : 53	棒 (great) : 3028 棒 酒店 (great hotel) : 463 棒 位置 (great position) : 218 棒 服务 (great service) : 168 棒 早餐 (great breakfast) : 164
3: 5000 to 10,000 yen	不错 (not bad) : 139 不错 酒店 (nice hotel) : 17 不错 位置 (nice location) : 16 不错 早餐 (nice breakfast) : 12 不错 服务 (nice service) : 8	大 (big) : 76 大 房间 (big room) : 11 大 床 (big bed) : 10 大 超市 (big supermarket) : 5 大 商场 (big market) : 3	干净 (clean) : 114 干净 房间 (clean room) : 21 干净 酒店 (clean hotel) : 10 干净 卫生 (clean and hygienic) : 6 干净 总体 (clean overall) : 4	近 (near) : 55 近 酒店 (near hotel) : 4 近 地铁 (near subway) : 2		棒 (great) : 11 棒 位置 (great position) : 2
4: 10,000 to 15,000 yen	不错 (not bad) : 601 不错 位置 (nice location) : 72 不错 酒店 (nice hotel) : 37 不错 服务 (nice service) : 34 不错 早餐 (nice breakfast) : 26	大 (big) : 348 大 房间 (big room) : 76 大 床 (big bed) : 30 大 社 (big club) : 26 大 空间 (big space) : 16	干净 (clean) : 455 干净 房间 (clean room) : 66 干净 卫生 (clean and hygienic) : 52 干净 酒店 (clean hotel) : 48 干净 打扫 (clean up) : 9	近 (near) : 323 近 酒店 (near hotel) : 27 近 站 (near station) : 14 近 地铁 (near subway) : 12 近 车站 (near the station) : 10	新 (new) : 37 新 设施 (new facility) : 9 新 装修 (new decoration) : 2 新 酒店 (new hotel) : 2	棒 (great) : 73 棒 位置 (great position) : 6 棒 房间 (great room) : 3 棒 水平 (great level) : 3 棒 温泉 (great hot spring) : 3
5: 15,000 to 20,000 yen	不错 (not bad) : 1925 不错 位置 (nice location) : 207 不错 酒店 (nice hotel) : 168 不错 服务 (nice service) : 131 不错 早餐 (nice breakfast) : 109	大 (big) : 1277 大 房间 (big room) : 316 大 床 (big bed) : 140 大 超市 (big supermarket) : 73 大 酒店 (big hotel) : 49	干净 (clean) : 1348 干净 房间 (clean room) : 234 干净 酒店 (clean hotel) : 161 干净 卫生 (clean and hygienic) : 92 干净 设施 (clean facilities) : 19	近 (near) : 1016 近 酒店 (near hotel) : 82 近 站 (near station) : 35 近 地铁站 (near subway station) : 34 近 桥 (near bridge) : 29	新 (new) : 234 新 设施 (new facility) : 47 新 酒店 (new hotel) : 25 新 装修 (new decoration) : 15 新 房间 (new room) : 10	棒 (great) : 241 棒 位置 (great position) : 33 棒 酒店 (great hotel) : 25 棒 服务 (great service) : 22 棒 早餐 (great breakfast) : 8
6: 20,000 to 30,000 yen	不错 (not bad) : 3110 不错 位置 (nice location) : 409 不错 酒店 (nice hotel) : 326 不错 服务 (nice service) : 206 不错 环境 (nice environment) : 183	大 (big) : 2245 大 房间 (big room) : 680 大 床 (big bed) : 198 大 酒店 (big hotel) : 102 大 空间 (big space) : 64	干净 (clean) : 1940 干净 房间 (clean room) : 360 干净 酒店 (clean hotel) : 203 干净 卫生 (clean and hygienic) : 137 干净 环境 (clean environment) : 21	近 (near) : 1433 近 酒店 (near hotel) : 164 近 地铁 (near subway) : 34 近 地铁站 (near subway station) : 31 近 车站 (near the station) : 27	新 (new) : 517 新 设施 (new facility) : 89 新 酒店 (new hotel) : 51 新 装修 (new decoration) : 24 新 房间 (new room) : 10	棒 (great) : 440 棒 酒店 (great hotel) : 51 棒 位置 (great position) : 45 棒 服务 (great service) : 23 棒 早餐 (great breakfast) : 20
7: 30,000 to 50,000 yen	不错 (not bad) : 2291 不错 位置 (nice location) : 277 不错 酒店 (nice hotel) : 274 不错 服务 (nice service) : 140 不错 环境 (nice environment) : 140	大 (big) : 1913 大 房间 (big room) : 643 大 床 (big bed) : 141 大 超市 (big supermarket) : 74 大 酒店 (big hotel) : 66	干净 (clean) : 1159 干净 房间 (clean room) : 224 干净 酒店 (clean hotel) : 146 干净 卫生 (clean and hygienic) : 71 干净 环境 (clean environment) : 16	近 (near) : 935 近 酒店 (near hotel) : 80 近 站 (near station) : 24 近 桥 (near bridge) : 20 近 山 (near mountain) : 12	新 (new) : 260 新 设施 (new facility) : 63 新 酒店 (new hotel) : 25 新 装修 (new decoration) : 15 新 房间 (new room) : 11	棒 (great) : 448 棒 酒店 (great hotel) : 68 棒 位置 (great position) : 34 棒 服务 (great service) : 24 棒 早餐 (great breakfast) : 14
8: 50,000 to 100,000 yen	不错 (not bad) : 4451 不错 酒店 (nice hotel) : 587 不错 位置 (nice location) : 415 不错 服务 (nice service) : 328 不错 早餐 (nice breakfast) : 251	大 (big) : 3670 大 房间 (big room) : 1340 大 床 (big bed) : 238 大 酒店 (big hotel) : 144 大 商场 (big market) : 88	干净 (clean) : 1577 干净 房间 (clean room) : 310 干净 酒店 (clean hotel) : 161 干净 卫生 (clean and hygienic) : 101 干净 服务 (clean service) : 13	近 (near) : 1354 近 酒店 (near hotel) : 88 近 桥 (near bridge) : 76 近 地铁站 (near subway station) : 35 近 铁 (Kintetsu) : 24	新 (new) : 1634 新 设施 (new facility) : 141 新 酒店 (new hotel) : 123 新 装修 (new decoration) : 57 新 斋 (new) : 22	棒 (great) : 1626 棒 酒店 (great hotel) : 281 棒 早餐 (great breakfast) : 112 棒 位置 (great position) : 96 棒 服务 (great service) : 86
9: 100,000 to 200,000 yen	不错 (not bad) : 375 不错 酒店 (nice hotel) : 53 不错 位置 (nice location) : 30 不错 环境 (nice environment) : 27 不错 服务 (nice service) : 22	大 (big) : 315 大 房间 (big room) : 131 大 面积 (large area) : 19 大 床 (big bed) : 15 大 卫生间 (big toilet) : 13	干净 (clean) : 72 干净 房间 (clean room) : 9 干净 酒店 (clean hotel) : 8 干净 卫生 (clean and hygienic) : 5	近 (near) : 65 近 酒店 (near hotel) : 8 近 地铁站 (near subway station) : 3 近 市场 (near market) : 3	新 (new) : 77 新 酒店 (new hotel) : 19 新 设施 (new facility) : 13 新 装修 (new decoration) : 3 新 位置 (new location) : 2	棒 (great) : 189 棒 酒店 (great hotel) : 36 棒 体验 (great experience) : 10 棒 服务 (great service) : 10 棒 早餐 (great breakfast) : 8

Table 11: Top 4 words related to the mainly used adjectives in negative texts.

Price range	一般 (general)	陈旧 (obsolete)	老 (old)
0: All Prices	一般 (general) : 1713 一般 设施 (general facilities) : 137 一般 服务 (general service) : 115 一般 酒店 (average hotel) : 106 一般 早餐 (average breakfast) : 97	陈旧 (obsolete) : 319 陈旧 设施 (obsolete facilities) : 184 陈旧 设备 (obsolete equipment) : 18 陈旧 房间 (outdated room) : 10 陈旧 酒店 (outdated hotel) : 10	老 (old) : 297 老 酒店 (old hotel) : 74 老 设施 (old facility) : 58 老 店 (old shop) : 15 老 装修 (old decoration) : 11
3: 5000 to 10,000 yen	一般 (general) : 28 一般 设施 (general facilities) : 5 一般 早餐 (average breakfast) : 3 一般 味道 (general taste) : 2 一般 效果 (general effect) : 2		老 (old) : 2
4: 10,000 to 15,000 yen	一般 (general) : 91 一般 设施 (general facilities) : 10 一般 位置 (general location) : 8 一般 酒店 (average hotel) : 6 一般 早餐 (average breakfast) : 5	陈旧 (obsolete) : 34 陈旧 设施 (obsolete facilities) : 17 陈旧 家具 (obsolete furniture) : 2 陈旧 设备 (obsolete equipment) : 2	老 (old) : 30 老 酒店 (old hotel) : 8 老 设施 (old facility) : 7 老 建筑 (old building) : 3
5: 15,000 to 20,000 yen	一般 (general) : 218 一般 设施 (general facilities) : 23 一般 酒店 (average hotel) : 21 一般 早餐 (average breakfast) : 14 一般 卫生 (general hygiene) : 8	陈旧 (obsolete) : 43 陈旧 设施 (obsolete facilities) : 25 陈旧 设备 (obsolete equipment) : 3 陈旧 酒店 (outdated hotel) : 2	老 (old) : 26 老 酒店 (old hotel) : 11 老 设施 (old facility) : 7 老 外观 (old appearance) : 2
6: 20,000 to 30,000 yen	一般 (general) : 504 一般 设施 (general facilities) : 42 一般 酒店 (average hotel) : 37 一般 服务 (general service) : 34 一般 早餐 (average breakfast) : 21	陈旧 (obsolete) : 75 陈旧 设施 (obsolete facilities) : 42 陈旧 设备 (obsolete equipment) : 7 陈旧 装修 (old decoration) : 3 陈旧 酒店 (outdated hotel) : 2	老 (old) : 55 老 酒店 (old hotel) : 9 老 设施 (old facility) : 8 老 店 (old shop) : 3 老 房间 (old room) : 3
7: 30,000 to 50,000 yen	一般 (general) : 311 一般 设施 (general facilities) : 23 一般 服务 (general service) : 22 一般 早餐 (average breakfast) : 19 一般 酒店 (average hotel) : 15	陈旧 (obsolete) : 71 陈旧 设施 (obsolete facilities) : 43 陈旧 设备 (obsolete equipment) : 5 陈旧 房间 (outdated room) : 3	老 (old) : 45 老 酒店 (old hotel) : 11 老 设施 (old facility) : 7 老 店 (old shop) : 3 老 房间 (old room) : 2
8: 50,000 to 100,000	一般 (general) : 510 一般 服务 (general service) : 39 一般 设施 (general facilities) : 32 一般 早餐 (average breakfast) : 30 一般 酒店 (average hotel) : 25	陈旧 (obsolete) : 90 陈旧 设施 (obsolete facilities) : 53 陈旧 房间 (outdated room) : 5 陈旧 感觉 (Stale feeling) : 2	老 (old) : 134 老 酒店 (old hotel) : 34 老 设施 (old facility) : 26 老 装修 (old decoration) : 9 老 店 (old shop) : 7
9: 100,000 to 200,000	一般 (general) : 51 一般 服务 (general service) : 7 一般 早餐 (average breakfast) : 5 一般 位置 (general location) : 2 一般 房间 (average room) : 2	陈旧 (obsolete) : 6 陈旧 设施 (obsolete facilities) : 4	老 (old) : 5 老 设施 (old facility) : 2

Table 12: Top 4 words related to the mainly used adjectives in positive English texts.

Price range	good	clean	comfortable	helpful	free	large	firendly	great
0: All Prices	good : 19148	clean : 9064	comfortable : 5625	helpful : 5846	free : 4318	large : 4104	friendly : 5606	great : 16127
	good location : 1985	clean room : 3596	comfortable bed : 1919	helpful staff : 2927	free wifi : 773	large room : 1256	friendly staff : 3819	great location : 2313
	good service : 1042	clean hotel : 969	comfortable room : 1098	helpful concierge : 304	free shuttle : 286	large hotel : 268	friendly service : 169	great view : 1099
	good breakfast : 942	clean bathroom : 282	comfortable stay : 272	helpful desk : 110	free drink : 234	large bathroom : 202	friendly hotel : 73	great service : 841
	good hotel : 874	clean everything : 200	comfortable hotel : 238	helpful service : 74	free bus : 225	larger room : 192	friendly person : 63	great hotel : 802
3: 5000 to 10,000 yen	good : 206	clean : 174	comfortable : 79	helpful : 70	free : 35	large : 31	friendly : 64	great : 143
	good location : 30	clean room : 55	comfortable bed : 21	helpful staff : 36	free wifi : 10	large room : 7	friendly staff : 53	great location : 21
	good value : 19	clean bathroom : 14	comfortable room : 9		free tea : 4	large area : 2	friendly everyone : 2	great view : 14
	good english : 10	clean place : 12	comfortable futon : 8		free raman : 2	large size : 2	friendly service : 2	great place : 13
	good place : 7	clean hotel : 6	comfortable stay : 3		free toothbrush : 2			great experience : 5
4: 10,000 to 15,000 yen	good : 1399	clean : 656	comfortable : 391	helpful : 393	free : 271	large : 250	friendly : 400	great : 961
	good location : 159	clean room : 247	comfortable bed : 123	helpful staff : 206	free wifi : 53	large room : 84	friendly staff : 292	great location : 158
	good breakfast : 87	clean hotel : 74	comfortable room : 90	helpful concierge : 20	free breakfast : 15	large bathroom : 20	friendly service : 15	great service : 51
	good hotel : 71	clean bathroom : 20	comfortable hotel : 26	helpful desk : 10	free service : 12	larger room : 12	friendly hotel : 7	great hotel : 43
	good service : 67	clean everything : 14	comfortable stay : 20	helpful service : 4	free drink : 11	large hotel : 10	friendly person : 6	great place : 35
5: 15,000 to 20,000 yen	good : 2242	clean : 1204	comfortable : 621	helpful : 552	free : 581	large : 349	friendly : 615	great : 1414
	good location : 242	clean room : 440	comfortable bed : 219	helpful staff : 301	free wifi : 109	large room : 85	friendly staff : 444	great location : 199
	good hotel : 116	clean hotel : 133	comfortable room : 99	helpful desk : 11	free shuttle : 35	large suitcase : 18	friendly hotel : 12	great view : 81
	good breakfast : 113	clean bathroom : 38	comfortable stay : 30	helpful concierge : 9	free bus : 30	larger room : 18	friendly service : 8	great hotel : 68
	good service : 108	clean everything : 26	comfortable hotel : 20	helpful reception : 5	free breakfast : 27	large hotel : 17	friendly most : 7	great place : 61
6: 20,000 to 30,000 yen	good : 6550	clean : 3364	comfortable : 1941	helpful : 1970	free : 1186	large : 1257	friendly : 1915	great : 5074
	good location : 703	clean room : 1379	comfortable bed : 658	helpful staff : 1019	free wifi : 269	large room : 329	friendly staff : 1311	great location : 881
	good service : 331	clean hotel : 379	comfortable room : 359	helpful concierge : 79	free breakfast : 68	large hotel : 87	friendly service : 51	great service : 249
	good english : 304	clean bathroom : 95	comfortable stay : 100	helpful desk : 42	free coffee : 57	larger room : 81	friendly person : 21	great hotel : 232
	good breakfast : 303	clean everything : 77	comfortable hotel : 82	helpful receptionist : 17	free drink : 38	large bed : 43	friendly hotel : 19	great view : 220
7: 30,000 to 50,000 yen	good : 3407	clean : 1750	comfortable : 1000	helpful : 1147	free : 933	large : 580	friendly : 1001	great : 2620
	good location : 380	clean room : 725	comfortable bed : 345	helpful staff : 607	free drink : 145	large room : 174	friendly staff : 715	great location : 393
	good breakfast : 191	clean hotel : 197	comfortable room : 193	helpful concierge : 53	free wifi : 129	larger room : 32	friendly service : 24	great view : 162
	good service : 182	clean bathroom : 61	comfortable hotel : 49	helpful service : 20	free coffee : 45	large hotel : 30	friendly hotel : 13	great hotel : 134
	good english : 155	clean everything : 36	comfortable stay : 47	helpful desk : 17	free bus : 38	large bed : 28	friendly person : 13	great service : 114
8: 50,000 to 100,000 yen	good : 4350	clean : 1655	comfortable : 1246	helpful : 1313	free : 1072	large : 1233	friendly : 1238	great : 4425
	good location : 406	clean room : 648	comfortable bed : 425	helpful staff : 589	free shuttle : 181	large room : 442	friendly staff : 810	great location : 506
	good service : 296	clean hotel : 156	comfortable room : 266	helpful concierge : 108	free wifi : 172	large hotel : 109	friendly service : 51	great view : 436
	good hotel : 196	clean bathroom : 48	comfortable stay : 56	helpful service : 28	free bus : 127	large bathroom : 58	friendly hotel : 20	great service : 267
	good breakfast : 191	cleanliness : 40	comfortable hotel : 51	helpful desk : 26	free service : 65	larger room : 38	friendly person : 12	great hotel : 241
9: 100,000 to 200,000 yen	good : 994	clean : 261	comfortable : 347	helpful : 401	free : 240	large : 404	friendly : 370	great : 1488
	good location : 65	clean room : 102	comfortable bed : 128	helpful staff : 169	free wifi : 31	large room : 135	friendly staff : 194	great location : 155
	good service : 56	clean hotel : 24	comfortable room : 82	helpful concierge : 35	free breakfast : 19	large bathroom : 38	friendly service : 18	great view : 155
	good breakfast : 53	cleanliness : 8	comfortable stay : 16	helpful everyone : 7	free drink : 16	large hotel : 15	friendly everyone : 7	great service : 101
	good hotel : 40	clean place : 7	comfortable hotel : 10	helpful team : 5	free bus : 14	large bed : 12	friendly person : 4	great hotel : 80

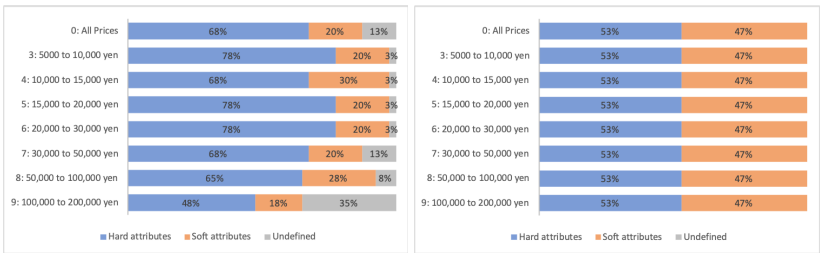
Table 13: Top 4 words related to the mainly used adjectives in negative English texts.

Price range	poor	dated	worst	dirty	uncomfortable
0: All Prices	poor : 460 poor service : 55 poor breakfast : 41 poor quality : 27 poor english : 24	dated : 431 outdated : 128 outdated room : 20 outdated hotel : 10 outdated bathroom : 7	worst : 327 worst hotel : 43 worst experience : 18 worst part : 15 worst service : 10	dirty : 188 dirty carpet : 34 dirty room : 23 not dirty : 7 dirty bathroom : 6	uncomfortable : 253 uncomfortable bed : 63 uncomfortable pillow : 20 uncomfortable mattress : 8 uncomfortable night : 8
3: 5000 to 10,000 yen	poor : 3		worst : 6 worst room : 2	dirty : 3	uncomfortable : 2
4: 10,000 to 15,000 yen	poor : 29 poor breakfast : 3 poor service : 3 poor conditioning : 2 poor view : 2	dated : 40 outdated : 11 outdated decor : 2 outdated room : 2	worst : 24 worst hotel : 4 worst experience : 2	dirty : 11 dirty floor : 2	uncomfortable : 23 uncomfortable bed : 4 not uncomfortable : 2 uncomfortable night : 2 uncomfortable pillow : 2
5: 15,000 to 20,000 yen	poor : 57 poor service : 10 poor breakfast : 6 poor hotel : 5 poor experience : 3	dated : 41 outdated : 8	worst : 36 worst hotel : 8 worst experience : 3 worst part : 2 worst service : 2	dirty : 14 dirty room : 2	uncomfortable : 26 uncomfortable bed : 7 uncomfortable pillow : 2
6: 20,000 to 30,000 yen	poor : 136 poor breakfast : 15 poor service : 14 poor english : 9 poor quality : 9	dated : 131 outdated : 31 outdated room : 6 outdated hotel : 2	worst : 86 worst hotel : 11 worst part : 7 worst breakfast : 5 worst experience : 5	dirty : 67 dirty room : 10 dirty carpet : 8 dirty bathroom : 3 dirty chair : 2	uncomfortable : 103 uncomfortable bed : 24 uncomfortable pillow : 11 uncomfortable night : 4 uncomfortable experience : 3
7: 30,000 to 50,000 yen	poor : 92 poor service : 8 poor breakfast : 7 poor english : 7 poor connection : 5	dated : 65 outdated : 17 outdated hotel : 4 outdated bathroom : 2 outdated decor : 2	worst : 64 worst hotel : 10 worst room : 3 worst service : 3 worst part : 2	dirty : 51 dirty carpet : 11 dirty room : 7 dirty clothe : 2 dirty luggage : 2	uncomfortable : 55 uncomfortable bed : 20 uncomfortable mattress : 6 uncomfortable pillow : 5 uncomfortable room : 5
8: 50,000 to 100,000 yen	poor : 124 poor service : 16 poor breakfast : 9 poor quality : 9 poor english : 6	dated : 150 outdated : 58 outdated room : 9 outdated furniture : 6 outdated hotel : 4	worst : 98 worst hotel : 9 worst experience : 5 worst part : 3	dirty : 36 dirty carpet : 12 dirty room : 3 dirty cup : 2 dirty rug : 2	uncomfortable : 33 uncomfortable bed : 7
9: 100,000 to 200,000 yen	poor : 19 poor service : 4 poor choice : 2 poor experience : 2	dated : 3 outdated : 2	worst : 12 worst experience : 2	dirty : 6	uncomfortable : 8 little uncomfortable : 2

5.3 Determining hard and soft attribute usage

To further understand the differences in satisfaction and dissatisfaction in Chinese and Western customers of Japanese hotels, we classified these factors as either hard or soft attributes of a hotel. We define hard attributes as matters regarding the hotel's physical or environmental aspects, such as facilities, location, or infrastructure. Some of these aspects would be impractical for the hotel to change, such as its surroundings and location. Others can be expensive to change, such as matters requiring construction costs, which are possible but would require significant infrastructure investment. On the other hand, soft attributes are the non-physical attributes of the hotel service and staff behavior that are practical to change through management. For example, the hotel's services or the cleanliness of the rooms are soft attributes. For our purposes, amenities, clean or good quality bed sheets or curtains, and other physical attributes that are part of the service and not the hotel's physical structure are considered soft attributes. Thus, we can observe the top 10 satisfaction and dissatisfaction keywords and determine whether they are soft or hard attributes.

We manually labeled each language's top keywords into either hard or soft by considering how the word would be used when writing a review. If the word described unchangeable physical factors by the staff or management, we consider them hard. If the word implied an issue that could be solved or managed by the hotel staff or management, we consider it soft. For adjectives, we looked at the top four adjective and noun pairings used in the entire dataset and counted the usage percentage in each context. If it was not clear from the word or the pairing alone, we declared it undefined. Then, we added the counts of these words in each category. A single word with no pairing is always deemed 100% in the category it corresponds to. We add the partial percentages for each category when an adjective includes various contexts. The interpretation of these keywords is shown in the Tables 14 and 15. We can see the summarized results for the hard and soft percentages of positive and negative Chinese keywords in Figure 5. For the English keywords, see Figure 6.

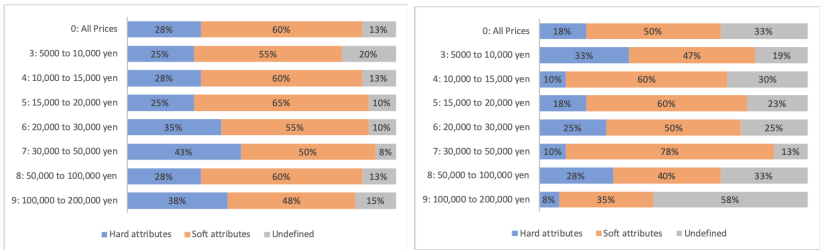


(a) Positive keywords (b) Negative keywords

Fig. 5: Hard and soft attributes from the top Chinese keywords for all price ranges

Table 14: Determination of hard and soft attributes for Chinese keywords.

Keyword Emotion	Keyword	Attribute Category
Positive Keywords	不错	50% hard, 25% soft, 25% undefined
	大	100% hard
	干净	25% hard, 75% soft
	早餐	100% soft
	交通	100% hard
	棒	25% hard, 50% soft, 25% undefined
	近	100% hard
	购物	100% hard
	环境	100% hard
	地铁	100% hard
	卫生	100% soft
	新	50% hard, 25% soft, 25% undefined
	推荐	100% undefined
	选择	100% undefined
	地铁站	100% hard
	远	100% hard
	附近	100% hard
	周边	100% hard
	赞	100% undefined
Negative Keywords	价格	100% soft
	一般	50% hard, 50% soft
	中文	100% soft
	距离	100% hard
	地理	100% hard
	陈旧	100% hard
	老	75% hard, 25% soft
	华人	100% soft



(a) Positive keywords (b) Negative keywords

Fig. 6: Hard and soft attributes from the top English keywords for all price ranges

6 Results

6.1 Experimental results and answers to research questions

Our research questions were related to two issues. Based on research questions 1a and 1b, the objective of this study was to determine the differences in how Chinese and Western tourists perceive Japanese hotels, whose hospitality and service are influenced by the *omotenashi* culture.

Table 15: Determination of hard and soft attributes for English keywords.

Keyword Emotion	Keyword	Attribute Category
Positive Keywords	good	25% hard, 50% soft, 25% undefined
	great	50% hard, 25% soft, 25% undefined
	staff	100% soft
	clean	100% soft
	location	100% hard
	nice	50% hard, 25% soft, 25% undefined
	excellent	25% hard, 50% soft, 25% undefined
	helpful	100% soft
	comfortable	25% hard, 50% soft, 25% undefined
	shopping	100% hard
	beautiful	25% hard, 75% soft
	friendly	100% soft
	train	100% hard
	large	100% hard
	free	100% soft
	subway	100% hard
	recommend	100% undefined
	wonderful	50% soft, 50% undefined
Negative Keywords	pricey	100% soft
	worst	25% hard, 50% soft, 25% undefined
	dated	75% hard, 25% undefined
	poor	100% soft
	walkway	100% hard
	sense	100% undefined
	unable	100% soft
	disappointing	50% soft, 50% undefined
	minor	100% undefined
	worse	100% undefined
	annoying	75% hard, 25% undefined
	lighting	100% soft
	uncomfortable	100% soft
	carpet	100% soft
	dirty	75% soft, 25% undefined
	cigarette	100% soft
	funny smell	100% soft
	rude	100% soft
	smallest	75% hard, 25% undefined
	mixed	100% undefined
	renovation	100% hard
	paper	100% undefined
	disappointment	100% undefined
	outdated	75% hard, 25% undefined

Observing the top-ranking positive keywords in Chinese reviews, as shown in Tables 8 and Table 10, it was revealed that, while service, cleanliness, and breakfast were praised in most hotels, the location was more important when observing the pairings. Hard attributes were abundant lower on the lists. The negative keywords in Table 9 indicate that a lack of a Chinese-friendly environment was perceived, although there were more complaints about hard attributes such as the building's age and the distance from other convenient spots. However, most complaints were about the hotel's price, which included all of the price ranges; therefore, the price was the primary concern for Chinese customers with different travel purposes.

On the other hand, the word "staff" is the second or third in the lists of satisfaction factors in English-written reviews in all the price ranges. This word is followed by a few other keywords lower in the top 10 list, such as "helpful" or "friendly". When we look at the pairings of the top-ranked keyword "good" in Table 12, we find that customers mostly praise the location, service, breakfast, or English availability. When we look at the negative keyword "poor" and its

pairings in Table 13, we see that it is also service-related concepts that the Western tourists are disappointed with.

We can also observe some keywords that are not considered by their counterparts. For example, English-speaking customers mentioned tobacco smell in many reviews. However, it was not statistically identified as a problem for their Chinese counterparts. On the other hand, although they appear in both English and Chinese lists, references to "购物 (shopping)" are more common in the Chinese lists across hotels of 15,000 yen to 200,000 yen per night. Meanwhile, the term "shopping" appeared solely in the top 10 positive keywords list for English speakers who stayed in rooms priced 20,000–30,000 yen per night.

With these results, we can observe that both Chinese and English-speaking tourists in Japan have different priorities. However, both populations consider the hotel's location and transport availability (subways and trains) nearby as secondary but still essential points in their satisfaction with a hotel. The Chinese customers are primarily satisfied with the room quality in spaciousness and cleanliness and the service of breakfast.

For research questions 2a and 2b, we considered how customers of both cultural backgrounds evaluated the hard and soft attributes of hotels. Our study discovered that Chinese tourists mostly positively react to the hotel's hard attributes, albeit the negative evaluations are more uniform than the positive evaluations, with a tendency of 53 % towards hard attributes. On the other hand, English-speaking tourists were more responsive to soft attributes, either positively or negatively. In the case of negative keywords, they were more concerned about the hotel's soft attributes.

One factor that both populations had in common is that, when perceiving the hotel negatively, the "老 (old)," "dated," "outdated," or "陈旧 (obsolete)" aspects of the room or the hotel were surprisingly criticized across most price ranges. However, this is a hard attribute and is unlikely to change for most hotels.

6.2 Chinese tourists: A big and clean space

We found that mainland Chinese tourists were mainly satisfied by big and clean spaces in Japanese hotels. The adjectival pairings extracted with dependency parsing and POS tagging (Table 10) imply big and clean rooms. Other mentions included big markets nearby or a big bed. Across different price ranges, the usage of the word "大 (big)" increased with the increasing price of the hotel. When inspecting closer by taking random samples of the pairs of "大 空间 (big space)" or "大 面积 (large area)," we notice that there were also many references to the public bathing facilities in the hotel. Such references were also implied by a word pairing "棒 温泉 (great hot spring)."

In Japan, there are the so-called "銭湯 (*sentō*)," which are artificially constructed public bathing facilities, including saunas and baths with unique qualities. On the other hand, there are natural hot springs, called "温泉 (*onsen*)."

However, they are interchangeable if natural hot spring water is used in artificially made tiled bath facilities. It is a Japanese custom that all customers first clean themselves in a shower and afterward use the baths nude. It could be a cultural shock for many tourists but a fundamental attraction for many others.

Chinese customers are satisfied with the size of the room or bed; however, it is not trivial to change this. In contrast, cleanliness is mostly related to soft attributes when we observe its adjectival pairings. We can observe pairs such as "干净 房间 (clean room)" at the top rank of all price ranges and thereupon "干净 酒店 (clean hotel)," "干净 总体 (clean overall)," "干净 环境 (clean environment)," and "干净 设施 (clean facilities)," among other examples. In negative reviews, there was a mention of criticizing the "一般 卫生 (general hygiene)" of the hotel, although it was an uncommon pair. Therefore, we can assert that cleanliness was an important soft attribute for Chinese customers, and they were mostly pleased when their expectations were fulfilled.

A key soft satisfaction factor was the inclusion of breakfast within the hotel. While other food-related words were extracted, most of them were general, such as "food" or "eating," and were lower-ranking. In contrast, the word "早餐 (breakfast)," referring to the hotel commodities, was frequently used in positive texts compared to other food-related words across all price ranges, albeit at different priorities in each of them. For this reason, we regard it as an important factor. From the word pairs of the positive Chinese keywords in Table 10, we can also note that "不错 (not bad)" is paired with "不错 早餐 (nice breakfast)" in four of the seven price ranges with reviews available as part of the top four pairings. It is only slightly lower in other categories, although it is not depicted in the table. Thus, we consider that a recommended strategy for hotel management is to invest in the inclusion or improvement of hotel breakfast to increase good reviews.

6.3 Western tourists: A friendly face and absolutely clean

From the satisfaction factors of English-speaking tourists, we observed at least three words were related to staff friendliness and services in the general database: "staff," "helpful," and "friendliness." The word "staff" is the highest-ranked of these three, ranking second for satisfied customers across most price ranges and only third in one of them. The word "good" mainly refers to the location, service, breakfast, or English availability in Table 12. Similar to Chinese customers, Western customers also seemed to enjoy the included breakfasts regarding their satisfaction keyword pairings. However, the relevant word does not appear in the top 10 list directly, in contrast to their Chinese counterparts. The words "helpful" and "friendly" are mostly paired with "staff," "concierge," "desk," and "service." By considering the negative keyword "poor" and its pairings in Table 13, we realized once again that Western tourists were disappointed with service-related concepts and reacted negatively.

Another soft attribute that is high on the list for most of the price ranges is the word "clean", so we examined its word pairings. Customers largely praised "clean rooms" and "clean bathrooms" and also referred to the hotel in general. When observing the negative keyword frequencies for English speakers, we can find words such as "dirty" and "carpet" as well as word pairings such as "dirty carpet," "dirty room," and "dirty bathroom." Along with complaints about off-putting smells, we could conclude that Western tourists had high expectations about cleanliness when traveling in Japan.

An interesting detail of the keyword ranking is that the word "comfortable" was high on the satisfaction factors, and "uncomfortable" was high on the dissatisfaction factors. The words were paired with nouns such as "bed," "room," "pillow," and "mattress," when they generally referred to their sleep conditions in the hotel. It seems that Western tourists were particularly sensitive about the hotels' comfort levels and whether they reached their expectations. The ranking for the negative keyword "uncomfortable" is similar across most price ranges except the two most expensive ones, where this keyword disappears from the top 10 list.

Albeit lower in priority, the price range of 15,000 to 20,000 yen hotels also includes "free" as one of the top 10 positive keywords, mainly paired with "Wi-Fi." This price range corresponds to business hotels, where users would expect this feature the most.

6.4 Tobacco, an unpleasant smell in the room

A concern for Western tourists was uncleanliness and the smell of cigarettes in their room, which can be regarded as soft attributes. Cigarette smell was an issue even in the middle- and high-class hotels, of which the rooms were priced at more than 30,000 yen per night. For hotels with rooms priced above 50,000 yen per night, however, this problem seemed to disappear from the list of top 10 concerns. Tobacco was referenced singularly as "cigarette", but also in word pairs in Table 13 as "funny smell." By manually inspecting a sample of reviews with this keyword, we noticed that the room was often advertised as non-smoking; however, the smell permeated the room and curtains. Another common complaint was that there were no nonsmoking facilities available. The smell of smoke can completely ruin some customers' stay, leading to bad reviews, thereby lowering the number of future customers.

In contrast, Chinese customers seemed not to be bothered by this. Previous research has stated that 49–60 % of Chinese men (and 2.0–2.8 % of women) currently smoke or smoked in the past. This was derived from a sample of 170,000 Chinese adults in 2013–2014, which is high compared to many English-speaking countries (Zhang et al. 2019; World Health Organization 2015).

Japan has a polarized view on the topic of smoking. Although it has one of the world's largest tobacco markets, tobacco use has decreased in recent years. Smoking in public spaces is prohibited in some wards of Tokyo (namely Chiyoda, Shinjuku, and Shibuya). However, it is generally only suggested and

not mandatory to lift smoking restrictions in restaurants, bars, hotels, and public areas. Many places have designated smoking rooms to keep the smoke in an enclosed area and avoid bothering others.

Nevertheless, businesses, especially those who cater to certain customers, are generally discouraged by smoking restrictions if they want to maintain their clientele. To cater to all kinds of customers, including Western and Asian, Japanese hotels must provide spaces without tobacco smell. Even if the smoke does not bother a few customers, the lack of such a smell will make it an appropriate space for all customers.

6.5 Location, location, location

The hotel's location, closeness to the subway and public transportation, and availability of nearby shops proved to be of importance to both Chinese and English-speaking tourists. In positive word pairings in Tables 10 and 12, we can find pairs such as "不错 位置 (nice location)," "近 地铁站 (near subway station)," "近 地铁 (near subway)" in Chinese texts and "good location," "great location," and "great view" as well as single keywords "location" and "shopping" for English speakers, and "交通 (traffic)," "购物 (shopping)," "地铁 (subway)," and "环境 (environment or surroundings)" for Chinese speakers. All of these keywords and their location in each population's priorities across the price ranges signify that the hotel's location was a secondary but still important point for their satisfaction. However, since this is a hard attribute, it is not often considered in the literature. By examining examples from the data, we recognized that most customers were satisfied if the hotel was near at least two of the following facilities: subway, train, and convenience stores.

Japan is a country with a peculiar public transportation system. During rush hour, the subway is crowded with commuters, and trains and subway stations create a confusing public transportation map for a visitor in Tokyo. Buses are also available, albeit less used than rail systems in metropolitan cities. These three means of transportation are usually affordable in price. There are more expensive means, such as the bullet train *shinkansen* for traveling across the country and taxis. The latter is a luxury in Japan compared to other countries. In Japan, taxis provide a high-quality experience with a matching price. Therefore, for people under a budget, subway availability and maps or GPS applications, as well as a plan to travel the city, are of utmost necessity for tourists, using taxis only as a last resort.

Japanese convenience stores are also famous worldwide because they offer a wide range of services and products, from drinks and snacks to full meals, copy and scanning machines, alcohol, cleaning supplies, personal hygiene items, underwear, towels, and international ATMs. If some trouble occurs, or a traveler forgot to pack a particular item, it is most certain that they can find it.

Therefore, considering that both transportation systems and nearby shops are points of interest for Chinese and Western tourists, and perhaps offering

guide maps and information about these as an appeal point could result in greater satisfaction.

7 Discussion

7.1 Western and Chinese tourists in the Japanese hospitality environment

To date, scholars have been correcting our historical bias towards the West. Studies have determined that different cultural backgrounds lead to different expectations, which influence tourists' satisfaction. In other words, tourists of a particular culture have different leading satisfaction factors across different destinations. However, Japan presents a particular environment; the spirit of hospitality and service, *omotenashi*, which is considered to be of the highest standard across the world. Our study explores whether such an environment can affect different cultures equally or whether it is attractive only to certain cultures.

Our results indicate that Western tourists are more satisfied with soft attributes than Chinese tourists. As explained earlier in this paper, Japan is well known for its customer service. Respectful language and bowing are not exclusive to high-priced hotels or businesses; these are met in convenience stores as well. Even in the cheapest convenience store, the level of hospitality is starkly different from Western culture and perhaps unexpected. In higher-priced hotels, the adjectives used to praise the service ranged from normal descriptors like "good" to higher levels of praise like "wonderful staff," "wonderful experience," "excellent service," and "excellent staff." Furthermore, Kozak (2002) and Shanka and Taylor (2004) have also proven that hospitality and staff friendliness are two determinants of Western tourists' satisfaction.

However, the negative English keywords indicate that a large part of the dissatisfaction with Japanese hotels stemmed from a lack of hygiene and room cleanliness. Although Chinese customers had solely positive keywords about cleanliness, English-speaking customers deemed many places unacceptable to their standards, particularly hotels with rooms priced below 50,000 yen per night. The most common complaint regarding cleanliness was about the carpet, followed by complaints about cigarette smell and lack of general hygiene. Kozak (2002) also proved that hygiene and cleanliness were essential satisfaction determinants for Western tourists. However, in the previous literature, this was linked merely to satisfaction. In contrast, our research revealed that words related to cleanliness were mostly linked to dissatisfaction. We could assert that Westerners had a high standard of room cleanliness compared to their Chinese counterparts.

According to previous research, Western tourists are already inclined to appreciate hospitality for their satisfaction. When presented with Japanese hospitality, this expectation is met and overcome. In contrast, according to our results, Chinese tourists were more concerned about room quality rather than hospitality, staff, or service. However, when analyzing the word pairs for

"不错 (not bad)" and "棒 (great)," we can see that they praise staff, service, and breakfast. By observing the percentage of hard to soft attributes in Figure 5, however, we discover that Chinese customers were more satisfied with hard attributes compared to Western tourists, who seemed to be meeting more than their expectations.

It could be considered that Chinese culture does not expect high-level service initially. When an expectation that is not held is met, the satisfaction derived is less than that if it was expected. In contrast, some tourists report a "nice surprise": when an unknown need is unexpectedly met, there is more satisfaction. It is necessary to note the difference between these two reactions. The "nice surprise" reaction fulfills a need unexpectedly. Perhaps the hospitality grade in Japan does not fulfill a need high enough for the Chinese population, thereby resulting in less satisfaction. For greater satisfaction, a need must be met. However, the word "not bad" is at the top of the list in most price ranges, and one of the uses is related to service. Thus, we cannot conclude that they were not satisfied with the service. Instead, they held other factors at a higher priority; thus, the keyword frequency was higher for other pairings.

Another possibility occurs when we observe the Chinese tourists' dissatisfaction factors. Chinese tourists may have expectations about their treatment that are not being met, even in this high-standard hospitality environment. This could be because Japan is monolingual and has a relatively large language barrier to tourists (Heinrich 2012; Coulmas and Watanabe 2002). While the Japanese effort to accommodate English speakers is slowly developing, efforts for Chinese accommodations can be lagging. Chinese language pamphlets and Chinese texts on instructions for the hotel room and its appliances and features (e.g., T.V. channels, Wi-Fi setup, etc.), or the treatment towards Chinese people, could be examples of these accommodations. Ryan and Mo (2001) also found that communication difficulty was one of the main reasons Chinese customers would state for not visiting again. However, this issue is not exclusive to Japan.

Our initial question was whether the environment of high-grade hospitality would affect both cultures equally. This study attempted to determine the answer. It is possible that Chinese customers had high-grade hospitality and were equally satisfied with Westerners. In that case, it appears that the difference in perception stems from a psychological source; expectation leads to satisfaction and a lack of expectation results in lesser satisfaction. There is also a possibility that Chinese customers are not receiving the highest grade of hospitality because of cultural friction between Japan and China.

It is unclear which of these two is most likely from our results. However, competing in hospitality and service includes language services, especially in the international tourism industry. Better multilingual support can only improve the hospitality standard in Japan. Considering that most of the tourists in Japan come from other countries in Asia, multilingual support is beneficial. Proposals for this endeavor include hiring Chinese-speaking staff, preparing

pamphlets in Chinese, or having a translator application readily available with staff trained in interacting through an electronic translator.

7.2 Hard vs. soft satisfaction factors

As stated in section 3.2, previous research has mostly focused on the hotel's soft attributes and their influence on customer satisfaction (e.g., Shanka and Taylor 2004; Choi and Chu 2001). Examples of soft attributes include staff behavior, commodities, amenities, and appliances that can be improved within the hotel. However, hard attributes are not usually analyzed in satisfaction studies. It is important to consider both kinds of attributes. If the satisfaction was based on soft attributes, a hotel can improve its services to attract more customers in the future. Otherwise, if the satisfaction was related more to hard attributes overall, hotels should be built considering the location while minimizing other costs. Because the satisfaction factors were decided statistically in our study via customers' online reviews, we can see the importance of the hard or soft attributes in their priorities.

Figure 5 shows that, in regards to Chinese customer satisfaction, in general, 68 % of the top 10 keywords are hard factors; in contrast, only 20 % are soft factors. The rates are similar for most price ranges except the highest-priced hotels. However, two of these soft attributes are all concentrated at the top of the list ("不错 (not bad)," "干净 (clean)"), and the adjective pairs related to soft attributes of "不错 (not bad)" are also at the top in most price ranges. Chinese tourists may expect spaciousness and cleanliness when coming to Japan. The expectation may be due to reputation, previous experiences, or cultural backgrounds. We can compare these results with previous literature, where traveling Chinese tourists choose their destination based on several factors, including cleanliness, nature, architecture, and scenery (Ryan and Mo 2001). These factors found in previous literature could be linked to the keyword "环境 (environment or surroundings)" as well. This keyword was found for hotels priced at more than 20,000 yen per night.

In contrast, English speakers are mostly satisfied with the hotels' soft attributes. Figure 6 shows that soft attributes are above 48 % in all price ranges, the highest being 65 % in the price range of 15,000 to 20,000 yen per night, which corresponds to, for example, affordable business hotels. The exception to this is the hard attribute that is the hotels' location, which is consistently around the middle of the top 10 lists for all price ranges.

For both customer groups, the main reason for dissatisfaction was pricing, which can be interpreted as a concern about value for money. However, English-speaking customers complained less about the price in lower-priced hotels. In contrast, Chinese customers consistently had "价格 (price)" as the first or second-most concern across all price ranges. A study on Chinese tourists found that they had this concern (Truong and King 2009). However, our results indicate that this has more to do with the pricing of hotels in Japan than with Chinese culture. In general, Japan is an expensive place to visit, thereby

impacting this placement in the ranking. Space is scarce in Japan, and capsule hotels with cramped spaces of 2 x 1 meters cost around 3000 to 6000 yen per night. Bigger business hotel rooms are relatively expensive, ranging from 5000 to 12,000 yen per night. For comparison, hotels in the USA with a similar quality can charge half the price.

Around half of the dissatisfaction factors for both Chinese and Western customers are caused by issues that could be improved; this is true for all price ranges. The improvements could be staff training (perhaps in language), hiring professional cleaning services for rooms with cigarette smoke smells, or improving the bedding; however, these considerations can be costly. However, once the hotel's location and construction are set, only a few changes can be made to satisfy Chinese customers further. As mentioned previously, Chinese language availability is a soft attribute that can be improved with staff and training investment.

Western tourists are mainly dissatisfied with soft attributes. This is revealed by a low satisfaction level of 35 % in the highest price range where undefined factors are the majority and a maximum of 78 % in the price range of 30,000 to 50,000 yen per night in a hotel. Improvement scope for Western tourists is more extensive than that for their Chinese counterparts. As such, it presents a larger investment opportunity.

7.3 Satisfaction across different price ranges

In previous sections of this paper, we mentioned the differences reflected in hotel price ranges. The most visible change across differently priced hotels is the change in voice when describing satisfaction. We noticed this by observing the adjective-noun pairs and finding pairs with different adjectives for the same nouns. For example, in English, words describing nouns such as "location" or "hotel" are "good" or "nice" in lower-priced hotels. In contrast, the adjectives that pair with the same nouns for higher-priced hotels are "wonderful" and "excellent." In Chinese, the change ranges from "不错 (not bad)" to "棒 (great)" or "赞 (awesome)." We can infer that the level of satisfaction is high and influences how customers write their reviews. Regarding the negative keywords, however, the change ranges from "annoying" or "disappointing" to "worst."

In this paper, we follow the definition of satisfaction by Hunt (1975), where meeting or exceeding expectations produces satisfaction. Conversely, the failure of meeting expectations causes dissatisfaction. We can assume that a customer that pays more for a higher-class experience has higher expectations. For example, in a highly-priced hotel, any lack of cleanliness can lead to disappointment. In the case of English-speaking customers in the 30,000-–50,000 yen per night price range, cigarette smell is particularly disappointing. However, we consistently see customers with high expectations for high-class hotels reacting even more positively when satisfied. In the positive case, expectations appear to be exceeded in most cases, judging from their reactions.

We argue that these are two different kinds of expectations: logical and emotional. In the first case, customers are determined that the service must not fall below a specific standard; for example, they can be disappointed with unhygienic rooms or cigarette smell. In contrast, in the second case, customers have a vague idea of having a positive experience but do not measure it against any standard. For example, they expect a pleasant customer service experience or a hospitable treatment by the staff at a high-class hotel. Regardless of their knowledge in advance, positive emotions offer them a perception of exceeded expectations and high satisfaction. Thus, hospitality and service enhance the experience of the customers.

There are interesting differences between Chinese and English-speaking tourists in their satisfaction to differently priced hotels. For example, Chinese tourists have "购物 (shopping)" as a top keyword in all the price ranges. In contrast, English-speaking tourists mention it only as a top keyword in the 20,000—30,000 yen price range. It is widely known in Japan that many Chinese tourists visit Japan for shopping. Tsujimoto (2017) analyzed the souvenir purchasing behavior of Chinese tourists in Japan and showed that common products besides food and drink are: electronics, cameras, cosmetics, and medicine, among *souvenir* items representative of the culture or places that they visit Japan Tourism Agency (2014). Furthermore, Chinese tourists' choice to shop in Japan is more related to the quality of the items rather than their relation to the tourist attractions. Our results suggested that Western tourists were engaging more in tourist attractions rather than shopping activities compared to Chinese tourists.

Another interesting difference is that English-speaking tourists start using negative keywords about the hotel's price only if it concerns hotels of 15,000 yen or more; thereafter, the more expensive the hotel, the higher the ranking. In contrast, for Chinese customers, this keyword is the top keyword across all price ranges. Previous research suggests that value for money is a key concern for Chinese and Asian tourists (Choi and Chu 2000, 2001; Truong and King 2009), whereas Western customers are more concerned about hospitality (Kozak 2002).

While some attributes' value changes depending on the hotel's price range, some other attributes remain constant for each culture's customers. For example, appreciation for staff from English-speaking tourists is ranked close to the top satisfaction factor in all the price ranges. Satisfaction for cleanliness by both cultures constantly remains part of the top 10 keywords, except for the most expensive one, where other keywords replace keywords related to satisfaction or cleanliness in the ranking; however, they remain still high on the list. Chinese tourists have a high ranking for the word "早餐 (breakfast)" across all price ranges as well. As discussed in section 6.5, transportation and location are also important for hotels of all classes and prices. While the ranking of attributes might differ between price ranges, hard and soft attribute proportions also appear to be constant within a 13 % margin of error per attribute. This suggests that, from a cultural aspect, the customers have a particular bias to consider some attributes more than others.

7.4 Cross-culture analysis of expectations and satisfaction

The basic premise of this study is that different cultures lead to different expectations and satisfaction factors. This premise also plays a role in the differentiation between the preferences of hard or soft attributes.

In Donthu and Yoo (1998), subjects from 10 different countries were compared with respect to their expectations of service quality and analyzed based on Hofstede's typology of culture (Hofstede 1984). The previous study states that, although culture has no specific index, five dimensions of culture can be used to analyze or categorize a country in comparison to others. These are *power distance*, *uncertainty avoidance*, *individualism—collectivism*, *masculinity–femininity*, and *long-term-–short-term orientation*. In each of these dimensions, at least one element of service expectations was found to be significantly different for countries grouped under contrasting attributes (e.g., individualistic countries vs. collectivist countries, high uncertainty avoidance countries vs. low uncertainty avoidance countries).

However, Hofstede's typology has received criticism from academics, particularly for the fifth dimension that Hofstede proposed, which was later added with the alternative name *Confucian dynamic*. Academics with a Chinese background criticized Hofstede for being misinformed on the philosophical aspects of Confucianism as well as considering a difficult dimension to measure (Fang 2003). Other models, such as the GLOBE model, also consider some of Hofstede's dimensions and replace them with others, making a total of nine dimensions (House et al. 1999). The *masculinity—femininity* dimension, for example, is proposed to be instead of two dimensions: *gender egalitarianism* and *assertiveness*. This addition of dimensions avoids assuming that assertiveness is either masculine or feminine, which stems from outdated gender stereotypes. Such gender stereotypes have also been the subject of critique on Hofstede's model(Jeknić 2014). We agree with these critiques and thus avoid considering such stereotypes in our discussion.

For our purposes of contrasting Western vs. Chinese satisfaction stemming from expectations, these dimensions could explain why Chinese customers are generally satisfied more often with hard factors while Westerners are satisfied or dissatisfied with soft factors.

The backgrounds of collectivism in China and individualism in Western countries have been studied previously (Gao et al. 2017; Kim and Lee 2000). These backgrounds as well as the differences in these cultural dimensions could be the underlying cause for differences in expectations. Regardless of the cause, however, measures in the past have proven that such differences exist (Armstrong et al. 1997).

The cultural background of Chinese tourists emphasizes their surroundings and their place in nature and the environment. Chinese historical backgrounds of Confucianism, Taoism, and Buddhism permeate the thought processes of Chinese populations. However, scholars argue that the changes in generations and their economic and recent history attaches less importance to these concepts in their lives (Gao et al. 2017). Nevertheless, one could argue a Chinese

cultural attribute emphasizes that the environment and the location affect satisfaction rather than the treatment they receive.

A more anthropocentric and individualistic Western culture could correlate more of their expectations and priorities to the treatment in social circumstances rather than the environment. According to Donthu and Yoo (1998), highly individualistic customers, in contrast to collectivist customers, have a higher expectation of empathy and assurance from the provider, which are aspects of service, a soft attribute of a hotel.

Among other dimensions in both models, we can consider uncertainty avoidance. Customers of high uncertainty avoidance carefully plan their travel and thus have higher expectations towards service. In contrast, customers of lower uncertainty avoidance do not take risks in their decisions and thus face less disappointment with different expectations. However, according to Xiumei and Jinying (2011), the difference between China and the USA in uncertainty avoidance is not clear when measuring with the Hofstede typology and the GLOBE typology. While the USA is not representative of Western society, uncertainty avoidance may not cause the difference in hard-soft attribute satisfaction between Chinese and Western cultures. Differences in another factor, power distance, were also noted when using Hofstede's method compared to the GLOBAL method; therefore, power distance was not considered for comparison.

7.5 Implications for hotel managers

Our study reached two important conclusions: one about hospitality and cultural differences and another about managerial decisions towards two different populations. Overall, Chinese tourists did not attach much importance to hospitality and service factors. Instead, they focused on the hard attributes of a hotel. In particular, they were not satisfied with hospitality as much as Western tourists were; otherwise, they felt that basic language and communication needs were not met; thereby, they were not much satisfied. Western tourists were highly satisfied with Japanese hospitality and preferred soft attributes to hard ones.

The other conclusion is that managerial decisions could mostly benefit Western tourists, except for language improvements and breakfast inclusion could satisfy both groups. As mentioned earlier in this paper, Westerners are "long-haul" customers, spending more of their budget on lodging than Asian tourists (Choi and Chu 2000). With bigger returns on managerial improvements, we recommend investing in improving attributes that dissatisfy Western customers, such as cleanliness and removing tobacco smell. In addition, breaking the language barrier is one of the few strategies to satisfy both groups. Recently, Japan has been facing an increase in Chinese students as well as students of Western universities. Hiring students as part-time workers could increase the language services of a hotel.

To satisfy both customer types, hotel managers need to invest in cleanliness, deodorizing, and making hotel rooms tobacco-free. It could also be recommended to invest in breakfast inclusion and multilingual services and staff preparedness to deal with Chinese and English speakers. Western tourists were also observed to have high comfort standards, which could be managerially improved for better reviews. Perhaps it could be suggested to perform surveys of the bedding that is most comfortable for Western tourists. However, not all hotels can invest in all of these factors simultaneously. Our results suggest that satisfying cleanliness needs could satisfy both customer types. We suggest investing in making the facilities tobacco-free. Our results are also divided by price ranges; thereby, a hotel manager could consider which analysis suits their hotel the most. Hard attributes are difficult to change; however, improvements in service can be made to accompany these attributes. For example, transportation guides for foreigners that might not know the area could increase satisfaction.

The managers must consider their business model for implementing the next strategy. One option could be attracting more Chinese customers with their observed low budgeting. Another could be attracting more big-budget Western customers. For example, investing more in cleanliness could improve Western customers looking for high-quality lodging satisfaction, even for an increased price per night. On the other hand, hotels might be deemed costly by Chinese customers wherever such an investment is made.

8 Limitations and Future Work

In this study, we analyzed keywords based on whether they appeared on satisfied reviews or dissatisfied ones. Following that, we attempted to understand these words' context by using a dependency parser and observing the related nouns. However, a limitation is that it analyzed solely the words directly related to each keyword and did not search for further connections. This means that if the words were used in combination with other keywords, we did not trace the effects of multiple contradicting statements. For example, in the sentence "The room is good, but the food is lacking," we extracted "good room" and "lacking food" but did not consider the fact that both occurred in the same sentence.

This study analyzed the differences in customers' expectations at different levels of hospitality and service factors by dividing our data into price ranges. However, in the same price range, for example, the highest one, we can find both a Western-style five-star resort and a high-end Japanese style *ryokan*. Services offered in these hotels are of high quality, albeit very different. Nevertheless, most of our database was focused on the middle range priced hotels, the services of which are comparably less varied.

An essential aspect of this study is that we focused on the satisfaction and dissatisfaction towards the expectations of individual aspects of the hotels. This gave us insight into the factors that hotel managers can consider.

However, each customer's overall satisfaction was not measured since it would require methods that are out of the scope of this paper. Another limitation is that further typology analysis could not be made because of the nature of the data collected (for example, Chinese men and women of different ages or their Westerner counterparts).

In future work, we plan to investigate these topics further. We plan to extend our data to research different trends and regions of Japan, different kinds of hotels, and customers traveling alone or in groups, whether for fun or for work. Another point of interest in this study's future work is to use word clusters with similar meanings instead of single words.

9 Conclusion

In this study, we analyzed the differences in satisfaction and dissatisfaction between Chinese and English-speaking customers of Japanese hotels, particularly in the context of Japanese hospitality, *omotenashi*. We extracted keywords from their online reviews on *Ctrip* and *TripAdvisor* using Shannon's entropy calculations. We used these keywords for sentiment classification via an SVC. We then used dependency parsing and part of speech tagging to extract common pairs of adjectives and nouns as well as single words. We divided these data by sentiment and hotel price range (most expensive room/night).

We found that Western tourists were most satisfied with staff behavior, cleanliness, and other soft attributes. However, Chinese customers had other concerns for their satisfaction; they were more inclined to praise the room, location, and hotel's convenience. We found that the two cultures had different reactions to the hospitality environment and the prices. Thus, we discussed two possible theories on why Chinese tourists responded differently from Westerners in the environment of *omotenashi*. One theory is that, although they were treated well, their experience was deteriorated by language or culture barriers. The second possible theory is that they reacted to hospitality differently since they did not have the same expectations. We theorized that a lack of expectations could result in lessened satisfaction than that to the same service if expected. On the other hand, even when they held high expectations in a high-priced hotel, Japanese hospitality exceeded Western tourists' expectations, judging by their vocabulary for expressing their satisfaction. We considered that Western tourists were more reactive to hospitality and service factors Chinese tourists.

Lastly, we measured the satisfaction and dissatisfaction factors, that is, a hotel's hard and soft attributes. Hard attributes are physical and environmental elements, and as such, are impractical elements to change. In contrast, soft attributes can be changed via management and staff by an improvement in services or amenities. We found that, for satisfaction, Western tourists favored soft attributes in contrast to Chinese tourists, who were more interested in the hard attributes of hotels across all the price ranges consistently. For dissatisfaction, Western tourists were also highly inclined to criticize soft attributes,

such as cleanliness or cigarette smell in rooms. In contrast, Chinese tourists' dissatisfaction derived from both hard and soft attributes evenly.

One approach for hotel managers is to work to satisfy Chinese tourists more, who dedicate a lower percentage of their budget to hotels but are more numerous. They are less satisfied with soft attributes but have an identifiable method for improving satisfaction by lessening language barriers and providing a satisfactory breakfast. Another approach was focused on the cleanliness, comfort, and tobacco-free space expected by Western tourists. "Long-haul" Western tourists, who spend almost half of their budget on hotels with this strategy, were favored. Although Westerners are less in number than Chinese tourists, it could be proven that they have more substantial returns. This is because Chinese customers also favor cleanliness as a satisfaction factor, and both populations could be pleased.

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